Newer Cisco Validated Design Guides Available

This guide is part of an older series of Cisco Validated Designs.

Cisco strives to update and enhance CVD guides on a regular basis. As we develop a new series of CVD guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in CVD guides, you should use guides that belong to the same series.

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Network Analysis Module

TECHNOLOGY DESIGN GUIDE

August 2013

VALIDATED DESIGN

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Preface

Cisco Validated Designs (CVDs) provide the framework for systems design based on common use cases or current engineering system priorities. They incorporate a broad set of technologies, features, and applications to address customer needs. Cisco engineers have comprehensively tested and documented each CVD in order to ensure faster, more reliable, and fully predictable deployment.

CVDs include two guide types that provide tested and validated design and deployment details:

- **Technology design guides** provide deployment details, information about validated products and software, and best practices for specific types of technology.
- **Solution design guides** integrate or reference existing CVDs, but also include product features and functionality across Cisco products and may include information about third-party integration.

Both CVD types provide a tested starting point for Cisco partners or customers to begin designing and deploying systems using their own setup and configuration.

How to Read Commands

Many CVD guides tell you how to use a command-line interface (CLI) to configure network devices. This section describes the conventions used to specify commands that you must enter.

Commands to enter at a CLI appear as follows:

```
configure terminal
```

Commands that specify a value for a variable appear as follows:

```
ntp server 10.10.48.17
```

Commands with variables that you must define appear as follows:

```
class-map [highest class name]
```

Commands at a CLI or script prompt appear as follows:

```
Router# enable
```

Long commands that line wrap are underlined. Enter them as one command:

```
police rate 10000 pps burst 10000 packets conform-action set-discard-class-
transmit 48 exceed-action transmit
```

Noteworthy parts of system output or device configuration files appear highlighted, as follows:

```
interface Vlan64
  ip address 10.5.204.5 255.255.255.0
```

Comments and Questions

If you would like to comment on a guide or ask questions, please use the feedback form.

For the most recent CVD guides, see the following site:

http://www.cisco.com/go/cvd

CVD Navigator

The CVD Navigator helps you determine the applicability of this guide by summarizing its key elements: the use cases, the scope or breadth of the technology covered, the proficiency or experience recommended, and CVDs related to this guide. This section is a quick reference only. For more details, see the Introduction.

Use Cases

This guide addresses the following technology use cases:

- **Analyzing and Troubleshooting Application Performance**—Application performance degradation can be caused by network congestion or an impacted server. Quickly pinpointing the cause will reduce end-user frustration.
- **Configuring Continuous Packet Capture**—Continuous packet capture provides network engineers a proactive approach to troubleshooting. The packet capture can be running in the background and decoded when issues are reported.
- **Analyzing and Troubleshooting Voice**—Voice is a business-critical and time-sensitive application, so being alerted when the Mean Opinion Score drops below a set threshold is critical.
- **Analyzing Pre- and Post- WAN Optimization**—Application performance challenges at remote sites can be improved by implementing WAN optimization. Improving performance benefits end users.

For more information, see the "Use Cases" section in this guide.

Scope

This guide covers the following areas of technology and products:

- Analyzing application response time and voice quality
- Capturing packets for further analysis

For more information, see the "Design Overview" section in this guide.

Proficiency

This guide is for people with the following technical proficiencies—or equivalent experience:

- **CCNA Routing and Switching**—1 to 3 years installing, configuring, and maintaining routed and switched networks

Related CVD Guides

Campus Wired LAN Technology Design Guide

To view the related CVD guides, click the titles or visit the following site: http://www.cisco.com/go/cvd

Technology Use Cases

Businesses rely on enterprise applications to help ensure efficient operations and gain competitive advantage. At the same time, IT is challenged with managing application delivery in an environment that is dynamic and distributed. The number of business applications is growing, application architectures are increasingly complex, application traffic is proliferating, and traffic patterns are difficult to predict.

In addition, driven by security, regulatory, and economic considerations, enterprises are embracing data center consolidation, server and desktop virtualization, and network and application convergence. Because of this confluence of new business demands, comprehensive application and network-visibility is no longer simply nice-to-have but is business critical. This visibility is now essential to achieving increased operational efficiency and to successfully manage the overall end-user experience.

You can use Cisco Prime Network Analysis Module (NAM) to maintain and improve operational efficiency. NAM includes essential features that allow you to analyze and troubleshoot application performance and voice, capture packets continuously, and see pre- and post- WAN optimization.

Use Case: Analyzing and Troubleshooting Application Performance

Application performance degradation can be caused by network congestion or an impacted server. Quickly pinpointing the cause will reduce end-user frustration.

This design guide enables the following network capabilities:

- Identify the application with response time issues
- View long-term response time trending
- Analyze network vs. server congestion
- Configure thresholds for alarms and trigger packet capture
- Capture packets for further analysis

Use Case: Configuring Continuous Packet Capture

Continuous Packet Capture provides the network engineer a proactive approach to troubleshooting. The packet capture can be running in the background and decoded when issues are reported.

This design guide enables the following network capabilities:

- Configuring a continuous packet capture session

Use Case: Analyzing and Troubleshooting Voice

Voice is a business critical and time sensitive application, so being alerted when the Mean Opinion Score drops below a set threshold is critical.

This design guide enables the following network capabilities:

- Enable voice traffic monitoring
- Configure the Mean Opinion Score threshold

Use Case: Analyzing Pre- and Post- WAN Optimization

Application performance challenges at remote sites can be improved by implementing WAN optimization. Improving performance benefits end users.

This design enables the following network capabilities:

- Identify application performance challenges
- Provide baseline application performance
- Gather Cisco Wide Area Application Services (WAAS) Flow Agent data for analysis
- Analyze pre- and post- WAN optimization

Design Overview

Cisco Prime Network Analysis Module (NAM), part of the overall Cisco Prime solution, is a product that:

- Provides advanced network instrumentation on the user-services layer in order to support data, voice, and video services.
- Allows network administrators, managers, and engineers to gain visibility into the user-services layer with a simple workflow approach—from monitoring overall network health to analyzing a variety of detailed metrics and troubleshooting with packet-level details.
- Supports network-services layers such as application optimization.
- Offers a versatile combination of real-time traffic analysis, historical analysis, packet capture capabilities, and the ability to measure user-perceived delays across the WAN.
- Provides a uniform instrumentation layer that collects data from a variety of sources, and then analyzes and presents the information. This information is available through an onboard web-based graphical user interface, and you can also export it to third-party applications.

In this design guide, Cisco Catalyst 6500 Series Network Analysis Module (NAM-3) is deployed in the Cisco Catalyst 6500 Series switch found in LAN core in the campus. NAM-3 takes advantage of backplane integration by simplifying manageability, lowering total cost of ownership, reducing network footprint, and reducing rack space. Cisco NAM-3 monitors traffic on the Cisco Catalyst 6500 switch via two internal 10-Gigabit data ports.

The campus use case utilizes Cisco NAM-3 for the following:

- Voice and video quality at the campus
- Traffic utilization and application performance between campus to data center and campus to branch
- Packet capture for troubleshooting
- URL monitoring for web filtering policies, quality of service (QoS) for enforcement of QoS policies
- Application and host analysis in VLAN

The Cisco Prime NAM 2320 appliance is deployed in the data center core connected to Cisco Nexus 5000 series switches. NAM 2320 has the flexibility to connect to any platform (including Catalyst and Nexus series platforms) that supports SPAN/RSPAN/ERSPAN for local switch visibility. The Cisco NAM 2320 appliance monitors traffic on the switches via two 10-Gigabit data port interfaces.

The data center use case utilizes Cisco Prime NAM 2320 for the following:

- Traffic utilization and application performance between data center to campus and data center to branch
- WAN optimization analysis and troubleshooting
- Packet capture for troubleshooting
- QoS for enforcement of QoS policies
- Application and host analysis in VLAN

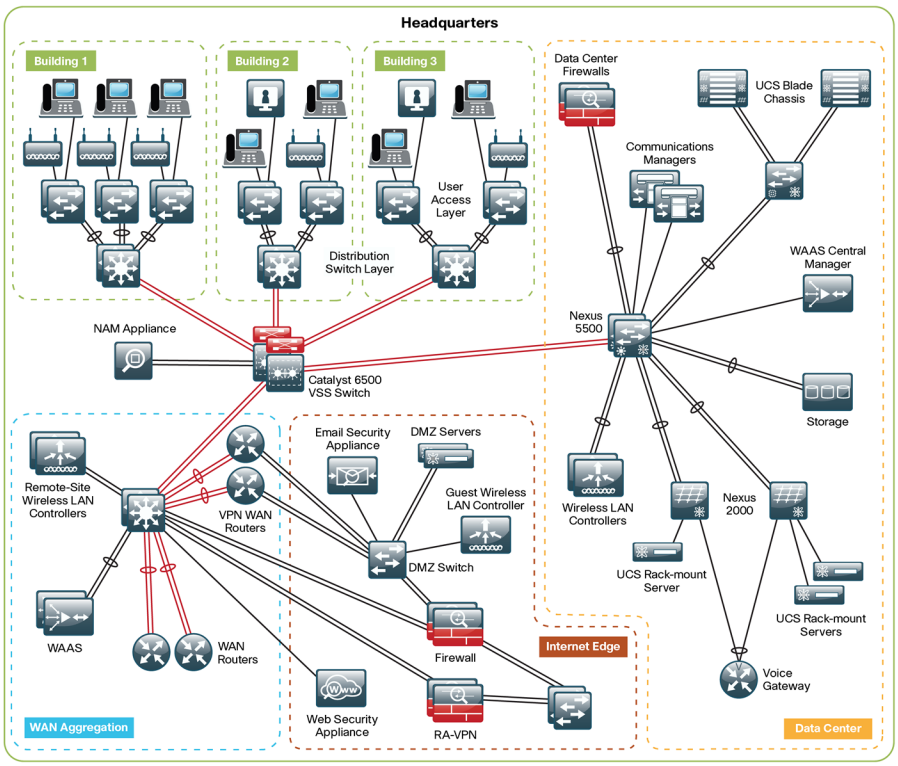
Cisco Prime NAM on Cisco Services Ready Engine (SRE) 710 or 910 series as part of ISR G2 is deployed in the regional office (Figure 1), which helps you monitor, measure, and report on the network's health at the branch level.

The branch use case utilizes Cisco Prime NAM SRE for the following:

- Voice and video quality at the branch
- Traffic utilization and application performance between branch to data center, branch to campus, and branch to branch
- Packet capture for troubleshooting
- URL monitoring for web filtering policies, QoS for enforcement of QoS policies
- Application and host analysis in VLAN

For more information, see the Campus Wired LAN Design Guide.

Figure 1 - Cisco Prime NAM providing network and application intelligence in Cisco Validated Design



Real-Time and Historical Application Monitoring

Cisco Prime NAM monitors traffic in real-time and provides a variety of analytics. It delivers on-demand historical analysis from the data collected. This category of monitoring includes application recognition, analysis of top conversations, hosts, protocols, differentiated services code points, and virtual LANs (VLANs). More advanced processing includes:

- Application performance analytics, including response-time measurements and various user-experience-related metrics
- Voice quality monitoring, which includes the ability to detect real-time streaming protocol streams and compute the mean opinion score, jitter, packet loss, and other voice over IP (VoIP) metrics

Application and Service Delivery with Application Performance Intelligence

In order to accurately assess the end-user experience, Cisco Prime NAM delivers comprehensive application performance intelligence (API) measurements. It analyzes TCP-based client/server requests and acknowledgements in order to provide transaction-aware response-time statistics, such as client delay, server delay, network delay, transaction times, and connection status. This data can help you isolate application problems to the network or to the server. It can also help you quickly diagnose the root cause of the delay and thus resolve the problem while minimizing end-user impact.

API can assist busy IT staff in troubleshooting application performance problems, analyzing and trending application behavior, identifying application consolidation opportunities, defining and helping ensure service levels, and performing pre- and post-deployment monitoring of application optimization and acceleration services.

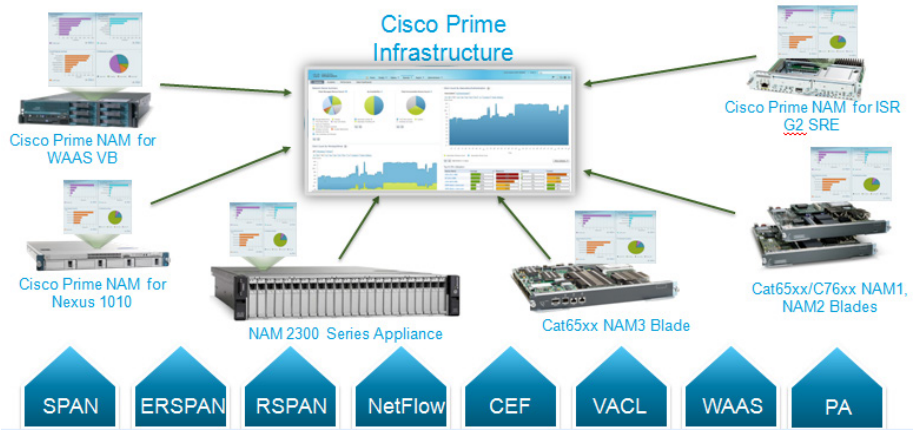
Simplified Problem Detection and Resolution

With Cisco Prime NAM, you can set thresholds and alarms on various network parameters—such as increased utilization, severe application response delays, and voice quality degradation—and be alerted to potential problems. When one or more alarms are triggered, Cisco Prime NAM can send an email alert, generate a syslog or SNMP trap, and automatically capture and decode the relevant traffic to help resolve the problem. Using a browser, the administrator can manually perform captures and view decodes through the Traffic Analyzer GUI while the data is still being captured. The capture and decode capability of the Cisco Prime NAM provides depth and insight into data analysis by using trigger-based captures, filters, decodes, a capture analysis, and error-scan toolset in order to quickly pinpoint and resolve problem areas.

Cisco Prime NAM Data Sources and Export Capabilities

In the context of Cisco Prime NAM, a data source refers to a source of traffic for which the entire stream, or summaries of data from that stream, is sent to Cisco Prime NAM for monitoring. Cisco Prime NAM can monitor a variety of data sources and compute appropriate metrics. The following figure provides a snapshot of all possible sources of data, and also the various export mechanisms supported by Cisco Prime NAM.

Figure 2 - Data sources for Cisco Prime NAM



This figure shows Cisco Prime NAM's role as a mediation layer tool—collecting and analyzing network data from a variety of sources and displaying the results on an integrated management and reporting console, for instance, NAM web GUI, and also providing data to Cisco Prime Infrastructure via representational state transfer (REST)/ XML interface.

As Cisco Prime NAM combines both a traffic analyzer (different form factors) and reporting console, the user can leverage NAM as standalone network application performance solution. If several NAMs are deployed in the network, for example, NAM in the data center, campus, and branches, then Cisco Prime Infrastructure offers a solution that allows the user to discover, configure and manage NAMs. Examples of Prime Infrastructure as a multi-NAM management includes a centralized configuration of Network Time Protocol (NTP), application ID and Domain Name System (DNS) configuration, centralized NAM image management, centralized packet capture with alarm triggers, and a single dashboard for consolidation of all NAM traffic information.

Using the SPAN feature, Cisco Prime NAMs can monitor traffic from physical ports, VLANs, or Cisco EtherChannel connections of the local switch or router. To support the selective monitoring of large amounts of traffic or the gathering of traffic from WAN interfaces, VLAN access control list (VACL) can filter traffic before it is sent to Cisco Prime NAMs. Remote SPAN (RSPAN) or Encapsulated Remote SPAN (ERSPAN) extends troubleshooting to remote parts of the network. The functional use case utilizes Cisco Prime NAM with SPAN for the following:

- Traffic analysis
- Application performance analysis
- Pre-WAN optimization
- Voice and video Analysis
- Packet capture

Using Cisco Express Forwarding (CEF), Cisco Prime NAM directly monitors and analyzes the WAN data streams from the packets traversing the router interfaces to the internal NAM interface. The functional use case utilizes Cisco Prime NAM with CEF for the following:

- Traffic analysis
- Application performance analysis
- Pre-WAN optimization
- Voice and video analysis
- Packet capture

Cisco Wide Area Application Services (WAAS) Flow Agent from Cisco Wide Area Application Engine (WAE) provides key data about the pre- and post-optimized network. This allows Cisco Prime NAM to identify potential candidates for WAN optimization based on Flow Agent data. The functional use case utilizes Cisco Prime NAM with WAAS Flow Agent data for the following: Pre- and post- WAN optimization.

Cisco IOS NetFlow allows a device to capture a snapshot of the flow in a record. These records provide analysis of real-time and historical traffic usage to obtain a broad view of how the network is performing. The functional use case utilizes Cisco Prime NAM with NetFlow for the following:

- Traffic analysis
- Pre-WAN optimization

Cisco Performance Agent is a licensed software feature of Cisco IOS that encapsulates application performance analytics, traffic statistics, and WAN optimization metrics in a NetFlow Version 9 template-based format and reports to the Cisco Prime NAM. Performance Agent provides visibility into branch-office applications traffic and performance. By using the instrumentation built into the Cisco infrastructure, Cisco Prime NAM offers more ways to see and understand what's happening on your network. The functional use case utilizes Cisco Prime NAM with Performance Agent for the following:

- Traffic analysis
- Application performance analysis
- Pre- and post-WAN optimization

Deployment Details

This section describes how to configure Cisco Catalyst 6500 Series NAM-3, the Cisco Prime NAM 2320 appliance, and Cisco Prime NAM on Cisco ISR G2 SRE in order to establish network connectivity; how to configure IP parameters; and how to perform other required administrative tasks by using the Cisco Prime NAM command-line interface. This section also provides information about how to get started with the Cisco Prime NAM GUI, and how to perform various system management tasks.

PROCESS

Preparing Cisco ACS for NAM Web User Authentication

1. Add NAM to the ACS Network Devices list
2. Define the command set permitted by ACS
3. Configure the NAM Access Policies

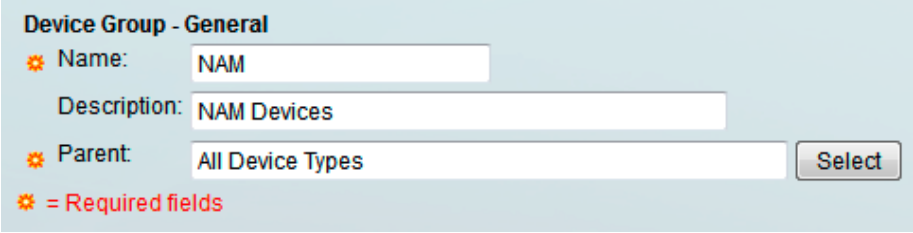
Procedure 1 Add NAM to the ACS Network Devices list

Step 1: Log in to Cisco Access Control Server (ACS) via https://**ACS.cisco.local**.

Step 2: Navigate to **Network Resources > Network Device Groups > Device Type**, and then click **Create**.

Step 3: In the **Name** box, enter a group name for NAM devices. (Example: NAM)

Step 4: In the **Description** box, enter an appropriate description. (Example: NAM Devices)



Step 5: Click **Submit**. The configuration is applied to the ACS.

Step 6: Navigate to **Network Resources > Network Devices and AAA Clients**, and then click **Create**.

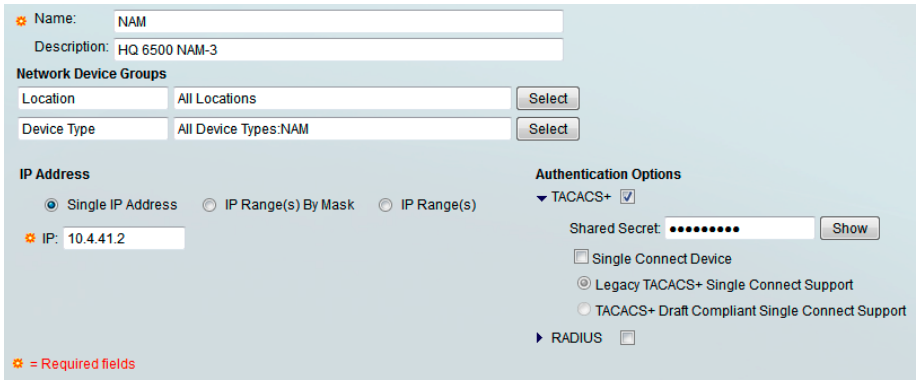
Step 7: On the Network Devices and AAA Clients configuration page enter the following values.

- Name – **NAM**
- Description – **HQ Core NAM-3**
- IP – **10.4.40.2**
- TACACS+ – selected
- Shared Secret – **SecretKey**

Step 8: To the right of the Device Type box, click **Select**.

Step 9: In the **All Device Types** list, choose the device group (example: NAM) that you created in Step 2, and then click **OK**. This inserts the device type.

Step 10: Click **Submit**. The NAM is added to the network device list in ACS.



Procedure 2 Define the command set permitted by ACS

Step 1: Navigate to **Policy Elements > Authorization and Permissions > Device Administration > Command Sets**, and then click **Create**.

Step 2: In the **Name** box, enter **NAM_Full_Access**, and then in the **Description** box, enter **Full Access to all NAM Commands**.

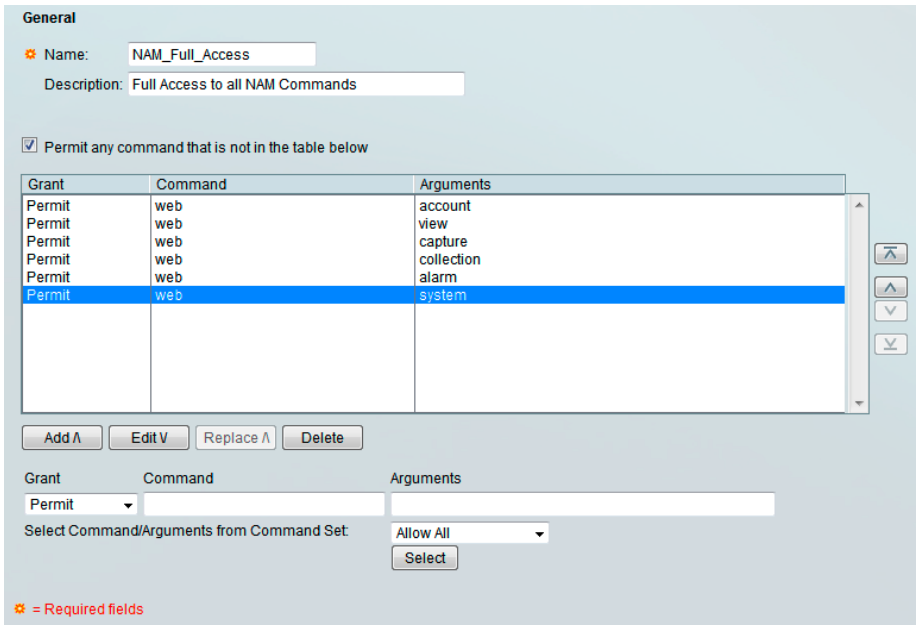
Step 3: Select **Permit any commands that are not in the table below**.

Step 4: Using the following table, add all the web commands available on Cisco Prime NAM by entering each data row into the **Grant**, **Command**, and **Arguments** boxes, and then clicking **Add**.

Table 1 - Web commands for Cisco Prime NAM

Grant	Command	Arguments
Permit	web	account
Permit	web	view
Permit	web	capture
Permit	web	collection
Permit	web	alarm
Permit	web	system

Step 5: Click **Submit**. The configuration of the command set is finalized.

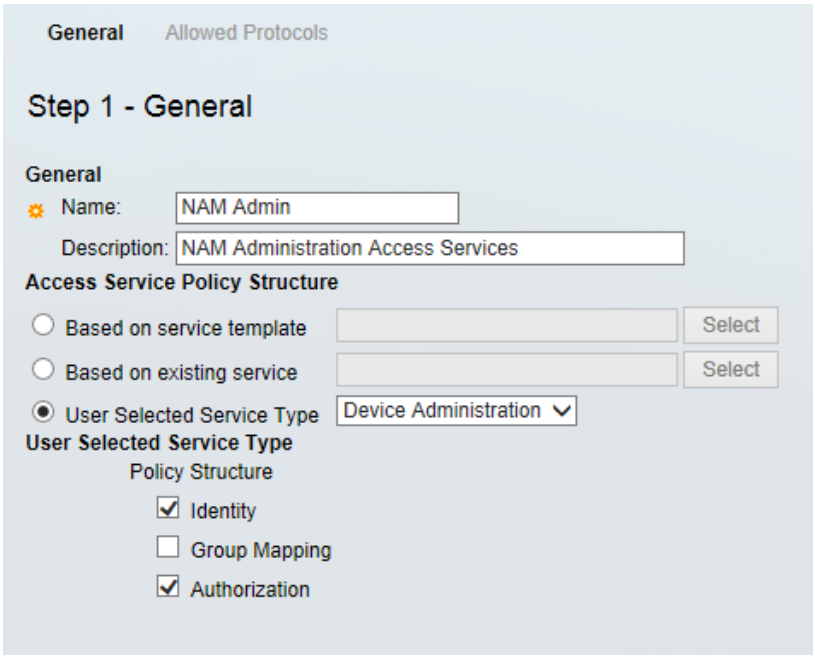


Procedure 3 Configure the NAM Access Policies

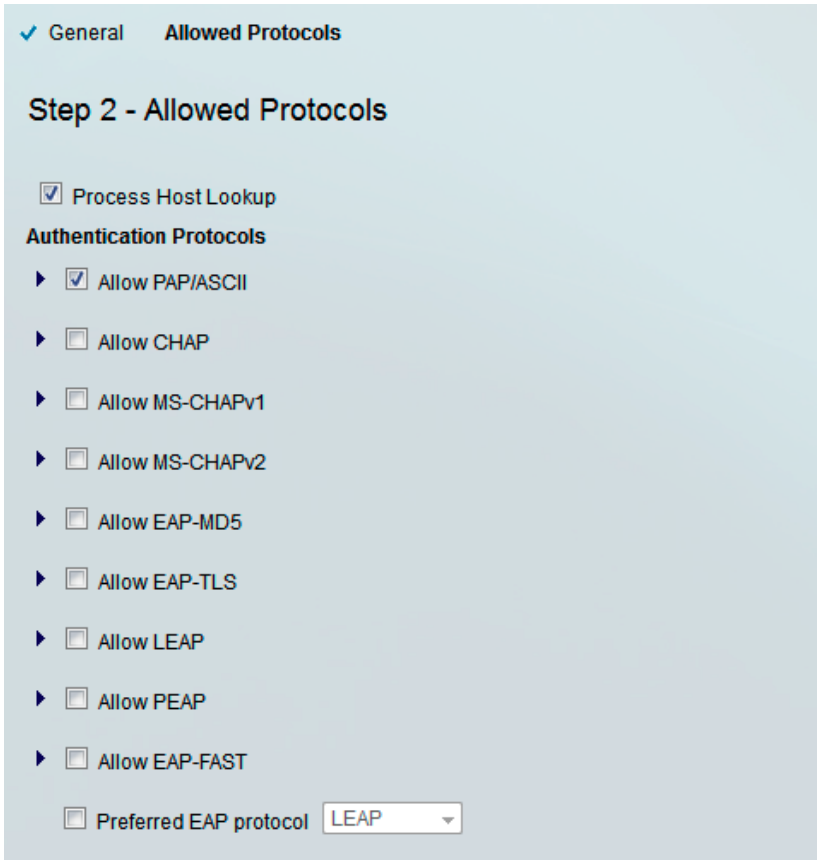
Step 1: Navigate to **Access Policies > Access Services**, and then click **Create**.

Step 2: In the Access Services configuration section, in the **Name** box, enter a name (Example: NAM Admin), and then in the **Description** box, enter a description (Example: NAM Administration Access Services).

Step 3: Select **User Selected Service Type**, and then in the **User Selected Service Type** list, choose **Device Administration**, and then click **Next**.



Step 4: In the Step 2 – Allowed Protocols section, select **Allow PAP/ASCII**, and then click **Finish**.



A dialog box regarding the modification of Service Selection policy appears.

Step 5: In the dialog box, click **Yes**. The Service Selection Rules page opens.

Step 6: Click **Create**. You can now make a rule.

Step 7: In the **Name** box, enter an appropriate name (Example: NAM Admin), and then make sure that, under Status, **Enabled** is selected.

Step 8: Under the Conditions section, select **Protocol**, ensure **match** is selected, and then, next to the Protocol and match boxes, click **Select**.

Step 9: In the dialog box that appears, select **Tacacs**, and then click **OK**.

Step 10: In the Conditions section, select **Compound Condition**.

Step 11: Under Dictionary, ensure **NDG** is selected, and then, to the right of Dictionary, click **Select**.

Step 12: In the dialog box that appears, select **Device Type**, and then click **OK**.

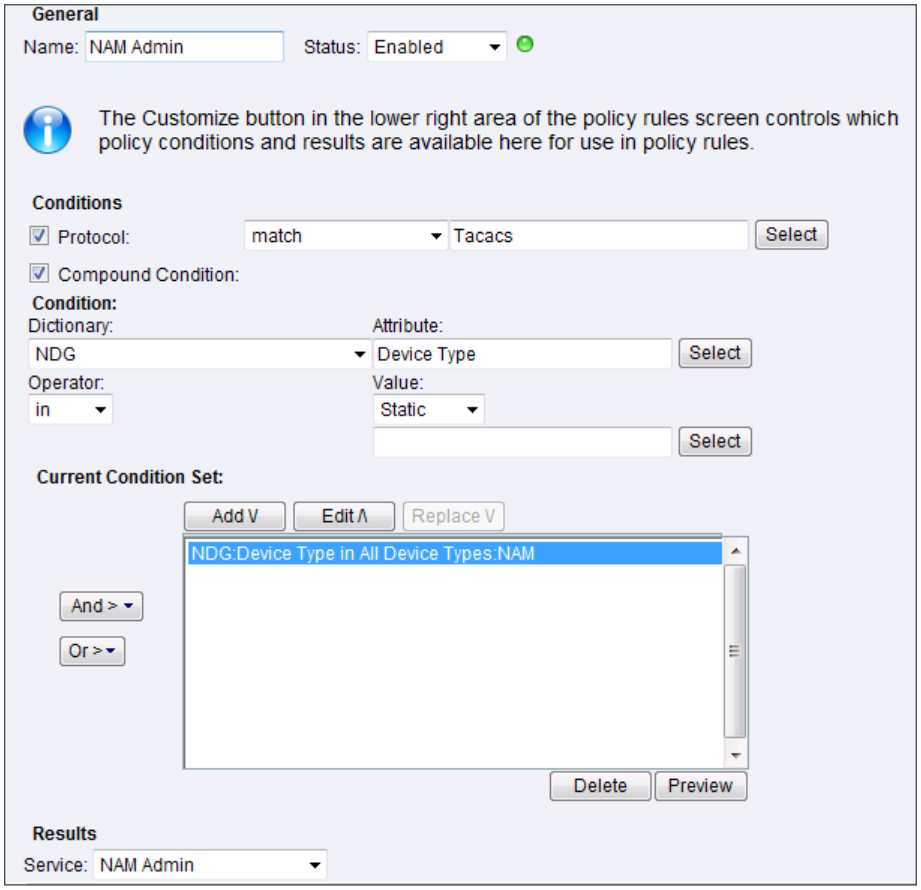
Step 13: Under Value, in the list, choose **Static**, and then next to the Value box, click **Select**.

Step 14: In the dialog box that appears, in the **All Device Types** list, choose the device group created in Procedure 1, "Add NAM to the ACS Network Devices list," Step 2 (Example: NAM), and then click **OK**.

Step 15: Under Current Condition Set, click **Add**.

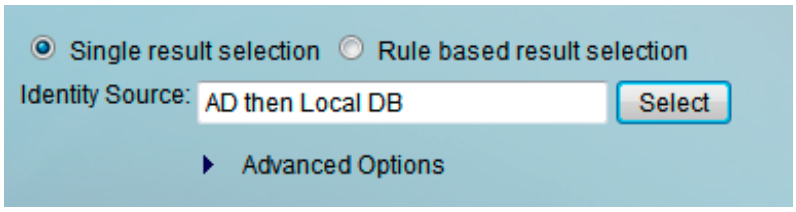
Step 16: Under Results, in the **Service** list, choose the Access Service created in Step 1 (Example: NAM Admin), click **OK**.

Step 17: Ensure the new rule is placed above any default TACACS or RADIUS rules by selecting the rule (Example: NAM Admin), and then pressing the up arrow until it is appropriately placed.



Step 18: Navigate to **Access Policies > Access Services > NAM Admin > Identity**, and then click **Select**.

Step 19: On the resulting dialog box, select the identity source intended to be used for authentication on Cisco Prime NAM (Example: AD the Local DB), apply the identity source by clicking **OK**, and then Click **Save Changes**. The Access Service is modified.



Step 20: Navigate to **Access Policies > Access Services > NAM Admin > Authorization**, and then click **Create**.

Step 21: In the **Name** box, enter an appropriate rule name (Example: NAM Access).

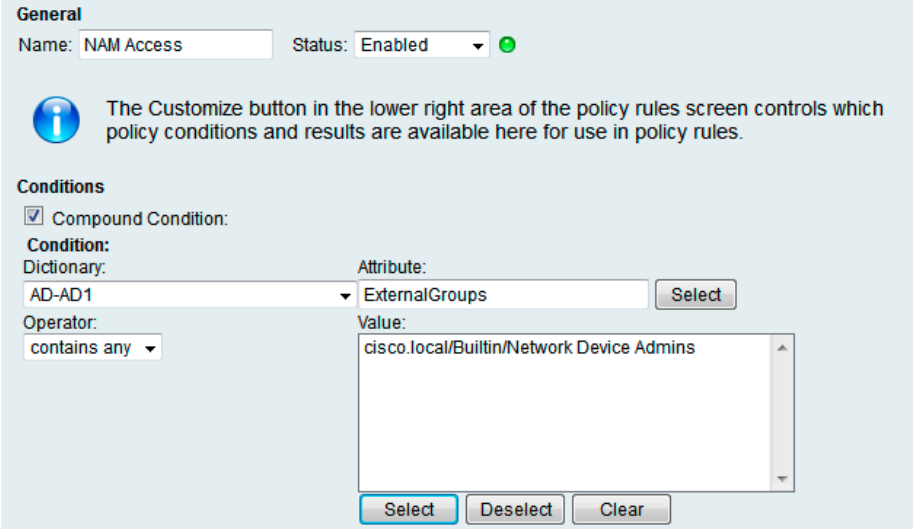
Step 22: Select **Compound Condition**.

Step 23: In the **Dictionary** list, choose the source of authorization for the NAM web access (Example: AD-AD1), and then, to the right of the Attribute box, click **Select**.

Step 24: In the resulting dialog box, select **ExternalGroups**, and then click **OK**.

Step 25: Under the Value box, click **Select**.

Step 26: In the dialog box, select the group that you want to have access to the NAM web UI (Example: cisco.local/Builtin/Network Device Admins), and then click **OK**.



Step 27: Click **Add.** The new condition is applied to the current condition set.

Step 28: To the Right of the Shell Profile box, click **Select**.

Step 29: In the resulting dialog box, select **Permit Access**, and then click **OK**.

Step 30: Under the Command Sets box, click **Select**.

Step 31: In the dialog box, select the command set created earlier in Procedure 2, "Define the command set permitted by ACS," Step 1, (Example: NAM_Full_Access), and then click **OK**.

Step 32: Click **OK.** The Access Service Authorization saves.

PROCESS

Configuring the Cisco Catalyst 6500 Series NAM-3

1. Install Cisco NAM-3
2. Log in to NAM Traffic Analyzer GUI
3. Verify SNMP
4. Configure NAM for user authentication
5. Verify the managed device parameters
6. Create a SPAN session for capture
7. Set up sites
8. View the home dashboard

Procedure 1 Install Cisco NAM-3

Step 1: In the Cisco Catalyst 6500 switch, insert Cisco NAM-3 into any available slot (except the slot reserved for supervisor modules).

Step 2: Verify Cisco NAM-3 is running.

```
C6509-1#show module
Mod Ports Card Type                                Model              Serial No.
--- ----- ---------------------------------------- ------------------ -----------
  1    24  CEF720 24 port 1000mb SFP               WS-X6824-SFP       SAL1533MAVH
  2     4  Trifecta NAM Module                      WS-SVC-NAM-3-K9    SAL16063ZHB
  4     8  DCEF2T 8 port 10GE                       WS-X6908-10G       SAL16020LYU
  5     5  Supervisor Engine 2T 10GE w/ CTS (Acti VS-SUP2T-10G       SAL1534NB4Q

Mod MAC addresses                       Hw     Fw           Sw           Status
--- ----------------------------------- ------ ------------ ------------ -------
  1  0007.7d90.5050 to 0007.7d90.5067   1.0    12.2(18r)S1  15.0(1)SY1   Ok
  2  e8b7.4829.b0d8 to e8b7.4829.b0e7   1.1    12.2(50r)SYL 15.0(1)SY1   Ok
  4  70ca.9bc5.e4f8 to 70ca.9bc5.e4ff   1.1    12.2(50r)SYL 15.0(1)SY1   Ok
  5  44d3.ca7b.c840 to 44d3.ca7b.c847   1.1    12.2(50r)SYS 15.0(1)SY1   Ok

Mod  Sub-Module                  Model              Serial       Hw     Status
---- --------------------------- ------------------ ------------ ------- -------
  1  Distributed Forwarding Card WS-F6K-DFC4-A      SAL1534N0K4  1.0    Ok
 2/0 NAM Application Processor   SVC-APP-PROC-1     SAL16063SD2  1.0    Ok
  4  Distributed Forwarding Card WS-F6K-DFC4-E      SAL16010BPL  1.1    Ok
  5  Policy Feature Card 4       VS-F6K-PFC4        SAL1535P6WS  1.0    Ok
  5  CPU Daughterboard           VS-F6K-MSFC5       SAL1537PPAT  1.1    Ok
```

```
Base PID:
Mod  Model         Serial No.
---- -----------   ----------
  2 WS-SVC-APP-HW-1    SAL16063ZHB

Mod  Online Diag Status
---- -------------------
  1  Pass
  2  Pass
 2/0 Pass
  4  Pass
  5  Pass
```

Step 3: Configure a management VLAN for Cisco NAM-3.

```
vlan [id]
 name [VLAN Name]
interface vlan [id]
 description [description]
 ip address [ip-address] [subnet]
 exit
analysis module [slot] management-port 1 access-vlan [id]
end
```

Example

```
vlan 141
 name NAM
!
interface Vlan141
 description NAM Management
 ip address 10.4.41.1 255.255.255.252
 no shutdown
!
analysis module 2 management-port 1 access-vlan 141
```

Step 4: Open a session into Cisco NAM-3.

```
session slot [slot] processor 1
```

Step 5: Log in to Cisco NAM-3 by using the username **root** and default password **root**.

```
Cisco Prime Network Analysis Module
nam.localdomain login: root
Password: root
Cisco Network Analysis Module (WS-SVC-NAM-2) Console, 5.1(2)
Copyright (c) 1999-2011 by Cisco Systems, Inc.
```

Step 6: Change the root password.

```
System Alert! Default password has not been changed!
Please enter a new root user password.
Enter new UNIX password:*******
Enter the new password for the root user.
Retype new UNIX password:*******
passwd: password updated successfully
root@nam.localdomain#
```

Step 7: Configure Cisco NAM-3 for network connectivity.

```
ip address [ip-address] [subnet-mask]
ip gateway [ip-address]
ip domain [domain-name]
ip host [name]
ip nameserver [ip-address]
```

Example

```
root@nam.localdomain# ip address 10.4.41.2 255.255.255.252
root@nam.localdomain# ip gateway 10.4.41.1
root@nam.localdomain# ip domain cisco.local
root@nam.cisco.local# ip host nam
root@nam.cisco.local# ip nameserver 10.4.48.10
```

Step 8: Verify that the network configuration is as shown.

```
root@nam.cisco.local# show ip
IP ADDRESS:             10.4.41.2
SUBNET MASK:            255.255.255.252
IP BROADCAST:           10.4.41.3
DNS NAME:               NAM.CISCO.LOCAL
DEFAULT GATEWAY:        10.4.41.1
NAMESERVER(S):          10.4.48.10
HTTP SERVER:            DISABLED
HTTP SECURE SERVER:     DISABLED
HTTP PORT:              80
HTTP SECURE PORT:       443
TACACS+ CONFIGURED:     NO
TELNET:                 DISABLED
SSH:                    DISABLED
```

Step 9: Configure Cisco NAM-3 to sync to a network time server.

```
time
sync ntp [ntp server]
zone [timezone]
exit
```

Example

```
root@NAM.cisco.local# time
Entering into subcommand mode for this command.
Type 'exit' to apply changes and come out of this mode.
Type 'cancel' to discard changes and come out of this mode.
root@NAM.cisco.local(sub-time)# sync ntp 10.4.48.17
root@NAM.cisco.local(sub-time)# zone PST8PDT
root@NAM.cisco.local(sub-time)# exit
```

Step 10: Verify that the network time configuration is as shown.

```
root@NAM.cisco.local# show time
NAM synchronize time to:          NTP
NTP server1:                      10.4.48.17
NAM time zone:                    PST8PDT
Current system time:              Thu Jun 28 16:04:01 PDT 2012
```

Step 11: Enable SSH for direct access to the appliance.

```
root@nam.cisco.local# exsession on ssh
```

Step 12: Enable the Cisco NAM Traffic Analyzer web secure server.

```
root@nam.cisco.local# ip http secure server enable
Enabling HTTP server...
```

Step 13: Enter a web username and password. The default username and password are both **admin**.

```
No web users configured!
Please enter a web administrator username [admin]:admin
New password:*******
Confirm password:*******
User admin added.
```

Step 14: Verify that Secure Shell Protocol (SSH) and HTTPS are enabled as shown.

```
root@nam.cisco.local# show ip
IP ADDRESS:             10.4.41.2
SUBNET MASK:            255.255.255.252
IP BROADCAST:           10.4.41.3
DNS NAME:               NAM.CISCO.LOCAL
DEFAULT GATEWAY:        10.4.41.1
NAMESERVER(S):          10.4.48.10
HTTP SERVER:            DISABLED
HTTP SECURE SERVER:     ENABLED
HTTP PORT:              80
HTTP SECURE PORT:       443
TACACS+ CONFIGURED:     NO
TELNET:                 DISABLED
SSH:                    ENABLED
```

Procedure 2 Log in to NAM Traffic Analyzer GUI

After you have configured the NAM Traffic Analyzer web server and enabled access to it, you should log in. This verifies that the web server is working.

Step 1: In your browser's address box, enter the full hostname of the Cisco Catalyst 6500 Series NAM-3: https://**[machine_name].[domain]**(Example: nam.cisco.local).

Step 2: When the login window appears, enter the administrator username and password that you configured in Procedure 1, "Install Cisco NAM-3," Step 13, and then click **Login**.

Procedure 3 Verify SNMP

Step 1: Verify that all devices within your network, such as the managed device connected to Cisco NAM, have Simple Network Management Protocol (SNMP) configured.

Step 2: If necessary, configure SNMP in order to facilitate communication between the managed device and Cisco NAM. Configure the SNMP read-write community strings on the managed device.

```
snmp-server community cisco RO
snmp-server community cisco123 RW
```

Procedure 4 Configure NAM for user authentication

(Optional)

If you have a centralized TACACS+ server, configure secure user authentication as the primary method for user authentication (login) and user authorization (configuration) by enabling AAA authentication for access control. AAA controls all management access to the Cisco NAM (HTTPS).

Tech Tip

A local web administrator was created on Cisco NAM during setup. This user account provides the ability to manage the device in case the centralized TACACS+ server is unavailable, or if you do not have a TACACS+ server in your organization.

Step 1: On the NAM web UI, navigate to **Administration > Users > TACACS+**.

Step 2: Enter the following values in the TACACS+ configuration page:

- Enable TACACS+ Authentication and Authorization – selected
- Primary TACACS+ Server – **10.4.48.15**
- Secret Key – **SecretKey**
- Verify Secret Key – **SecretKey**

Step 3: Click **Submit**. The configuration is applied to Cisco NAM.

Procedure 5 Verify the managed device parameters

Now you need to verify the managed device parameters in Cisco NAM-3.

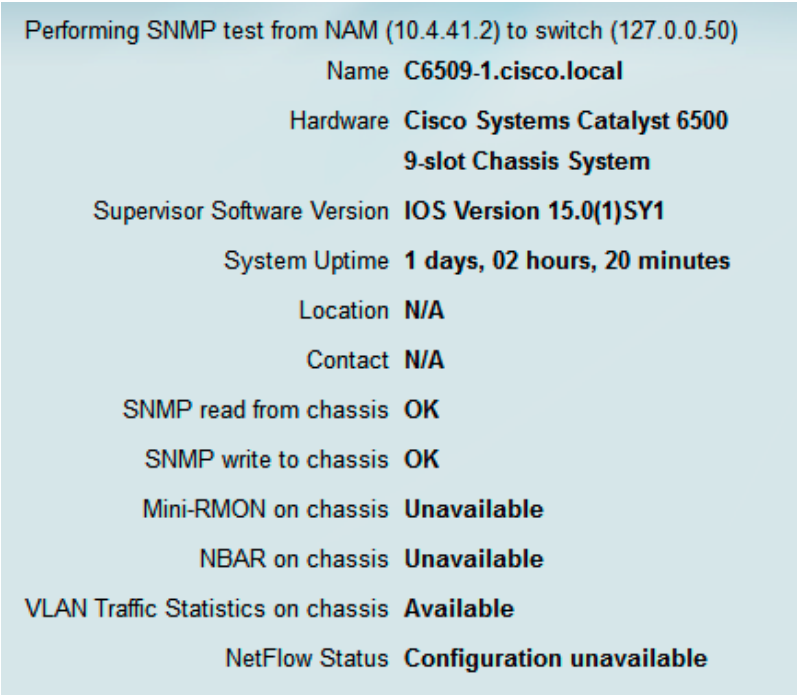
Based on the SNMP configuration of the switch, Cisco NAM-3 will be able to automatically communicate with its host Cisco Catalyst 6500.

Step 1: Navigate to **Setup > Managed Device > Device Information**.

Step 2: Verify the **SNMP read from chassis** and **SNMP write to chassis** fields show **OK**.

Tech Tip

If the fields are not OK, perform Procedure 3, "Verify SNMP" again.



Procedure 6 Create a SPAN session for capture

In order to provide traffic to Cisco NAM-3 for analysis, a SPAN session is required on the managed device. You can use the Cisco Prime NAM GUI to create a SPAN session or via CLI from the switch.

On the Cisco Prime NAM GUI:

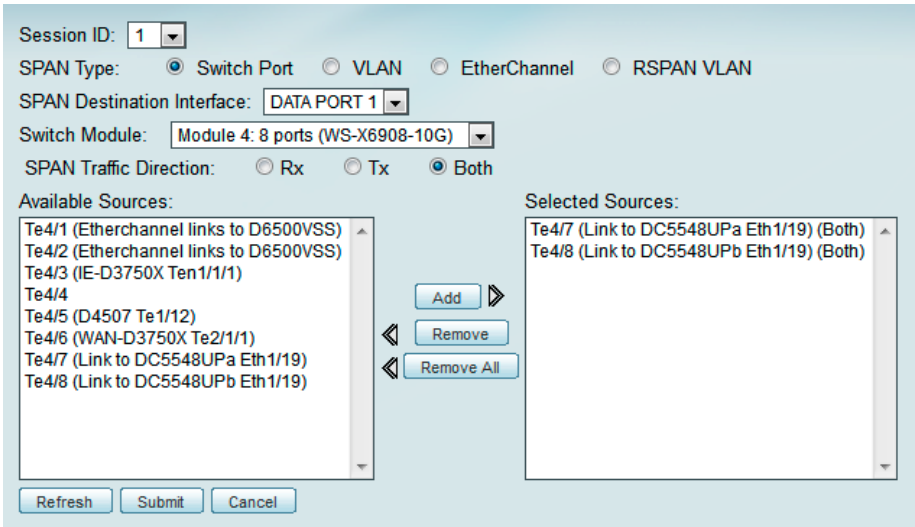
Step 1: Navigate to **Setup > Traffic > SPAN Sessions**, and then click **Create**.

Step 2: For **SPAN Type**:

- If you want to monitor a physical interface, select **Switch Port**.
- If you want to monitor an EtherChannel interface, select **EtherChannel**.

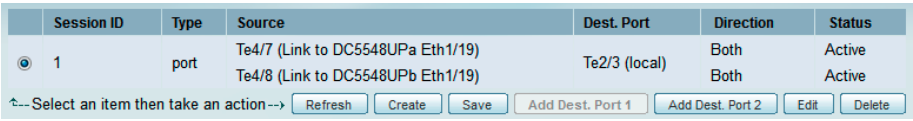
Step 3: In the **Switch Module** list, choose the module you wish to select sources from for monitoring. The Available Sources list populates with ports from that module and their relative port descriptions.

Step 4: Move the interfaces you want to monitor from **Available Sources** to **Selected Sources**.



Step 5: Click **Submit**. The SPAN session is created.

Step 6: In the active SPAN session window, click **Save**. This saves the SPAN session currently in the running-configuration to the startup-configuration.



The preceding steps apply this configuration for creating a SPAN session on the switch.

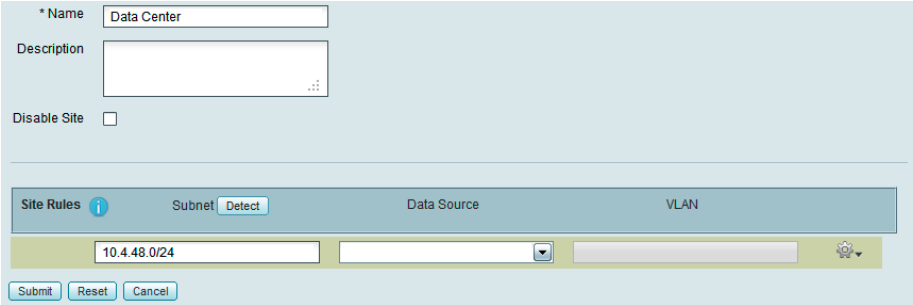
```
C6500_core# conf term
C6500_core(config)# monitor session 1 source interface Te4/7 - 8 both
C6500_core(config)# monitor session 1 destination analysis-module 2 data-port 1
C6500_core(config)# end
```

Procedure 7 Set up sites

Setting up sites in Cisco Prime NAM enables site-level monitoring. You create a site for the campus and a site for the data center.

Step 1: Navigate to **Setup > Network > Sites**, and then click **Create**. The Site Configuration window appears.

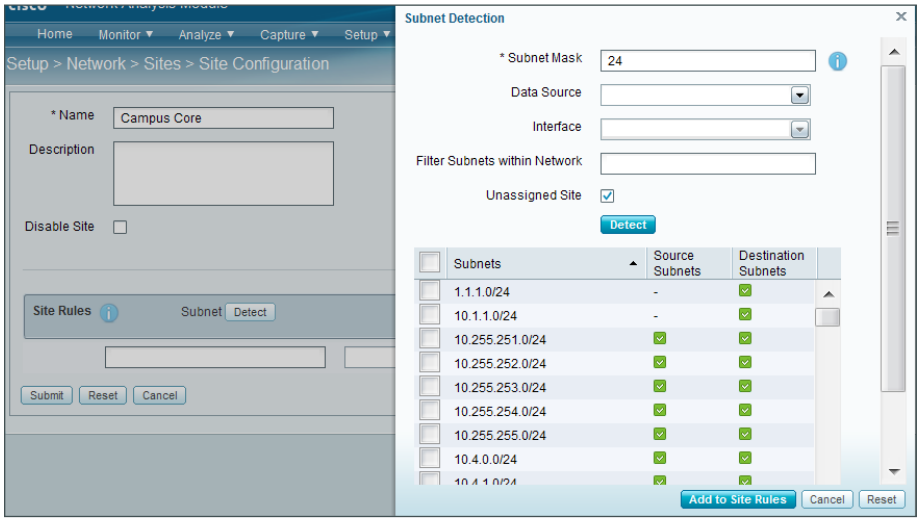
Step 2: Specify the site name and the associated subnet, and then click **Submit**.



Step 3: If you want to display all the subnets available as seen by Cisco Prime NAM, click **Detect**.

Step 4: In the Subnet Detection window, in the **Subnet Mask** box, enter the desired value, and then click **Detect.**

Step 5: Select the appropriate rows, and then click **Add to Site Rules**.



Procedure 8 View the home dashboard

Step 1: After creating sites, from the menu, choose **Home**.

The home dashboard links to Monitor > Overview > Traffic Summary. The Traffic Summary Overview dashboard provides information of Top N Applications, Top N Application Groups, Top N Hosts (In and Out), IP Distribution by Bits, Top N DSCP, and Top N VLAN.

Step 2: If you want to view the Traffic Summary by a site, in the **Interactive Report** list, choose **Filter**, in the **Site** list, choose **campus** or **data center**, and then click **Submit**.

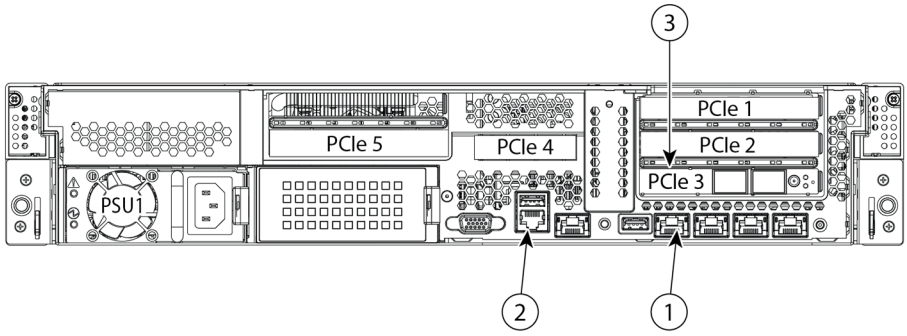
PROCESS

Configuring the Cisco Prime NAM 2320 Appliance

1. Connect the management port
2. Connect a console terminal
3. Connect the monitoring ports
4. Install the Cisco Prime NAM 2320 appliance
5. Log in to NAM Traffic Analyzer GUI
6. Configure NAM for user authentication
7. Verify SNMP
8. Configure the managed device parameters
9. Create a SPAN session for capture
10. Set up sites
11. View the home dashboard

As illustrated in the following figure, you set up your Cisco Prime NAM 2320 appliance for connections to a management port (#1), a console terminal (#2), and the monitoring ports (#3).

Figure 3 - Cisco Prime NAM 2320 appliance back panel



Procedure 1 Connect the management port

The Cisco Prime NAM 2320 appliance management port, shown in location #1 in Figure 3, is an RJ-45 10BASE-T/100BASE-TX/1000BASE-T network interface connector.

Step 1: Connect one end of a Cat5E UTP cable to the management port on the appliance.

Step 2: Connect the other end of the cable to a switch in your network.

Procedure 2 Connect a console terminal

The Cisco Prime NAM 2320 appliance console port, shown in location #2 in Figure 3, is an RJ-45 serial (console) connector.

Step 1: Connect a console terminal that is using a PC running terminal-emulation software to the console port on the Cisco Prime NAM 2320 appliance.

Procedure 3 Connect the monitoring ports

The Cisco Prime NAM 2320 appliance monitoring ports are shown in location #3 in Figure 3. Each monitoring port supports a 10-GB SFP+ transceiver module (single-mode fiber, multi-mode fiber, or passive or active twinaxial cables (except for 5M passive cable).

Step 1: Connect the Cisco Prime NAM 2320 appliance directly to the core switch by running a fiber optical cable from a 10-GB Ethernet port on the remote device to DataPort 1 on the Cisco Prime NAM 2320 appliance.

Tech Tip

The SFP+ slot on the right of the Cisco Prime NAM 2320 appliance provides input to logical DataPort 1, and the slot on the left provides input to logical DataPort 2.

Procedure 4 Install the Cisco Prime NAM 2320 appliance

Step 1: Connect to the console of the appliance and log in using the username **root** and default password **root**.

```
Cisco Prime NAM 2320 appliance (NAM2320)
nam.localdomain login: root
Password: root
Cisco Prime NAM Appliance 2320 ("NAM2320-K9") Console, 5.1(3)
Copyright (c) 1999-2012 by Cisco Systems, Inc.
```

Step 2: Change the root password.

```
System Alert! Default password has not been changed!
Please enter a new root user password.
Enter new UNIX password:******
Enter the new password for the root user.
Retype new UNIX password:******
passwd: password updated successfully
root@nam.cisco.local#
```

Step 3: Configure Cisco NAM for network connectivity.

```
ip address [ip-address] [subnet-mask]
ip gateway [ip-address]
ip domain [domain-name]
ip host [name]
ip nameserver [ip-address]
```

Example

```
root@nam.localdomain# ip address 10.4.41.2 255.255.255.252
root@nam.localdomain# ip gateway 10.4.41.1
root@nam.localdomain# ip domain cisco.local
root@nam.cisco.local# ip host nam
root@nam.cisco.local# ip nameserver 10.4.48.10
```

Step 4: Verify that the network configuration is as follows.

```
root@nam.cisco.local# show ip
IP ADDRESS:             10.4.41.2
SUBNET MASK:            255.255.255.252
IP BROADCAST:           10.4.41.3
DNS NAME:               NAM.CISCO.LOCAL
DEFAULT GATEWAY:        10.4.41.1
NAMESERVER(S):          10.4.48.10
HTTP SERVER:            DISABLED
HTTP SECURE SERVER:     DISABLED
HTTP PORT:              80
HTTP SECURE PORT:       443
TACACS+ CONFIGURED:     NO
TELNET:                 DISABLED
SSH:                    DISABLED
```

Step 5: Configure Cisco NAM for network time.

```
time
sync ntp [ntp server]
zone [timezone]
exit
```

Example

```
root@NAM.cisco.local# time
Entering into subcommand mode for this command.
Type 'exit' to apply changes and come out of this mode.
Type 'cancel' to discard changes and come out of this mode.
root@NAM.cisco.local(sub-time)# sync ntp 10.4.48.17
root@NAM.cisco.local(sub-time)# zone PST8PDT
root@NAM.cisco.local(sub-time)# exit
```

Step 6: Verify that the network time configuration is as shown.

```
root@NAM.cisco.local# show time
NAM synchronize time to:          NTP
NTP server1:                      10.4.48.17
NAM time zone:                    PST8PDT
Current system time:              Thu Jun 28 16:04:01 PDT 2012
```

Step 7: Enable SSH for direct access to the appliance.

```
root@nam.cisco.local# exsession on ssh
```

Step 8: Enable the Cisco NAM Traffic Analyzer web secure server.

```
root@nam.cisco.local# ip http secure server enable
Enabling HTTP server...
```

Step 9: Enter a web username and password. The default username and password are both **admin**.

```
No web users configured!
Please enter a web administrator username [admin]:admin
New password:******
Confirm password:******
User admin added.
```

Step 10: Verify that SSH and HTTPS are enabled as shown.

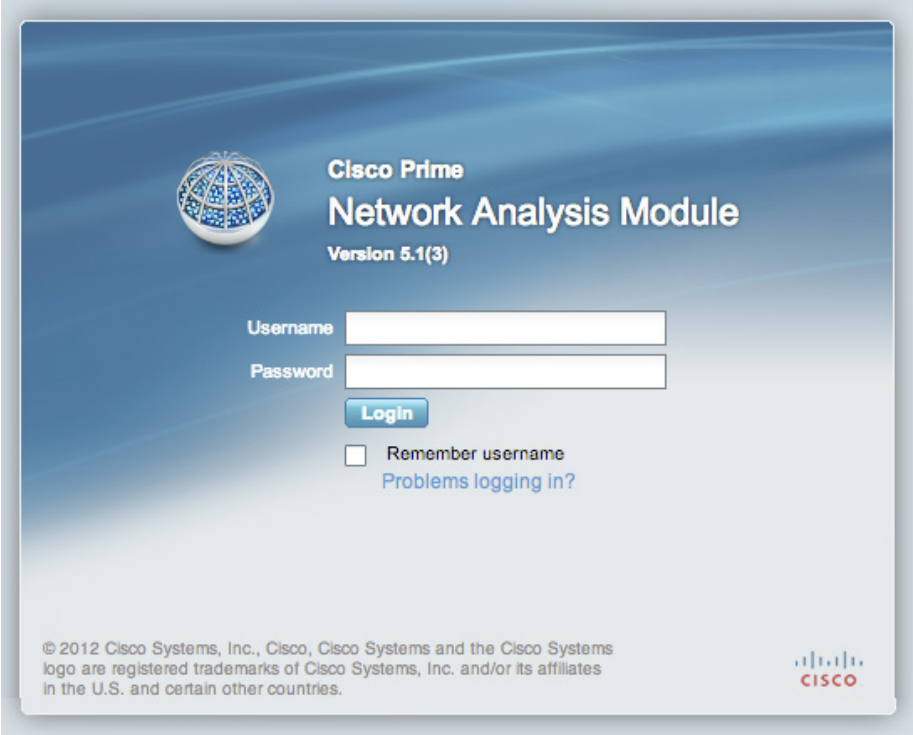
```
root@nam.cisco.local# show ip
IP ADDRESS:              10.4.41.2
SUBNET MASK:             255.255.255.252
IP BROADCAST:            10.4.41.3
DNS NAME:                NAM.CISCO.LOCAL
DEFAULT GATEWAY:         10.4.41.1
NAMESERVER(S):           10.4.48.10
HTTP SERVER:             DISABLED
HTTP SECURE SERVER:      ENABLED
HTTP PORT:               80
HTTP SECURE PORT:        443
TACACS+ CONFIGURED:      NO
TELNET:                  DISABLED
SSH:                     ENABLED
```

Procedure 5 Log in to NAM Traffic Analyzer GUI

After you have configured the NAM Traffic Analyzer web server and enabled access to it, you should log in. This verifies that the web server is working.

Step 1: In your browser's address box, enter the full hostname of the Cisco NAM 2200 Series appliance: **https://[machine_name].[domain]** (Example: nam.cisco.local)

Step 2: When the login window appears, enter the administrator username and password that you configured in Procedure 4, "Install the Cisco Prime NAM 2320 appliance," Step 9, and then click **Login**.



Procedure 6 Configure NAM for user authentication

(Optional)

If you have a centralized TACACS+ server, configure secure user authentication as the primary method for user authentication (login) and user authorization (configuration) by enabling AAA authentication for access control. AAA controls all management access to the Cisco NAM (HTTPS).

Tech Tip

A local web administrator was created on the Cisco NAM during setup. This user account provides the ability to manage the device in case the centralized TACACS+ server is unavailable, or if you do not have a TACACS+ server in your organization.

Step 1: On the Cisco NAM web UI, navigate to **Administration > Users > TACACS+**.

Step 2: Enter the following values in the TACACS+ configuration page:

- Enable TACACS+ Authentication and Authorization – selected
- Primary TACACS+ Server – **10.4.48.15**
- Secret Key – **SecretKey**
- Verify Secret Key – **SecretKey**

Step 3: Click **Submit**. The configuration is applied to Cisco NAM.

After you connect an output interface of a managed device to the monitoring ports of the Cisco Prime NAM 2320 appliance, you must also configure the managed device to send data to that interface.

Procedure 7 Verify SNMP

Step 1: Verify that all devices within your network, such as the managed device connected to Cisco NAM, have SNMP configured.

Step 2: If necessary, configure SNMP in order to facilitate communication between the managed device and Cisco NAM. Configure the SNMP read-write community strings on the managed device.

```
snmp-server community cisco RO
snmp-server community cisco123 RW
```

Procedure 8 Configure the managed device parameters

Now you need to configure the managed device parameters in Cisco NAM.

Step 1: Navigate to **Setup > Managed Device > Device Information**.

Step 2: Enter the managed device IP address. Enter the same IP address that was configured on the managed device. (Example: 10.4.40.252)

Step 3: Enter the **SNMP v1/v2c RW Community String**. You must enter the same read-write community string (example: cisco123) that was configured on the managed device, otherwise Cisco NAM won't be able to communicate via SNMP with the managed device.

Step 4: In the **Verify String** box, enter the SNMP read-write community string again.

Step 5: After you enter the managed device parameters, click **Test Connectivity.** The Connectivity Test dialog box opens.

Step 6: On the Connectivity Test dialog box, verify that the **SNMP Read from Managed Device** and **SNMP Write from Managed Device** parameters have a status of **OK**, and then click **Close**

Step 7: On the Device Information page, click **Submit**.

Procedure 9 Create a SPAN session for capture

For providing traffic to Cisco NAM 2320 for analysis, a SPAN session is required on the managed device. You can use the Cisco Prime NAM GUI to create a SPAN session or via CLI from the switch.

Tech Tip

Ensure the interface intended to be used as the Remote Destination Port is not shut down before creating the SPAN session. Using the NAM web interface will only configure the monitoring configuration but it will not bring up the interface if it is down.

Step 1: On the Cisco Prime NAM GUI, navigate to **Setup > Traffic > SPAN Sessions**, and then click **Create**.

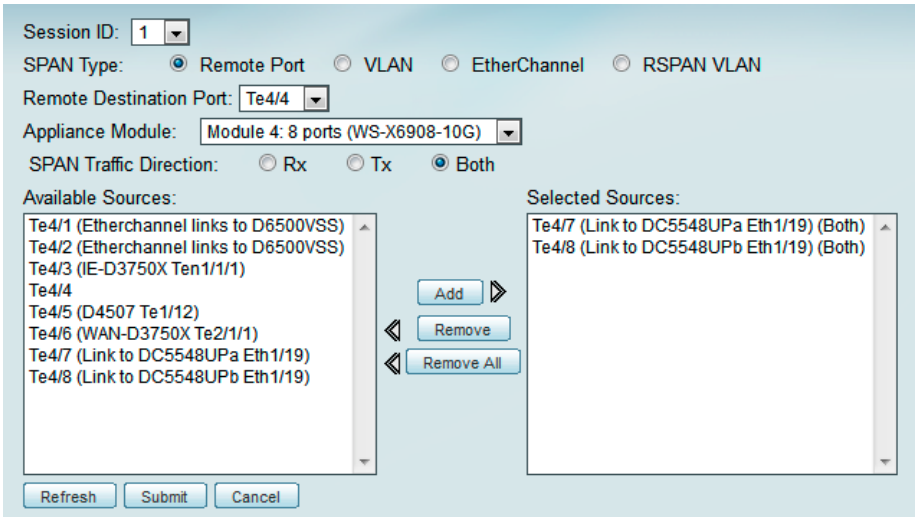
Step 2: For SPAN Type:

- If you want to monitor a physical interface, select **Switch Port**.
- If you want to monitor an EtherChannel interface, select **EtherChannel**.

Step 3: Select the **Remote Destination Port** to align with optical 10-GB Ethernet port that was used in Procedure 3, “Connect the monitoring ports,” Step 1.

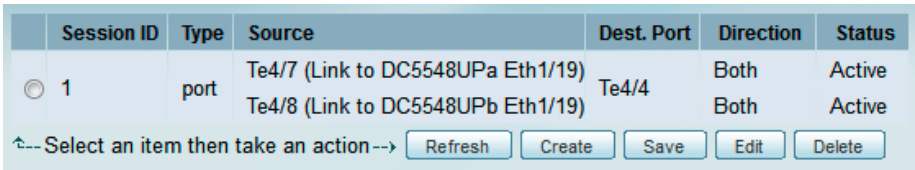
Step 4: In the **Switch Module** list, choose the module you wish to select sources from for monitoring. The **Available Sources** list populates with ports from that module and their relative port descriptions.

Step 5: Move the interfaces you want to monitor from **Available Sources** to **Selected Sources**.



Step 6: Click **Submit**. The SPAN session is created.

Step 7: In the active SPAN session window, click **Save**. This saves the SPAN session currently in the running-configuration to the startup-configuration.



The preceding steps apply this configuration for creating a SPAN session on the Cisco Catalyst 6500 switch.

```
C6500_core# conf term
C6500_core(config)# monitor session 1 source interface Te4/7 - 8 both
C6500_core(config)# monitor session 1 destination analysis-module 2 data-port 1
C6500_core(config)# end
```

The preceding steps apply this configuration for creating a SPAN session on the Cisco Nexus 5000 switch.

1. Configuring the Destination Port

```
N5000_core# conf term
N5000_core(config)# interface Te 4/4
N5000_core(config)# switchport monitor
N5000_core(config)# end
```

2. Creating a SPAN Session

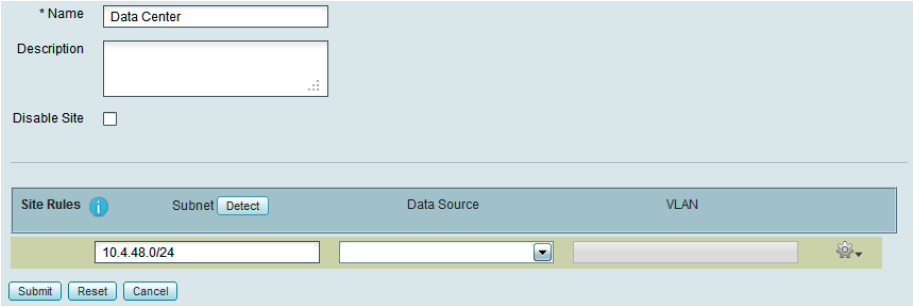
```
N5000_core# conf term
N5000_core(config)# monitor session 1
N5000_core(config)# source interface Te4/7 - 8 both
N5000_core(config)# destination interface Te4/4
N5000_core(config)# end
```

Procedure 10 Set up sites

Setting up sites in Cisco NAM enables site-level monitoring. You create a site for the campus and a site for the data center.

Step 1: Navigate to **Setup > Network > Sites**, and then click **Create**. The Site Configuration window appears.

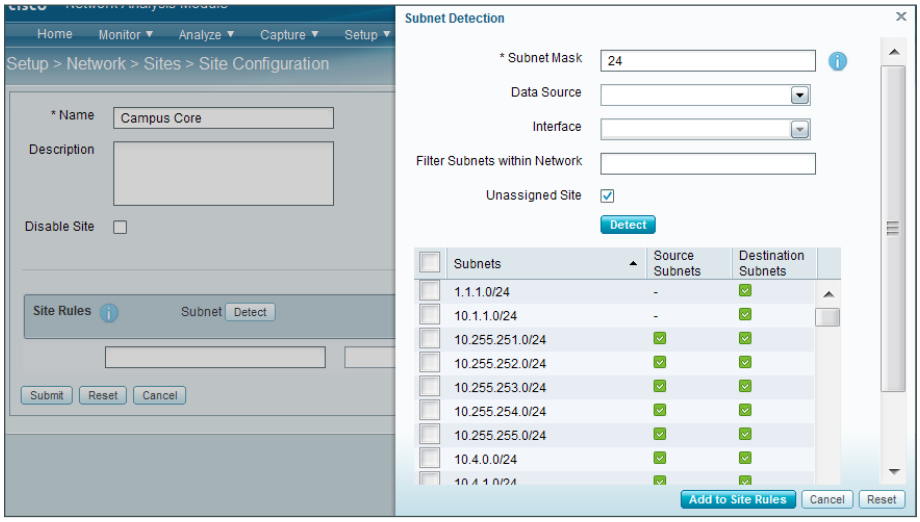
Step 2: Specify the site name and the associated subnet, and then click **Submit**.



Step 3: If you want to display all the subnets available as seen by Cisco NAM, click **Detect**.

Step 4: In the Subnet Detection window, enter the desired value in the **Subnet Mask** box, and then click **Detect.**

Step 5: Select the appropriate rows, and then click **Add to Site Rules**.



Procedure 11 View the home dashboard

Step 1: After creating sites, in the menu, choose **Home**.

The home dashboard links to Monitor > Overview > Traffic Summary. The Traffic Summary Overview dashboard provides information of Top N Applications, Top N Application Groups, Top N Hosts (In and Out), IP Distribution by Bits, Top N DSCP, and Top N VLAN.

Step 2: If you want to view the Traffic Summary by a site, in the **Interactive Report** list, choose **Filter** , in the **Site** list, choose **campus** or **data center**, and then click **Submit**.

PROCESS

Configuring Cisco Prime NAM on Cisco ISR G2 SRE

1. Install Cisco Prime NAM on SRE
2. Secure Cisco Prime NAM on SRE
3. Log in to Cisco NAM Traffic Analyzer GUI
4. Configure NAM for user authentication
5. Enable Cisco NAM packet monitoring
6. Set up sites
7. View the home dashboard

Requirements:

- Cisco Integrated Services Router (ISR) 2911, 2921, 2951, 3925 or 3945.
- Open slot for either Cisco Service Ready Engine (SRE) 710, or 910 module.
- Cisco IOS release 15.1(4)M or later.
- Cisco Prime NAM software 5.1(2) for SRE, downloaded from the Cisco website to a local FTP server.

Procedure 1 Install Cisco Prime NAM on SRE

Step 1: Download the Cisco Prime NAM 5.1(2) software from the following location: http://www.cisco.com/cisco/software/navigator.html

Step 2: Navigate to **Cloud and Systems Management > Network Analysis Module (NAM) Products**, select the appropriate NAM form factor, and then navigate to **All Releases > 5 > 5.1.2**.

Step 3: On the following file: **nam-app-x86_64.5-1-2.bin.gz.zip**, click **Download Now**.

Step 4: Copy the downloaded image to a local FTP server and unzip the contents into a folder.

Step 5: Log in to Cisco ISR G2 and configure the SRE interface for router-side (internal) and module-side (Cisco NAM management) connectivity.

```
interface sm [slot]/0
ip address [router-side-ip-address] [subnet-mask]
service-module [ip address module-side-ip-address] [subnet-mask]
service-module ip default-gateway [gateway-ip-address]
no shutdown
```

Example

```
interface sm 4/0
 ip address 10.5.0.17 255.255.255.252
 service-module ip address 10.5.0.18 255.255.255.252
 service-module ip default-gateway 10.5.0.17
 no shutdown
```

Step 6: Verify interface configuration via show run.

The following example shows the configuration of the internal interface between Cisco SM-SRE and the router.

Example

```
Router# show running-config interface SM4/0
interface SM4/0
 ip address 10.5.0.17 255.255.255.0
 service-module fail-open
 service-module ip address 10.5.0.18 255.255.255.252
 service-module ip default-gateway 10.5.0.17
```

Next, if AAA has been enabled on the router, configure an AAA exemption for Cisco SRE devices.

Configuring an exemption on the router is required because when AAA is enabled on the router, you will be prompted for both a router login and a Cisco NAM login, which can be confusing. Disabling the initial router authentication requires you to create an AAA method, which you then apply to the specific line configuration on the router associated with Cisco SRE.

Step 7: Create the AAA login method.

```
aaa authentication login MODULE none
```

Step 8: Determine which line number is assigned to SRE. The example output below shows line 67.

Example

```
RS200-3925-1# show run | begin line con 0
line con 0
 logging synchronous
line aux 0
line 67
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
 flowcontrol software
line vty 0 4
 transport preferred none
 transport input ssh
```

Step 9: Restrict access to the SRE console by creating an access-list. The access-list number is arbitrary, but the IP address must match the address assigned to the SM interface in the Step 5.

```
access-list 67 permit 10.5.0.17
```

Step 10: Assign the method to the appropriate line.

```
line 67
 login authentication MODULE
 access-class 67 in
 transport output none
```

Step 11: Install Cisco Prime NAM on Cisco SRE. This command will take about 15 or 20 minutes to complete.

```
service-module sm [slot]/0 install url [url]
```

Example

```
Router# service-module sm 4/0 install url ftp://10.4.48.11/NAM/nam-app-x86_64.5-1-2.bin.gz
```

Step 12: Open a session into Cisco NAM:

```
service-module SM [slot]/0 session
```

Step 13: Log in to Cisco NAM by using the username **root** and default password **root**.

```
RS200-3945-1# service-module SM 4/0 session

Cisco Prime Network Analysis Module
nam.localdomain login: root
Password:

Cisco SM-SRE Network Analysis Module (SM-SRE-910-K9) Console, 5.1(2)
Copyright (c) 1999-2011 by Cisco Systems, Inc.
```

Step 14: Change the root password.

```
System Alert! Default password has not been changed!
Please enter a new root user password.
Enter new password:******
Confirm new password:******
Successfully changed password for user 'root'
root@nam.localdomain#
```

Step 15: Configure NAM for network connectivity.

```
ip domain [domain-name]
ip host [name]
ip nameserver [ip-address]
```

Example

```
root@nam.localdomain# ip domain cisco.local
root@nam.cisco.local# ip host nam
root@nam.cisco.local# ip nameserver 10.4.48.10
```

Step 16: Verify the network configuration is as follows:

```
root@nam.cisco.local# show ip
IP ADDRESS:             10.5.0.18
SUBNET MASK:            255.255.255.252
IP BROADCAST:           10.5.0.19
DNS NAME:               NAM.CISCO.LOCAL
DEFAULT GATEWAY:        10.5.0.17
NAMESERVER(S):          10.4.48.10
HTTP SERVER:            DISABLED
HTTP SECURE SERVER:     DISABLED
HTTP PORT:              80
HTTP SECURE PORT:       443
TACACS+ CONFIGURED:     NO
TELNET:                 DISABLED
SSH:                    DISABLED
```

Step 17: Configure Cisco NAM for network time.

```
time
sync ntp [ntp server]
zone [timezone]
exit
```

Example

```
root@NAM.cisco.local# time
Entering into subcommand mode for this command.
Type 'exit' to apply changes and come out of this mode.
Type 'cancel' to discard changes and come out of this mode.
root@NAM.cisco.local(sub-time)# sync ntp 10.4.48.17
root@NAM.cisco.local(sub-time)# zone PST8PDT
root@NAM.cisco.local(sub-time)# exit
```

Step 18: Verify that the network time configuration is as shown.

```
root@NAM.cisco.local# show time
NAM synchronize time to:          NTP
NTP server1:                      10.4.48.17
NAM time zone:                    PST8PDT
Current system time:              Thu Jun 28 16:04:01 PDT 2012
```

Procedure 2 Secure Cisco Prime NAM on SRE

To increase security for Cisco NAM, in this section you:

- Enable secure sockets layer (SSL) on Cisco NAM for secure, encrypted HTTP sessions.
- Enable SSH protocol for secure Telnet to Cisco NAM.

Step 1: Enable SSH for direct access to Cisco Prime NAM on Cisco SRE.

```
root@nam.cisco.local# exsession on ssh
```

Step 2: Enable the Cisco NAM traffic analyzer web secure server.

```
root@nam.cisco.local# ip http secure server enable
Enabling HTTP server...
```

Step 3: Enter a web username and password. The default username and password are both **admin**.

```
No web users configured!
Please enter a web administrator username [admin]:admin
New password:*******
Confirm password:*******
User admin added.
```

Step 4: Verify that SSH and HTTPS are enabled as shown.

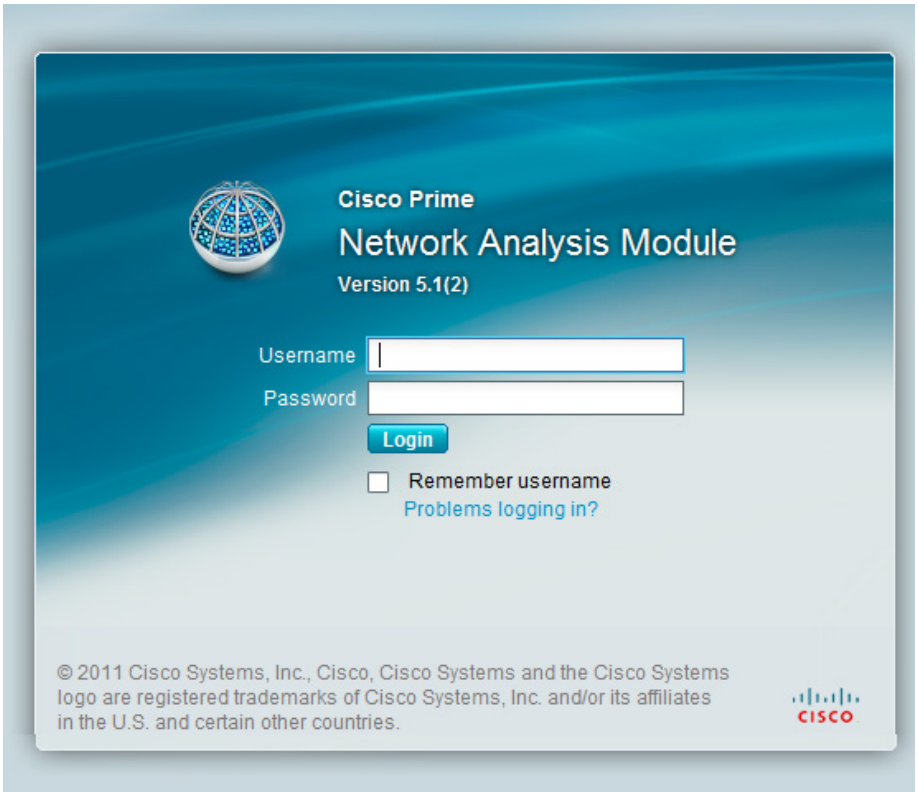
```
root@nam.cisco.local# show ip
IP ADDRESS:              10.5.0.18
SUBNET MASK:             255.255.255.252
IP BROADCAST:            10.5.0.19
DNS NAME:                NAM.CISCO.LOCAL
DEFAULT GATEWAY:         10.5.0.17
NAMESERVER(S):           10.4.48.10
HTTP SERVER:             DISABLED
HTTP SECURE SERVER:      ENABLED
HTTP PORT:               80
HTTP SECURE PORT:        443
TACACS+ CONFIGURED:      NO
TELNET:                  DISABLED
SSH:                     ENABLED
```

Procedure 3 Log in to Cisco NAM Traffic Analyzer GUI

After you have configured the Cisco NAM Traffic Analyzer web server and enabled access to it, you should log in. This verifies that the web server is working.

Step 1: In your browser's address box, enter the full hostname of Cisco Prime NAM: **https://[machine_name].[domain]** (Example: nam.cisco.local)

Step 2: When the login window appears, enter the administrator username and password that you configured in Procedure 2, "Secure Cisco Prime NAM on SRE," Step 3, and then click **Login**.



Procedure 4 Configure NAM for user authentication

(Optional)

If you have a centralized TACACS+ server, configure secure user authentication as the primary method for user authentication (login) and user authorization (configuration) by enabling AAA authentication for access control. AAA controls all management access to the Cisco NAM (HTTPS).

Tech Tip

A local web administrator was created on the Cisco NAM during setup. This user account provides the ability to manage the device in case the centralized TACACS+ server is unavailable, or if you do not have a TACACS+ server in your organization.

Step 1: On the NAM web UI, navigate to **Administration > Users > TACACS+**.

Step 2: Enter the following values in the TACACS+ configuration page:

- Enable TACACS+ Authentication and Authorization – selected
- Primary TACACS+ Server – **10.4.48.15**
- Secret Key – **SecretKey**
- Verify Secret Key – **SecretKey**

Step 3: Click **Submit**. The configuration is applied to Cisco NAM.

Procedure 5 Enable Cisco NAM packet monitoring

You can enable Cisco NAM packet monitoring on router interfaces that you want to monitor through the internal Cisco NAM interface.

Step 1: Enable Cisco NAM packet monitoring on the routers LAN interface. Cisco Express Forwarding sends an extra copy of each IP packet that is received from or sent out on that interface to Cisco NAM through the Cisco SRE interface on the router and the internal Cisco NAM interface.

```
ip cef
interface type [slot/port]
 analysis-module monitoring
```

Example

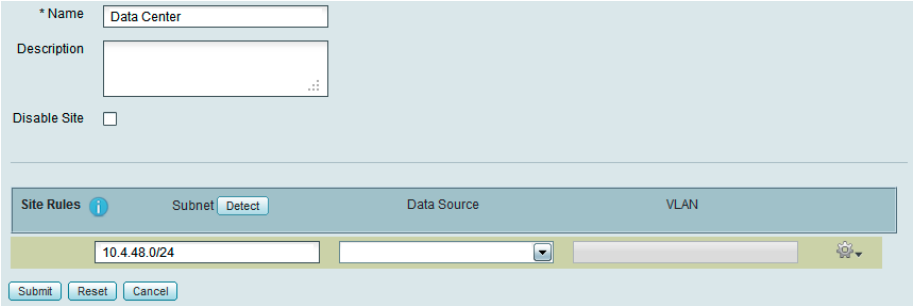
```
ip cef
!
interface GigabitEthernet 0/0
 analysis-module monitoring
```

Procedure 6 Set up sites

Setting up sites in Cisco NAM enables site-level monitoring. You create a site for the campus and a site for the data center.

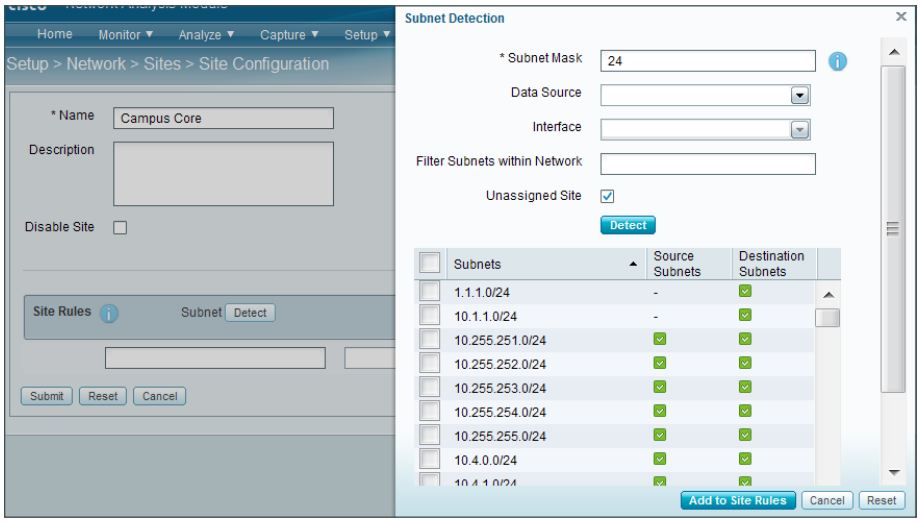
Step 1: Navigate to **Setup > Network > Sites**, and then click **Create**. The Site Configuration window appears.

Step 2: Specify the site name and the associated subnet, and then click **Submit**.



Step 3: If you want to display all the subnets available as seen by Cisco NAM, click **Detect**.

Step 4: In the Subnet Detection window, in the **Subnet Mask** box, enter the desired value, and then click **Detect.** Select the appropriate rows, and then click **Add to Site Rules**.



Procedure 7 View the home dashboard

Step 1: After creating sites, in the menu, choose **Home**.

The home dashboard links to Monitor > Overview > Traffic Summary. The Traffic Summary Overview dashboard provides information of Top N Applications, Top N Application Groups, Top N Hosts (In and Out), IP Distribution by Bits, Top N DSCP, and Top N VLAN.

Step 2: If you want to view the Traffic Summary by a site, in the **Interactive Report** list, choose **Filter**, in the **Site** list, choose **campus** or **data center**, and then click **Submit**.

Day 1+ Scenarios

This section walks you through a service-centric assurance approach to monitoring, analyzing and troubleshooting lifecycle for poor application performance, continuous packet capture, poor voice quality, and pre- and post- WAN optimization.

PROCESS

Analyzing and Troubleshooting Application Performance

1. Monitor SharePoint response time
2. Drill-down SharePoint response time
3. Analyze SharePoint response time trend
4. Analyze network vs. server congestion
5. Analyze SharePoint server
6. Set up packet capture session
7. Set up Cisco NAM alarm email
8. Set alarm actions
9. Set alarm thresholds
10. View alarm summary
11. Decode triggered packet capture
12. Scan for packet capture errors

An employee on campus calls the helpdesk because he/she have been experiencing delays with SharePoint (application). As a network engineer, a determination of where the problem lays either stemming from network congestion or severely impacted server needs to be assessed.

Currently the Cisco Catalyst 6500 Series NAM-3 is deployed in the campus and Cisco Prime NAM 2320 appliance is deployed in the data center. Either of these can be used to help with analysis and troubleshooting.

Since all application servers are hosted in the data center, the network engineer has configured a site called Data Center that can be used to filter by in the Interactive Report. You start with Response Time Summary dashboard in order to obtain an overview of application performance and then drill down to analyze if the issue is a result from an impacted server or a network congestion issue.

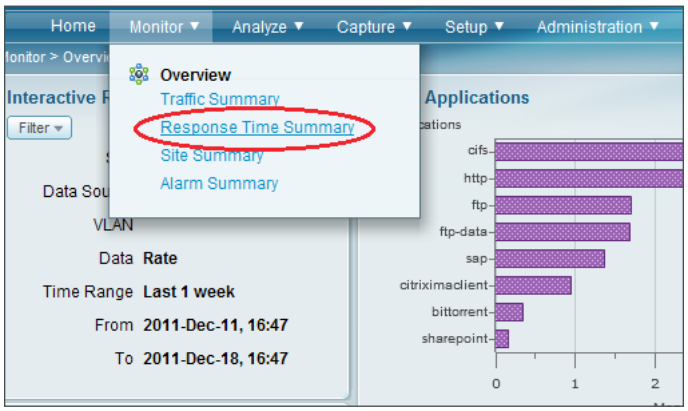
Once you complete the analysis and resolve the problem, you can take a pro-active approach by leveraging alarms to alert you and to capture packets should this issue happen in the future.

With Cisco NAM 2320 deployed in the data center, you have the option to leverage continuous packet capture and perform packet analysis when needed.

Procedure 1 Monitor SharePoint response time

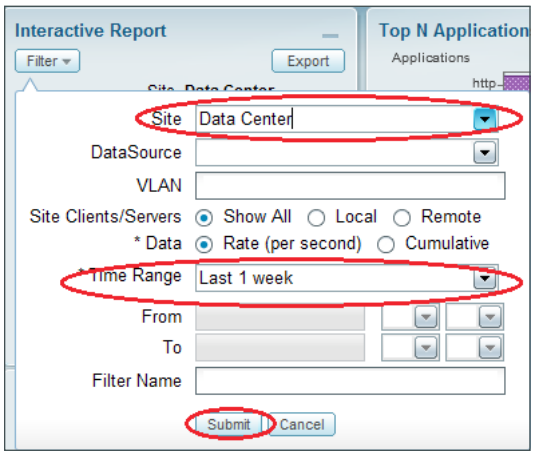
Because all application servers are hosted in the data center, and clients in the campus core are experiencing delays, you obtain an overview of application performance in the Response Time Summary dashboard.

Step 1: Navigate to **Monitor > Overview > Response Time Summary**.



Step 2: In the Interactive Report pane on the left, click **Filter.**

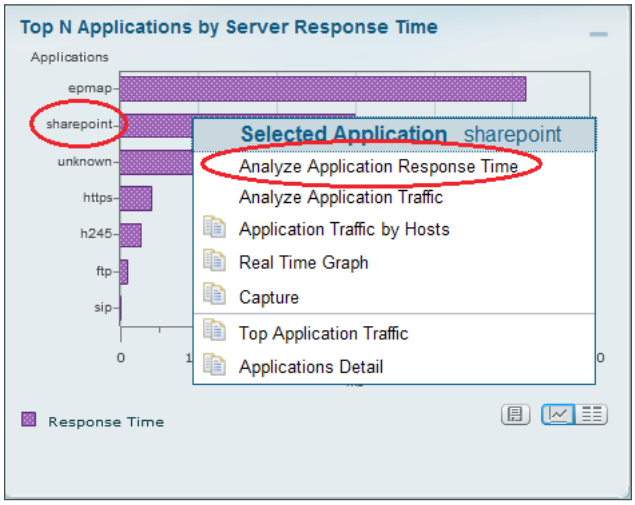
Step 3: In the **Site** list, choose **Data Center**, and in the **Time Range** list, choose **Last 1 week**, and then click **Submit**. You can now view application performance at the campus to the data center.



Procedure 2 Drill-down SharePoint response time

Noticing SharePoint's response time degradation (in the Top N Application by Server Response Time report), you drill down to analyze SharePoint.

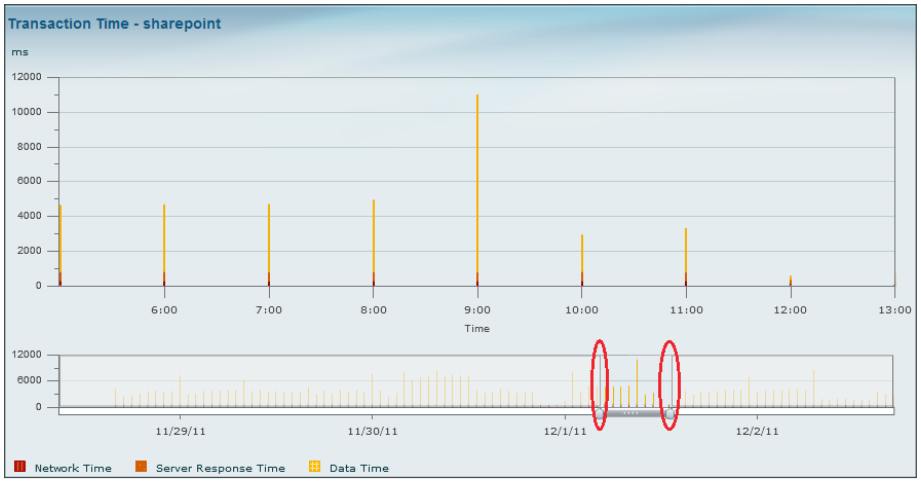
Step 1: In the Top N Applications by Server Response Time report, click **SharePoint**, and then choose **Analyze Application Response Time**.



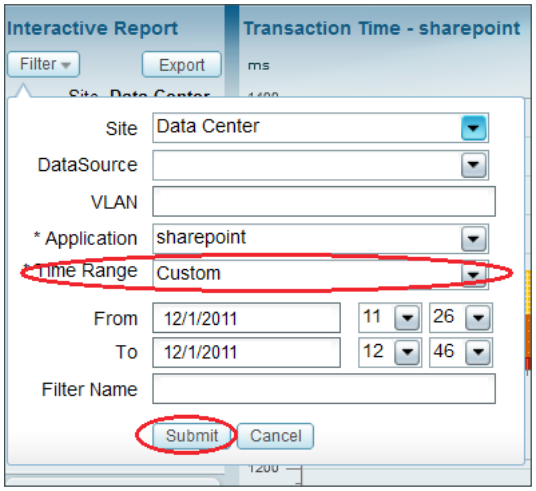
Procedure 3 Analyze SharePoint response time trend

In the SharePoint response time trend analysis, you observe a spike in overall response time. You zoom in to the time interval and note the clients that were affected, as well as a list of affected servers.

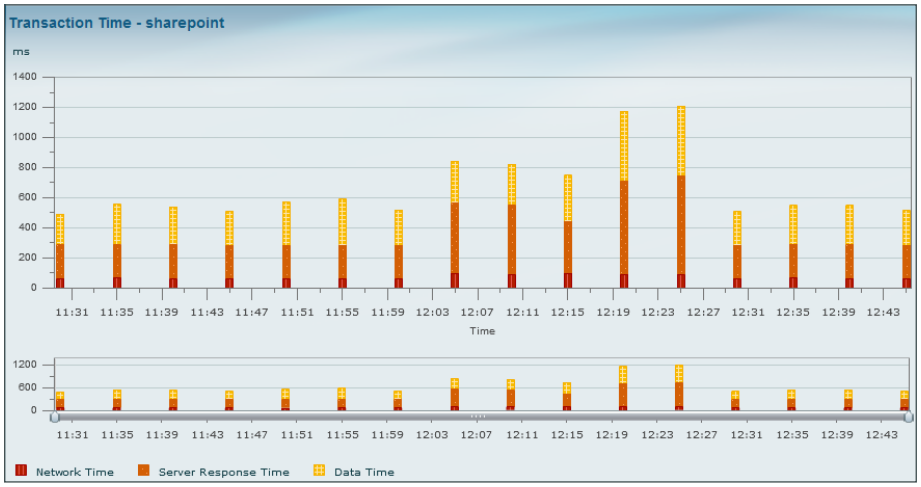
Step 1: Open the dashboard by navigating to **Analyze > Response Time > Application**, and then zoom to a spike in SharePoint response time by moving the left slider to a start point of the time-interval of interest and the right slider to the end point of the interval of interest.



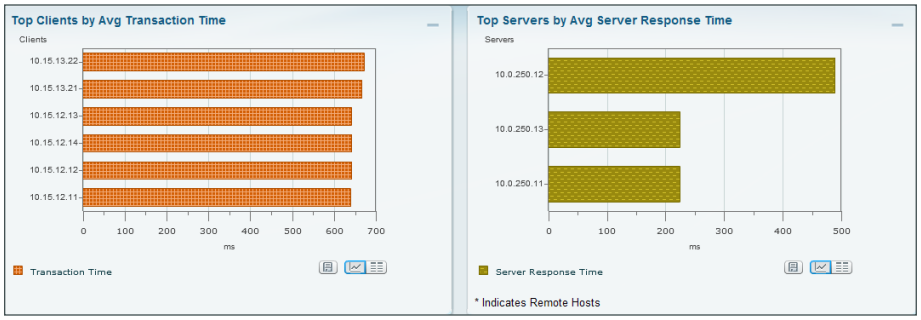
Step 2: Obtain more granular detail by clicking **Filter**, and in the **Time Range** list, choosing **Custom**. Specify a time range from 12/1/2011 at 11:26 to 12/1/2011 at 12:46, as shown, and then click **Submit**.



The transaction time for application SharePoint appears.



Step 3: Scroll down to view top clients and servers that were affected by poor SharePoint response time during this interval.



Procedure 4 Analyze network vs. server congestion

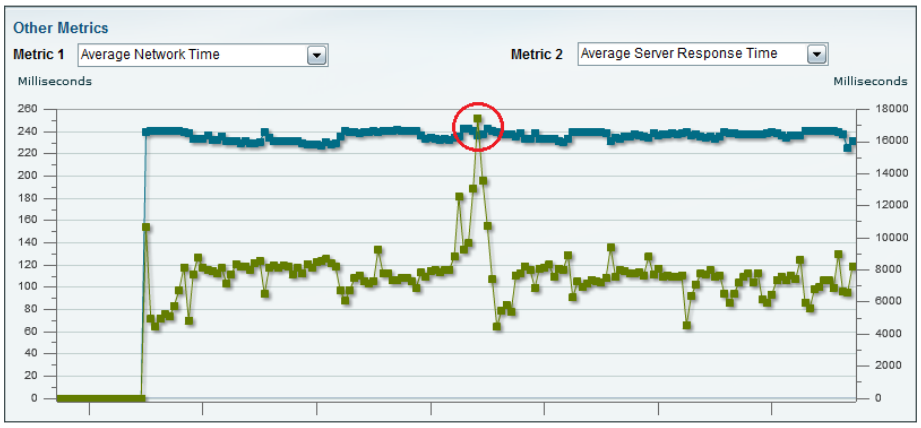
To determine if the cause is from a network congestion issue or a server issue, you analyze the network time and the application transaction time. Since the network time is constant (no network delay), you have determined the root cause is an application delay from an overloaded server.

Next you determine if the root cause is from a network delay or server delay.

Step 1: On the Transaction Time report page, scroll down further to the **Other Metrics** chart.

Step 2: In the **Metric 1** list, choose **Average Network Time**, which represents network delay.

Step 3: In the **Metric 2** list, choose **Average Server Response Time**, which represents server application delay.



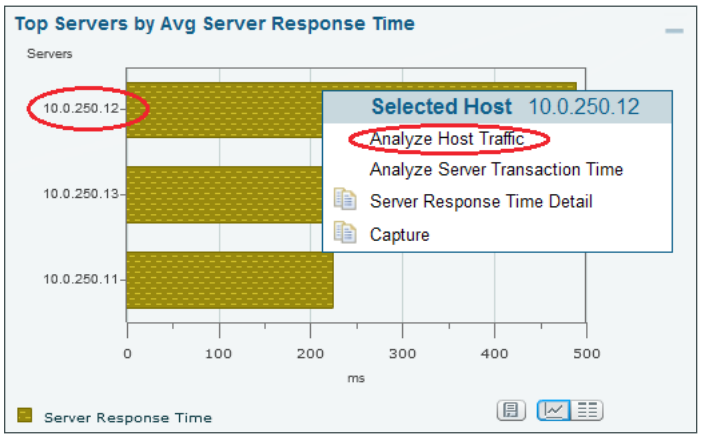
Step 4: Examine the resulting data. Based on the spike in the green line (average server response time) and the consistency of the blue line (average network time), you infer the issue stems from a delay from the application server.

Procedure 5 Analyze SharePoint server

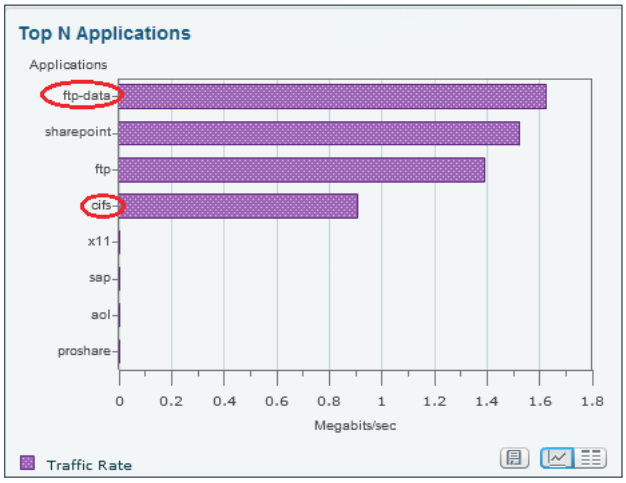
Because you can infer that the issue stems from a delay on the application server, look at applications other than SharePoint that might be causing the delay.

Step 1: Scroll back up and view the Top Servers by Avg Server Response Time chart.

Step 2: Further analyze this server by clicking **10.0.250.12**, and then clicking **Analyze Host Traffic**.



Step 3: From the 10.0.250.12 analysis dashboard, scroll down to view applications running on this server in **Top N Applications**. You notice that in addition to the business-critical application on this server, SharePoint, FTP, and CIFS are also running. You realize that many users are downloading the latest Windows 7 patch hosted on this server, which affected SharePoint as well.



Step 4: Take corrective action by ensuring that existing and future Windows patches are hosted on a different server.

Procedure 6 Set up packet capture session

To take a proactive approach moving forward, you create alarms to alert you via email and trigger a packet-capture based on SharePoint response-time normal-trend values.

Step 1: Navigate to **Capture > Packet Capture/Decode > Sessions**, and then click **Create**. The Capture Settings window appears.

Step 2: In the **Name** box, type **SharePoint_Capture**.

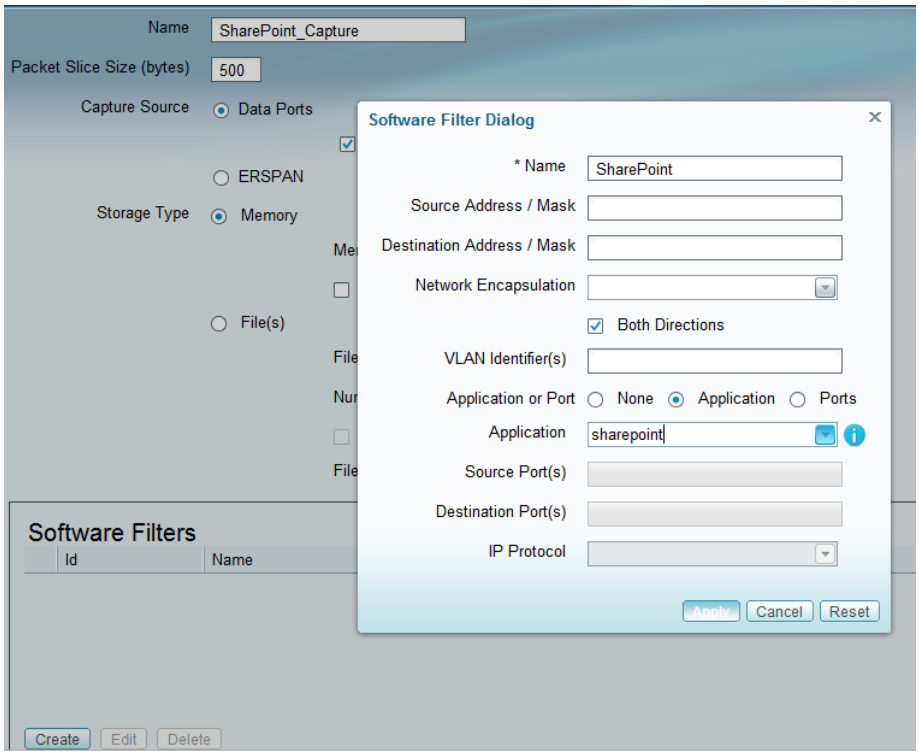
Step 3: Under **Capture Source**, choose **DATA PORTs**. Leave the **Packet Slice Size** at 500 bytes (the default). This limits the size of the capture packets.

Step 4: Under **Storage Type**, choose **Memory,** and then in the **Memory Size** box, enter **100**.

Step 5: In the **Software Filters** pane, click **Create.** The Software Filter dialog box appears.

Step 6: Enter the following values:

- Name–**SharePoint**
- Both Directions–selected
- Application or Port–**Application**
- Application–**sharepoint**



Step 7: Click **Apply**, and then click **Submit.** The capture session is created.

Procedure 7 Set up Cisco NAM alarm email

Step 1: Navigate to **Administration > System > E-Mail Setting**, and then choose **Enable Mail**.

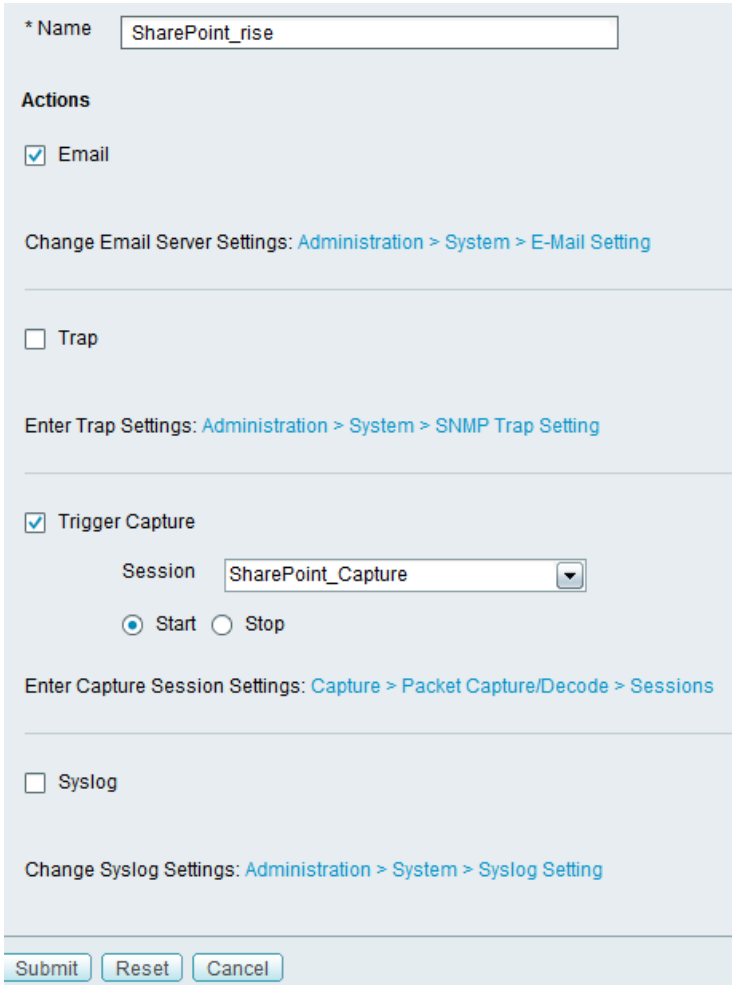
Step 2: Enter the hostname of the **External Mail Server**.

Step 3: In the **Mail Alarm to** box, enter one or more email addresses that will receive the Cisco NAM alarm mail. Use a space to separate multiple email addresses.

Step 4: Click **Submit**.

Procedure 8 Set alarm actions

Step 1: Navigate to **Setup > Alarms > Actions**, and then click **Create**.



Step 2: Enter a description of the alarm event. (Example: SharePoint_rise)

Step 3: Under Actions, select **Email**. When threshold on the rising value is violated, an email alert will be sent to the email you specified in Procedure 7, "Set up Cisco NAM alarm email."

Step 4: Select **Trigger Capture**.

Step 5: In the **Session** list, choose **SharePoint_Capture** (configured in Procedure 6, "Set up packet capture session"), and then select **Start**. This will start a packet capture when the threshold on the rising value is violated.

Step 6: Click **Submit**.

The Alarm Events table displays the newly configured Alarm Event in its list.

Step 7: Next, create a second event for the falling edge alarm action, repeat Step 1through Step 6 with the following changes:

- Name–**SharePoint_fall**
- Trigger Capture–**Stop**

Procedure 9 Set alarm thresholds

Step 1: Navigate to **Setup > Alarms > Thresholds**. The Alarm Events table displays any configured Alarm Events.

Step 2: Click **Create**, and then click the **Response Time** tab**.**

Step 3: Enter a name for the response time threshold. (Example: SharePoint_ResponseTime)

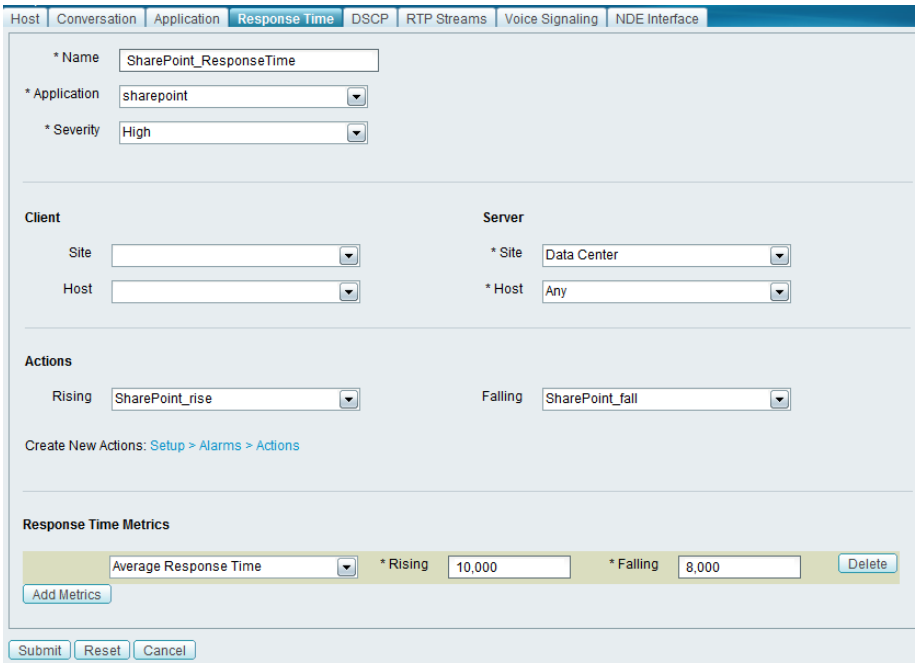
Step 4: In the **Application** list, choose **sharepoint**.

Step 5: Under Server, in the **Site** list, choose **Data Center**, and then in the **Host** list, choose **Any** (because there is more than one server in the data center hosting SharePoint).

Step 6: Under **Actions**, choose the alarm actions you created in Procedure 8, "Set alarm actions," for the rising edge of the threshold and the falling edge of the threshold. In this example, SharePoint_rise is associated with the rising action and SharePoint_fall is associated with the falling action.

Step 7: Under Response Time Metrics, choose **Average Response Time**. In the **Rising** list, choose **10,000** milliseconds, and then in the **Falling** list, choose **8,000** milliseconds.

> **Tech Tip**
>
> You can add more metrics for this threshold by clicking **Add Metrics**.



Step 8: Click **Submit**.

Procedure 10 View alarm summary

When you receive an email alert that SharePoint response time has exceeded your configured threshold, you can use the Cisco NAM dashboard to learn more details of the alarm, as well as analyze the triggered packet capture. You can help reduce time and effort in analyzing the packet capture by invoking Error Scan to quickly view just the packets with anomalies.

Step 1: Navigate to **Monitor > Overview > Alarm Summary**, and then view the Top N Applications by Alarm Count chart.

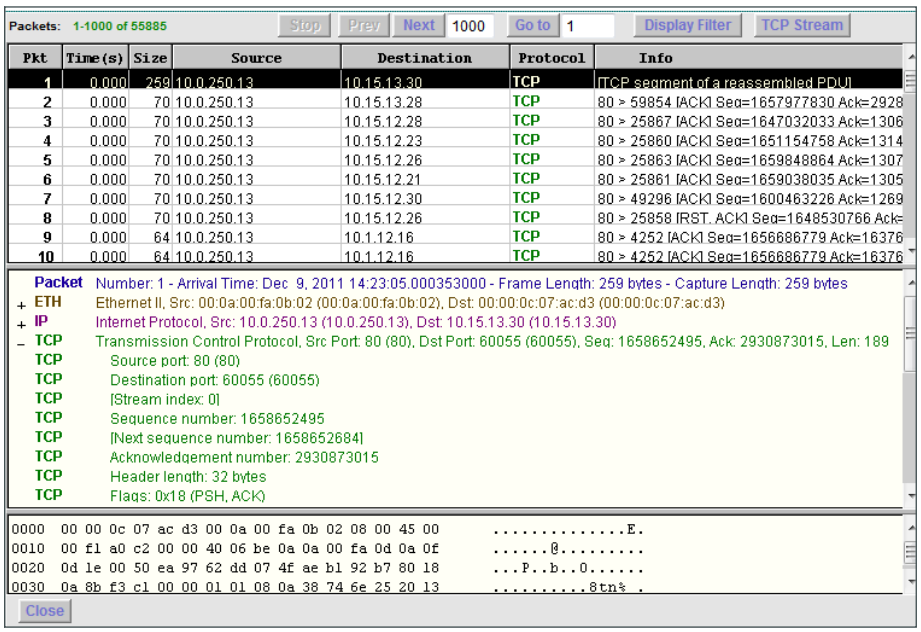
Step 2: Identify the SharePoint application.

Step 3: Click **SharePoint**, and then click **All Alarms**. Additional details appear.

Procedure 11 Decode triggered packet capture

Step 1: Navigate to **Capture > Packet Capture/Decode > Sessions**, and then select the **SharePoint_Capture** (configured in Procedure 6, "Set up packet capture session") that was triggered when the SharePoint threshold was violated.

Step 2: Click **Decode**. A dialog box showing packet decode appears.



Procedure 12 Scan for packet capture errors

Step 1: Navigate to **Capture > Packet Capture/Decode > Sessions**, and then select **SharePoint_Capture**.

Step 2: If the capture is in progress, click **Stop**.

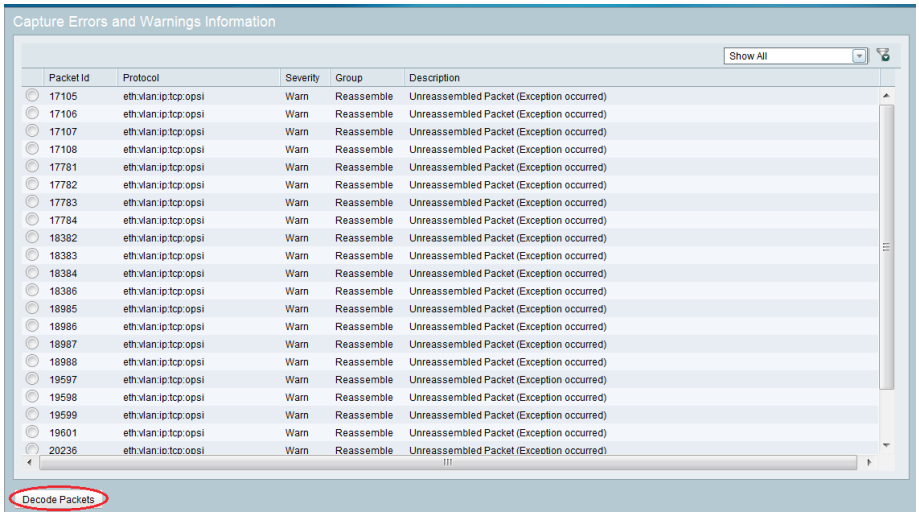
Step 3: Click **Save To File**.

Step 4: On the Save File dialog box, provide a **New File Name**, and then click **OK.**

Step 5: Navigate to **Capture > Packet Capture/Decode > Files**, and then select **SharePoint_Capture.pcap**.

Step 6: Click **Errors Scan.** The Capture Errors and Warnings Information dialog box opens.

Step 7: On the Capture Errors and Warnings Information dialog box, select a packet with an anomaly, and then click **Decode Packets**. You can further analyze the packet and continue troubleshooting.



PROCESS

Configuring Continuous Packet Capture

1. Create a capture session

The Cisco Prime NAM 2320 appliance can be configured with 24x1-TB hard disk drives, of which, approximately 20 TB are used for packet capture. In this example, the IT manager wants to continuously capture application server traffic. If there is any anomaly detected during the analysis of the dashboards or from the alarms, the IT manager can decode the packet capture that has been running in the background on the NAM.

Procedure 1 Create a capture session

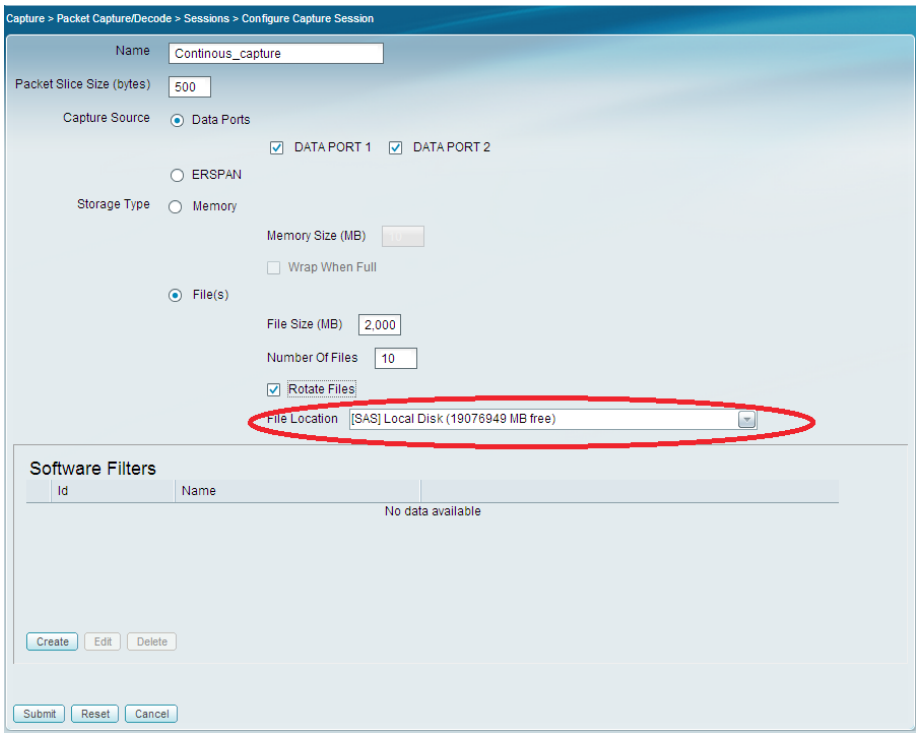
Step 1: Navigate to **Capture > Packet Capture/Decode > Sessions**.

Step 2: Click **Create.** A packet capture session is created.

Step 3: Enter an appropriate name for the packet capture session (Example: Continous_capture), and then select the appropriate Data Ports to capture (Example: Data port 1 and 2).

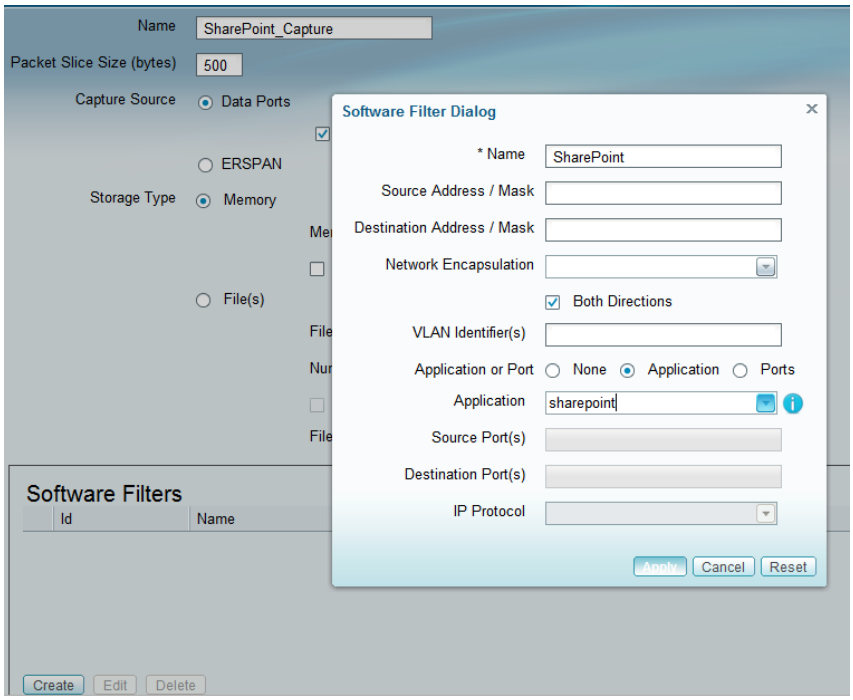
Step 4: For storage type, select **Files**, and then enter the appropriate file size (ranging from 1 MB to 2,000 MB).

Step 5: Enter the number of files to be created for this session, and then select **Rotate Files**. Leave the default **File Location** setting to Local Disk.



Step 6: Create packet capture filters. You can use a combination of either hardware filters or software filters, or both, for the capture session.

If you want to use software filters, in the Software Filters section (in the packet capture session), click **Create**, fill in the appropriate filters, click **Apply**, scroll down, and then click **Submit**. The capture session is created.

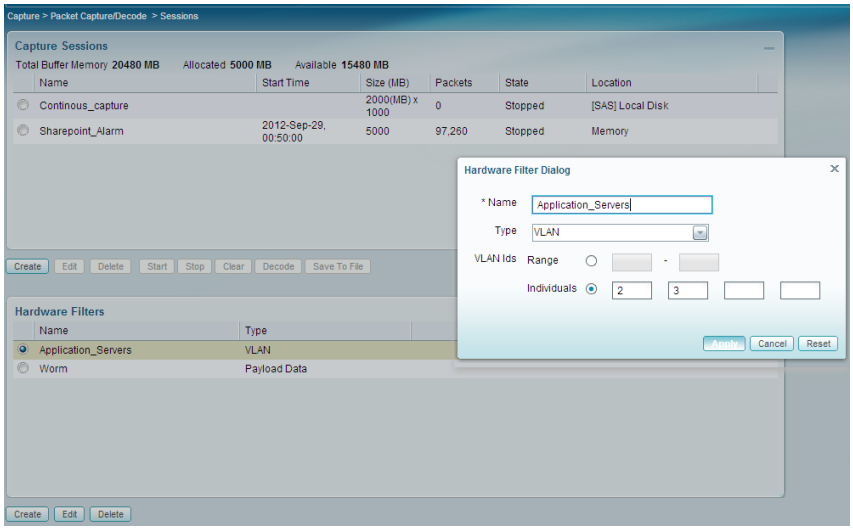


If you want to use the hardware filters, in **Capture > Packet Capture/Decode > Sessions** dashboard, scroll down to the Hardware Filters section, and then click **Create**. In the Hardware Filter dialog box, name this filter Application_Servers.

Step 7: Since the application servers sit in VLAN 2 and 3, select **Type** as VLAN, and then in the Individual VLAN input, enter **2** and **3**.

Next, start continuous packet capture.

Step 8: Once the filters have been applied, select the row **Continuous_capture**, and then click **Start**.



PROCESS

Analyzing and Troubleshooting Voice

1. Enable voice and RTP monitoring
2. Analyze RTP streams
3. View regional office traffic use

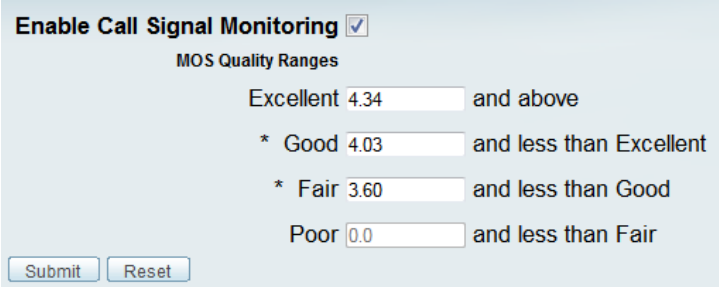
In this scenario, you are an IT network manager. You currently have deployed Cisco Prime NAM on Cisco ISR G2 SRE 710 in the Singapore regional office and have configured two sites called regional office and a campus to filter by in the Interactive Report.

To resolve a scenario in which a couple of users have opened a trouble ticket that describes their recent experience of choppy audio during a call, follow the procedures below.

Procedure 1 Enable voice and RTP monitoring

Step 1: Navigate to **Setup > Monitoring > Voice**.

Step 2: Ensure that **Enable Call Signal Monitoring** is selected and that you are satisfied with the default Mean Opinion Score (MOS) values.



Step 3: Navigate to **Setup > Monitoring > RTP Filter** and ensure that **Enable RTP Stream Monitoring** is selected.

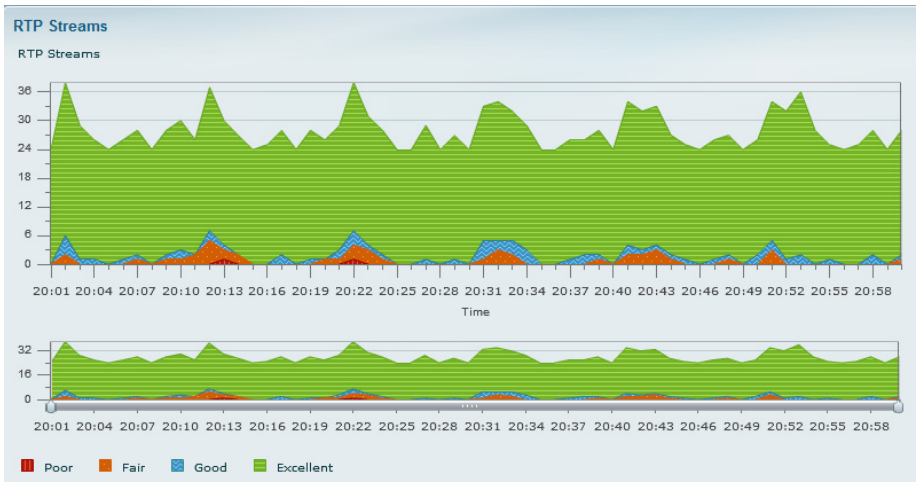
Procedure 2 Analyze RTP streams

Step 1: Navigate to **Analyze > Media > RTP Streams**.

Step 2: In the Interactive Report pane on the left, click **Filter**.

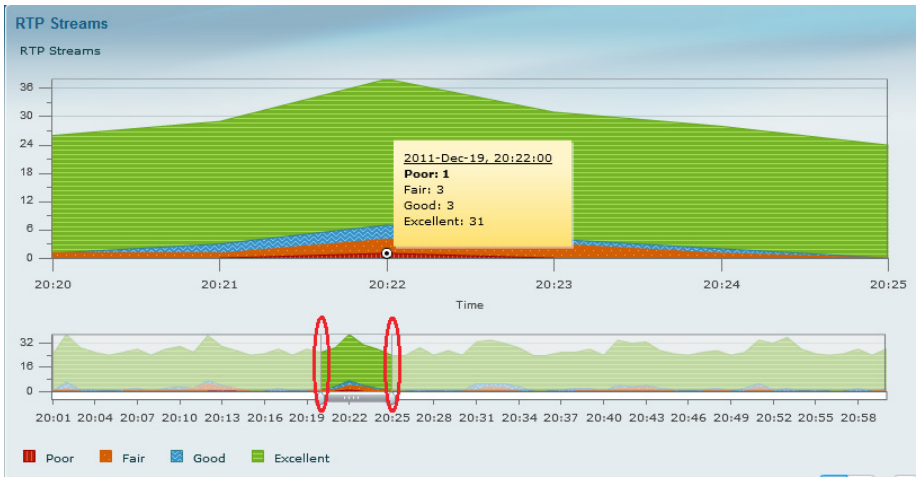
Step 3: Under **Site**, specify the regional office site.

Step 4: For **Time Range**, specify the Last 1 hour, and then click **Submit**. The RTP Streams chart appears.



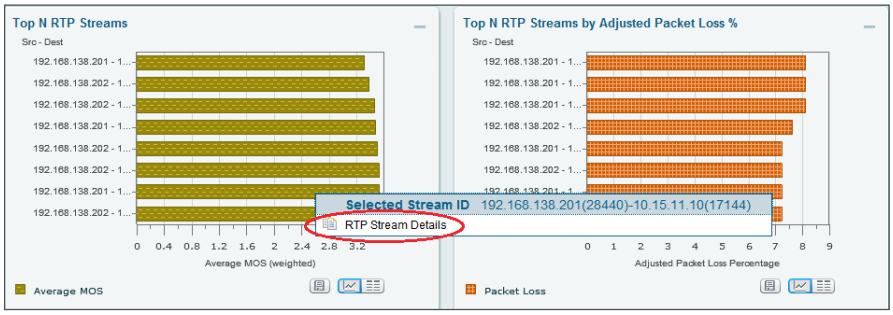
Next, analyze poor MOS values.

Step 5: Use the slider controls on the bar to zoom in to a time interval. In the following figure, there are a total of 41 RTP-streams, with one RTP-stream rated as poor MOS value and three RTP-streams rated as fair MOS value.

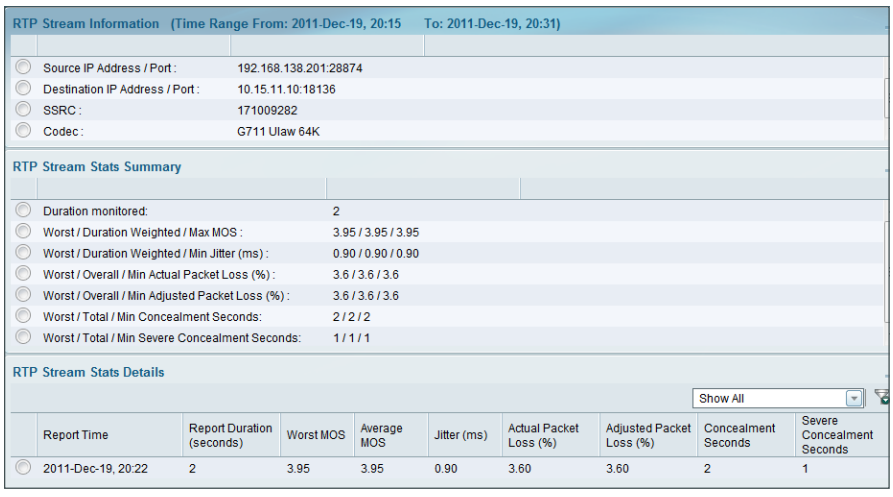


Step 6: Scroll down to view the Top N Source/Destination Endpoints, Top N RTP Stream, and Top N RTP Streams by Adjusted Packet Loss % charts.

Step 7: If you want to further analyze an RTP-stream, select an endpoint from the Top N RTP Streams by Adjusted Packet Loss % chart, click a data-point of interest, and then click **RTP Stream Details**.



A new dialog box appears, providing varied RTP-stream information, such as codec, MOS, jitter, packet loss, RTP Stream Stats Summary, and RTP Stream Stats Details.



RTP Stream Information (Time Range From: 2011-Dec-19, 20:15 To: 2011-Dec-19, 20:31)

Source IP Address / Port :	192.168.138.201:28874
Destination IP Address / Port :	10.15.11.10:18136
SSRC :	171009282
Codec :	G711 Ulaw 64K

RTP Stream Stats Summary

Duration monitored:	2
Worst / Duration Weighted / Max MOS :	3.95 / 3.95 / 3.95
Worst / Duration Weighted / Min Jitter (ms) :	0.90 / 0.90 / 0.90
Worst / Overall / Min Actual Packet Loss (%) :	3.6 / 3.6 / 3.6
Worst / Overall / Min Adjusted Packet Loss (%) :	3.6 / 3.6 / 3.6
Worst / Total / Min Concealment Seconds:	2 / 2 / 2
Worst / Total / Min Severe Concealment Seconds:	1 / 1 / 1

RTP Stream Stats Details

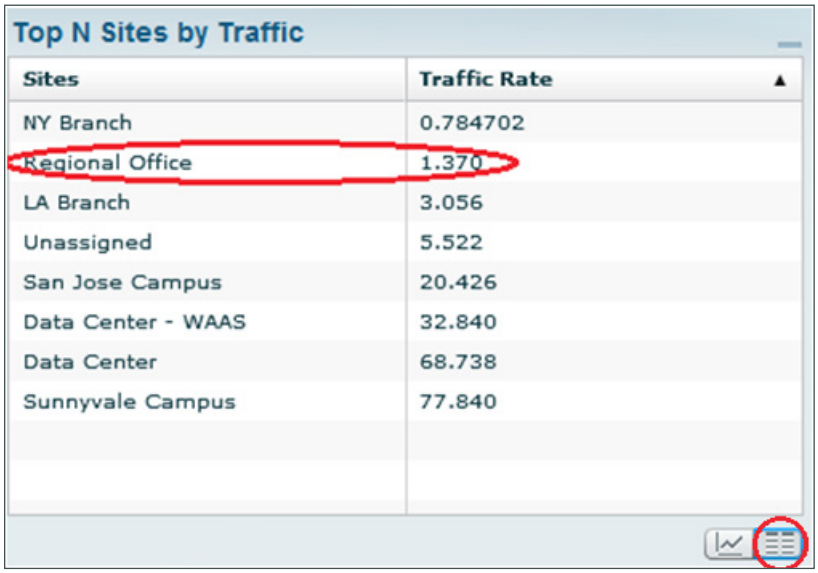
Show All

Report Time	Report Duration (seconds)	Worst MOS	Average MOS	Jitter (ms)	Actual Packet Loss (%)	Adjusted Packet Loss (%)	Concealment Seconds	Severe Concealment Seconds
2011-Dec-19, 20:22	2	3.95	3.95	0.90	3.60	3.60	2	1

Procedure 3 View regional office traffic use

Step 1: Navigate to **Monitor > Overview > Site Summary**.

Step 2: In the Top N Sites by Traffic chart grid view, observe Regional Office traffic use.



PROCESS

Deploying Pre- and Post- WAN Optimization

1. Identify performance challenges
2. Baseline acceptable app performance
3. Send WAAS Flow Agent (FA) to NAM
4. Analyze impact of WAN optimization
5. Monitor and analyze WAN optimized traffic
6. Troubleshoot a WAN-optimized network

IT network managers are tasked with deploying WAN optimization, including data center server and storage consolidation efforts to protect data, increased availability, and a reduction in the number of devices to manage, so the distributed workforce can benefit from LAN-like performance over WAN for enterprise applications. WAN optimization helps employees be more productive and drive bottom-line revenue and profits.

To roll out WAN optimization, the IT network manager needs to identify which site has application performance issues and to be able to quantify the application performance. Once a site is selected for WAN optimization deployment, the IT network manager needs to validate the impact of WAN optimization, monitor ongoing optimization, and troubleshoot WAN optimized traffic. Follow the procedures below to leverage Cisco NAM in order to provide visibility to Cisco Wide Area Application Services (WAAS) lifecycle deployment.

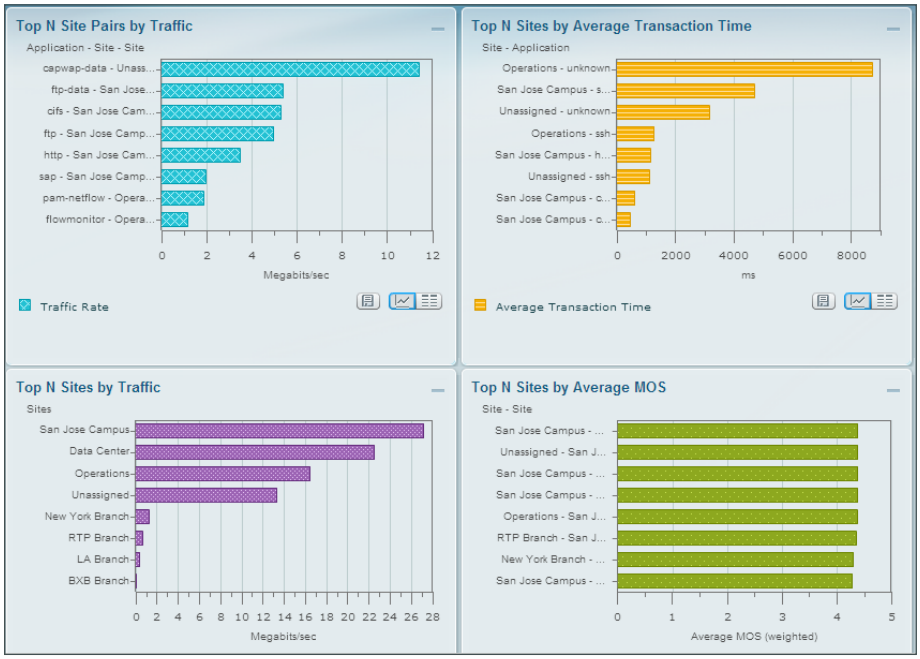
For details about how to deploy Cisco WAAS, see the Application Optimization Using Cisco WAAS Design Guide.

Procedure 1 Identify performance challenges

In this procedure you identify sites, application, or hosts with application performance challenges.

Step 1: Navigate to **Monitor > Overview > Site Summary** dashboard. This dashboard shows sites with highest average transaction time and sites with highest traffic rate.

Step 2: Select sites that would benefit most from WAN optimization. For the initial rollout of Cisco WAAS, this guide uses the San Jose Campus site.



Next, Select application, clients (in a site) or servers (in a site) for WAN optimization.

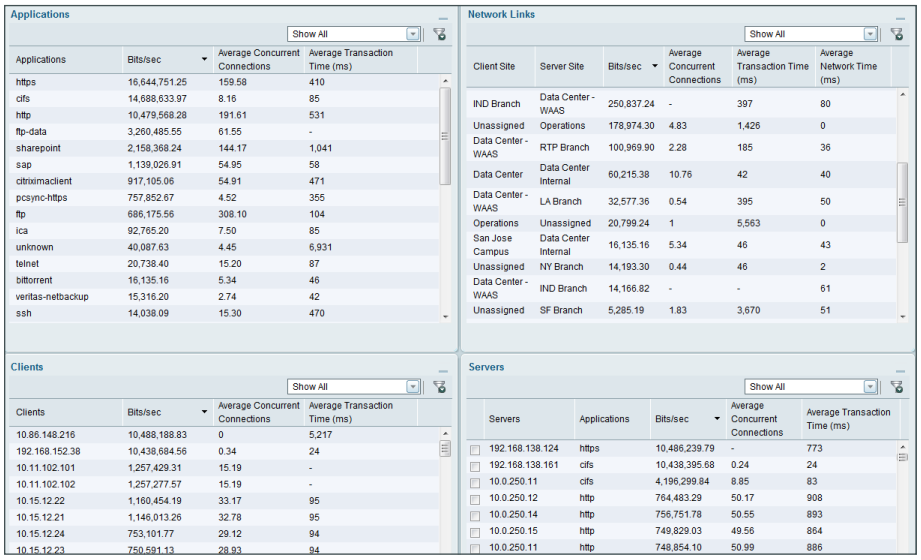
Step 3: Navigate to **Analyze > WAN Optimization > Top Talkers Detail** dashboard.

This page provides details on top applications, clients, servers and network links with additional information on connect counts and average transaction time. You can use this page to determine the top application protocols by transaction time, connection count, as well as by data volume and data rate.

You can use the Servers chart on this page to add top servers to the Cisco WAAS monitoring list. Application servers with high volume or with high transaction time can be good candidates for WAAS monitoring.

Tech Tip

It is important to select the site and the data sources on this page in order to avoid duplicate counting of the traffic unless the site defined already has a data source filter.



Applications

Show All

Applications	Bits/sec	Average Concurrent Connections	Average Transaction Time (ms)
https	16,644,751.25	159.58	410
cifs	14,688,633.97	8.16	85
http	10,479,568.28	191.61	531
ftp-data	3,260,485.55	61.55	-
sharepoint	2,158,368.24	144.17	1,041
sap	1,139,026.91	54.95	58
citriximaclient	917,105.06	54.91	471
pcsync-https	757,852.67	4.52	355
ftp	686,175.56	308.10	104
ica	92,765.20	7.50	85
unknown	40,087.63	4.45	6,931
telnet	20,738.40	15.20	87
bittorrent	16,135.16	5.34	46
veritas-netbackup	15,316.20	2.74	42
ssh	14,038.09	15.30	470

Network Links

Show All

Client Site	Server Site	Bits/sec	Average Concurrent Connections	Average Transaction Time (ms)	Average Network Time (ms)
IND Branch	Data Center - WAAS	250,837.24	-	397	80
Unassigned	Operations	178,974.30	4.83	1,426	0
Data Center - WAAS	RTP Branch	100,969.90	2.28	185	36
Data Center	Data Center Internal	60,215.38	10.76	42	40
Data Center - WAAS	LA Branch	32,577.36	0.54	395	50
Operations	Unassigned	20,799.24	1	5,563	0
San Jose Campus	Data Center Internal	16,135.16	5.34	46	43
Unassigned	NY Branch	14,193.30	0.44	46	2
Data Center - WAAS	IND Branch	14,166.82	-	-	61
Unassigned	SF Branch	5,285.19	1.83	3,670	51

Clients

Show All

Clients	Bits/sec	Average Concurrent Connections	Average Transaction Time (ms)
10.86.148.216	10,488,188.83	0	5,217
192.168.152.38	10,438,684.56	0.34	24
10.11.102.101	1,257,429.31	15.19	-
10.11.102.102	1,257,277.57	15.19	-
10.15.12.22	1,160,454.19	33.17	95
10.15.12.21	1,146,013.26	32.78	95
10.15.12.24	753,101.77	29.12	94
10.15.12.23	750,591.13	28.93	94

Servers

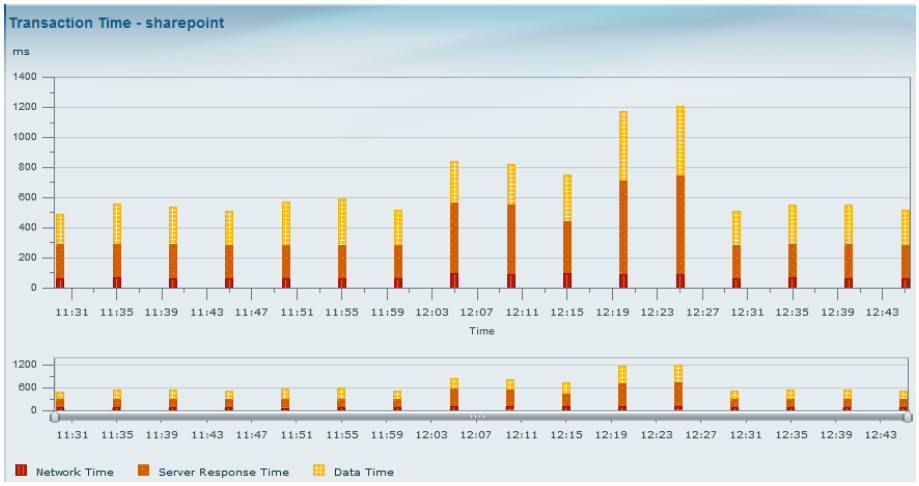
Show All

Servers	Applications	Bits/sec	Average Concurrent Connections	Average Transaction Time (ms)
192.168.138.124	https	10,486,239.79	-	773
192.168.138.161	cifs	10,438,395.68	0.24	24
10.0.250.11	cifs	4,196,299.84	8.85	83
10.0.250.12	http	764,483.29	50.17	908
10.0.250.14	http	756,751.78	50.55	893
10.0.250.15	http	749,829.03	49.56	864
10.0.250.11	http	748,854.10	50.99	886

Procedure 2 Baseline acceptable app performance

Step 1: Navigate to **Analyze > Response Time > Application** dashboard.

In the **Filter** list, select the **San Jose Campus** site, the Time Range for **last 1 day**, and Application as **SharePoint**. The resulting analysis can help you understand Sharepoint performance and quantify response time by network time, server response time, and data transfer time. A comparison can be done later after Cisco WAAS is deployed in order to understand the improved application performance.

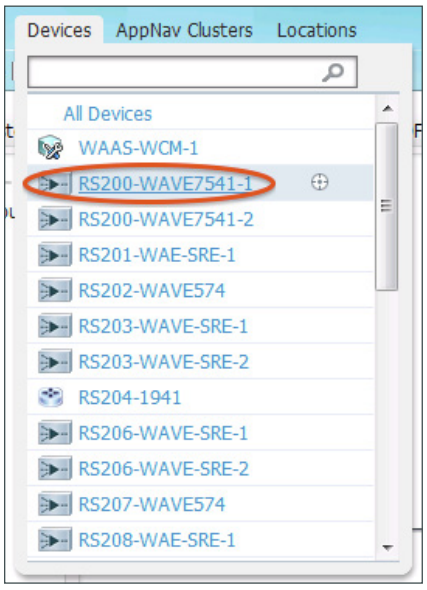


Procedure 3 Send WAAS Flow Agent (FA) to NAM

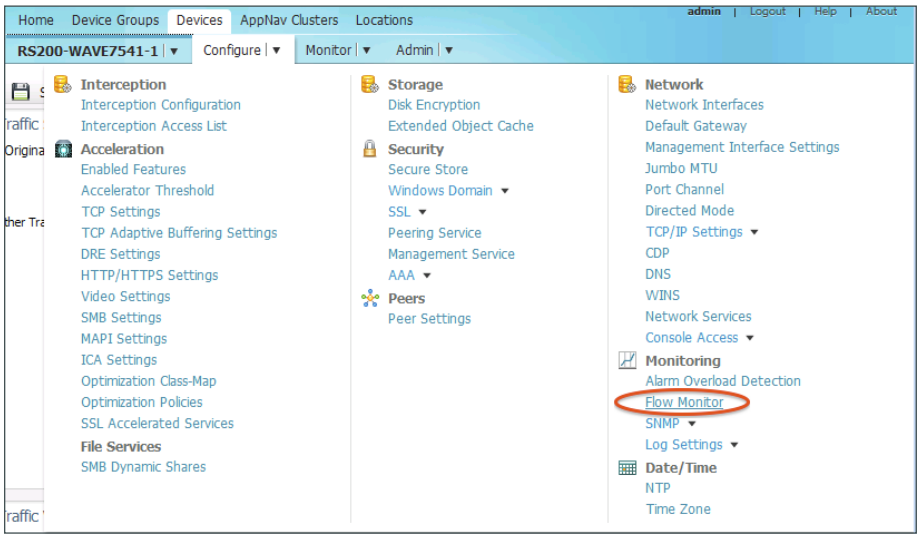
After Cisco WAAS is deployed, you need to configure the Cisco WAAS device to send WAAS FA to Cisco NAM.

Step 1: In your browser's address box, enter the full hostname of Cisco WAAS Central Manager, **https://[Machine Name].[Domain]:8443** (Example: CM.cisco.local).

Step 2: In **Central Manager > Devices**, select the remote site Wide Area Application Engine (WAE) device.

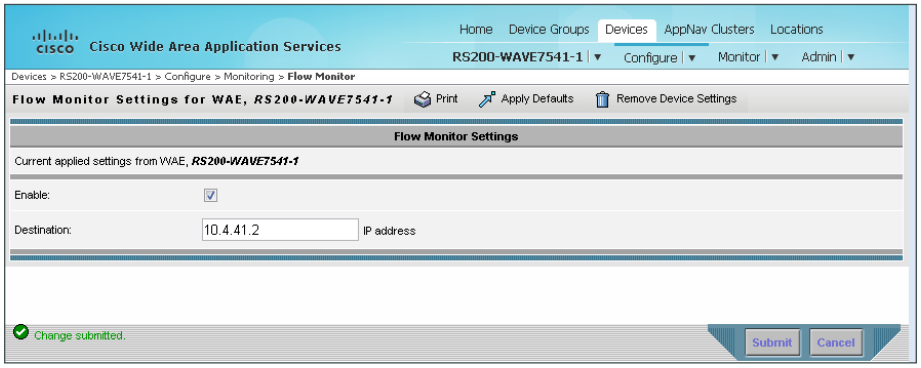


Step 3: Select **Configure** > **Monitoring** > **Flow Monitor**. This enables FA to Cisco NAM.



Step 4: Enter the IP address of the Cisco NAM appliance, and then click **Submit**.

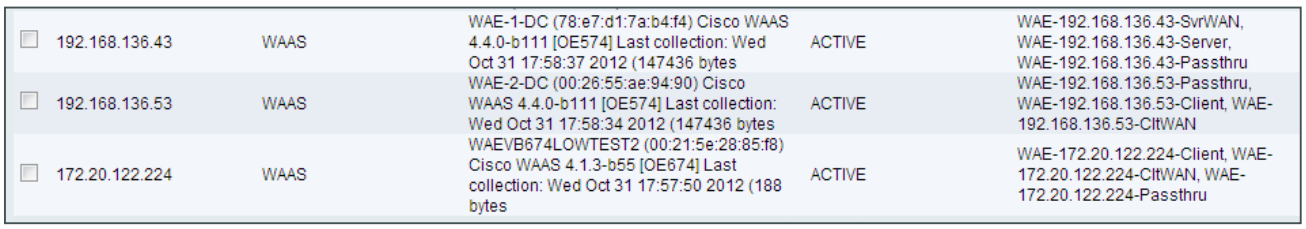
Step 5: Select **Enable**, and then click **Submit**.



Step 6: Repeat Step 1through Step 4for campus or data center head-end Cisco WAE device.

Step 7: Validate Cisco WAAS FA is received on Cisco NAM by navigating to **Setup > Traffic > NAM Data Sources**.

Step 8: For the Cisco WAE device deployed at the remote site, define the traffic source as Client, CltWAN, and Passthru (Example: WAEVB674LOWTEST2, as shown in the following figure). For the WAE device deployed at the head-end, define that traffic source as Server, SvrWAN, and Passthru (Example: WAE-1-DC, as shown in the following figure).

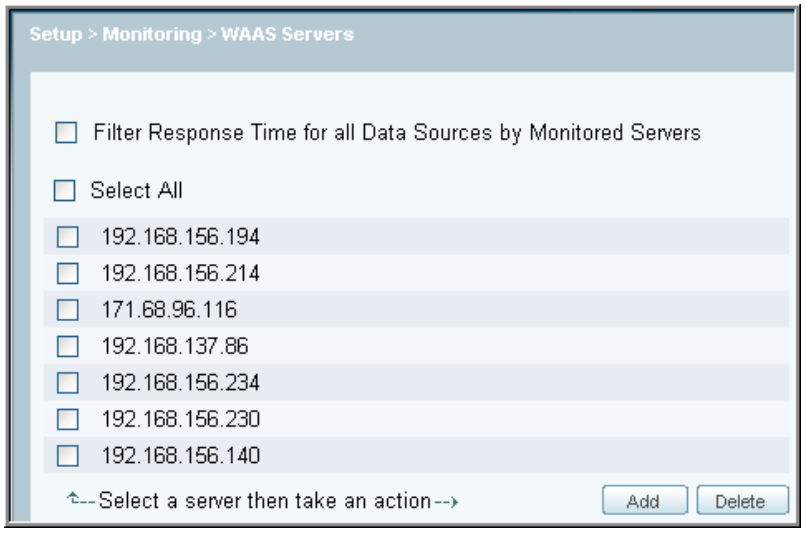


192.168.136.43	WAAS	WAE-1-DC (78:e7:d1:7a:b4:f4) Cisco WAAS 4.4.0-b111 [OE574] Last collection: Wed Oct 31 17:58:37 2012 (147436 bytes	ACTIVE	WAE-192.168.136.43-SvrWAN, WAE-192.168.136.43-Server, WAE-192.168.136.43-Passthru
192.168.136.53	WAAS	WAE-2-DC (00:26:55:ae:94:90) Cisco WAAS 4.4.0-b111 [OE574] Last collection: Wed Oct 31 17:58:34 2012 (147436 bytes	ACTIVE	WAE-192.168.136.53-Passthru, WAE-192.168.136.53-Client, WAE-192.168.136.53-CltWAN
172.20.122.224	WAAS	WAEVB674LOWTEST2 (00:21:5e:28:85:f8) Cisco WAAS 4.1.3-b55 [OE674] Last collection: Wed Oct 31 17:57:50 2012 (188 bytes	ACTIVE	WAE-172.20.122.224-Client, WAE-172.20.122.224-CltWAN, WAE-172.20.122.224-Passthru

Next, configure the application servers for Cisco WAE to monitor and send relevant information to Cisco NAM.

Step 9: Navigate to **Setup > Monitoring > WAAS Servers**.

Step 10: As you did in Procedure 1, "Identify performance challenges," Step 1, you can use the application server information and add it (for instance, IP addresses) in the table.



Step 11: Navigate to **Setup > Traffic > NAM Data Sources** and validate the status of Cisco WAAS FA is Active.

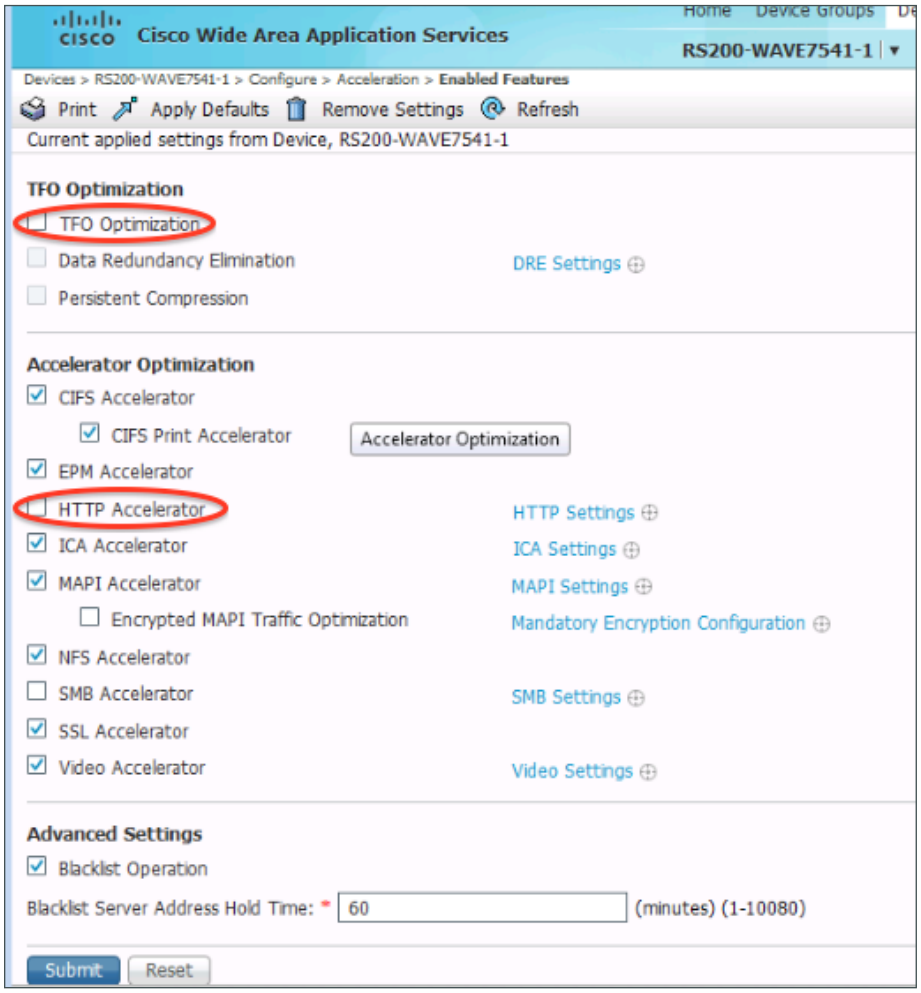
Tech Tip

If the Data Source is still Inactive, validate Procedure 3, "Send WAAS Flow Agent (FA) to NAM," again. You can check the Cisco WAAS FA packets counter on the Cisco WAE appliance to see if there are any drops by using the following command: **show statistics flow monitor tcpstat-v1**. Also, check that firewall policies are not blocking the ports that WAE and Cisco NAM use for data and control connection.

Procedure 4 Analyze impact of WAN optimization

In order to display the pre- and post- WAN optimization in the dashboard, log onto Cisco WAAS Central Manager and disable optimization policy for the *before* trend. Once Cisco NAM collects a sufficient amount of data over a period of time, enable the optimization policy for the *after* trend.

Step 1: In Central Manager > **Configure** > **Acceleration** > **Enabled Features**, clear **TFO Optimization** and **HTTP Accelerator**.

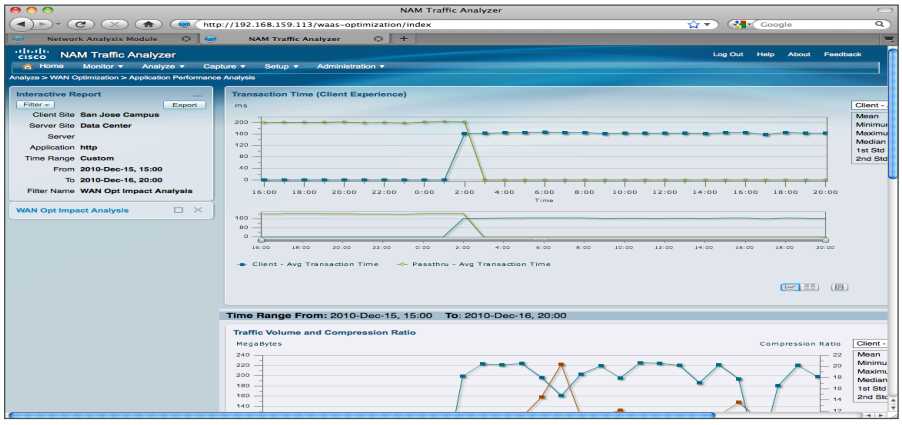


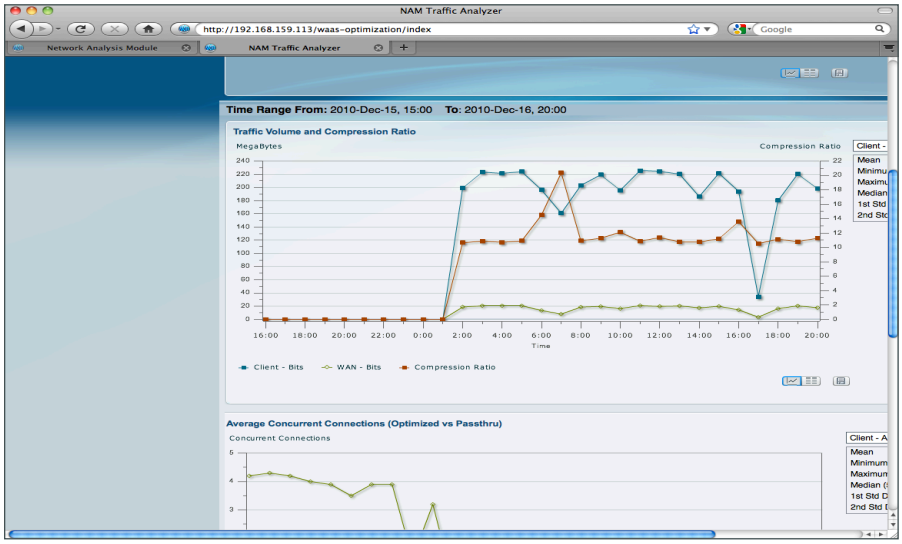
Step 2: After 30 minutes, select **TFO Optimization** and **HTTP Accelerator** again.

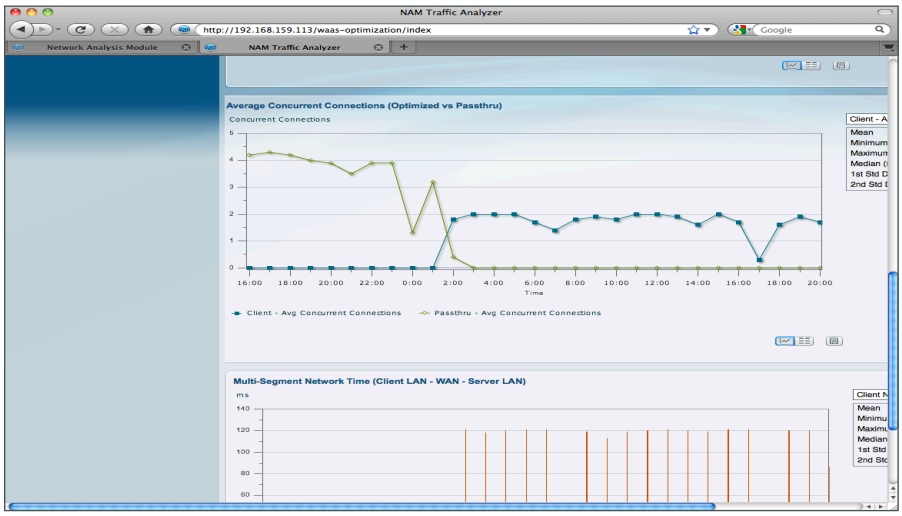
Step 3: Navigate to the **Analyze > WAN optimization > Application Performance Analysis** dashboard.

Step 4: Select the Client and Server site, along with application protocol. You can filter the data further by selecting the appropriate server IP address.

This dashboard shows overall trending of the client transaction time over time, as well as showing response time changes before (light green) and after (dark green) Cisco WAAS optimization. In addition, this report provides data compression ratio and connection counts over time information, all of which are important parameters in evaluating the overall impact of WAAS.







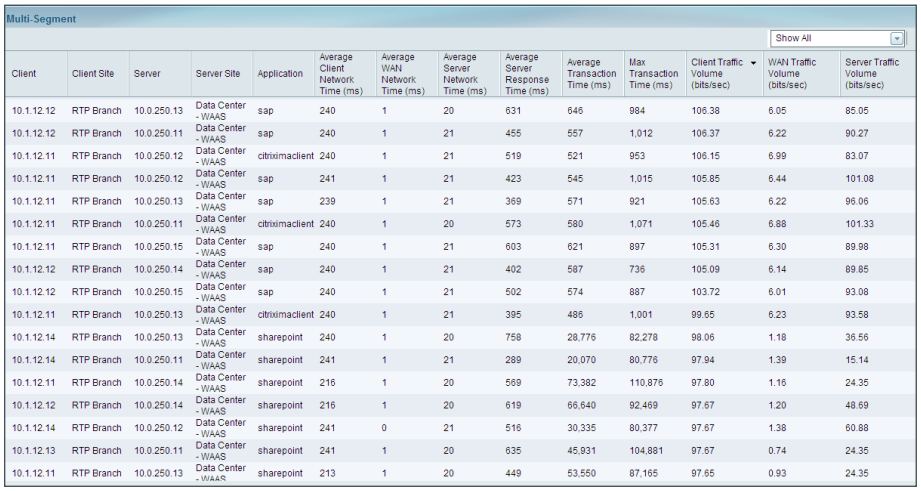
Procedure 5 Monitor and analyze WAN optimized traffic

Step 1: Navigate to **Analyze > WAN Optimization > Conversation Multi-segments.**

This dashboard provides details in a table format, including the breakdown of network time on client LAN, WAN, and server LAN, as well as server response time and average transaction time.

Step 2: Filter information based on site, client IP, server IP, or application by using the Interactive Report Filter.

This level of detail greatly helps in problem isolation—administrators can determine whether a performance issue is caused by a congested WAN, slow server, or poor compression.



Multi-Segment

Show All

Client	Client Site	Server	Server Site	Application	Average Client Network Time (ms)	Average WAN Network Time (ms)	Average Server Network Time (ms)	Average Server Response Time (ms)	Average Transaction Time (ms)	Max Transaction Time (ms)	Client Traffic Volume (bits/sec)	WAN Traffic Volume (bits/sec)	Server Traffic Volume (bits/sec)
10.1.12.12	RTP Branch	10.0.250.13	Data Center - WAAS	sap	240	1	20	631	646	984	106.38	6.05	85.05
10.1.12.12	RTP Branch	10.0.250.11	Data Center - WAAS	sap	240	1	21	455	557	1,012	106.37	6.22	90.27
10.1.12.11	RTP Branch	10.0.250.12	Data Center - WAAS	citriximaclient	240	1	21	519	521	953	106.15	6.99	83.07
10.1.12.11	RTP Branch	10.0.250.12	Data Center - WAAS	sap	241	1	21	423	545	1,015	105.85	6.44	101.08
10.1.12.11	RTP Branch	10.0.250.13	Data Center - WAAS	sap	239	1	21	369	571	921	105.63	6.22	96.06
10.1.12.11	RTP Branch	10.0.250.11	Data Center - WAAS	citriximaclient	240	1	20	573	580	1,071	105.46	6.88	101.33
10.1.12.11	RTP Branch	10.0.250.15	Data Center - WAAS	sap	240	1	21	603	621	897	105.31	6.30	89.98
10.1.12.12	RTP Branch	10.0.250.14	Data Center - WAAS	sap	240	1	21	402	587	736	105.09	6.14	89.85
10.1.12.12	RTP Branch	10.0.250.15	Data Center - WAAS	sap	240	1	21	502	574	887	103.72	6.01	93.08
10.1.12.11	RTP Branch	10.0.250.13	Data Center - WAAS	citriximaclient	240	1	21	395	486	1,001	99.65	6.23	93.58
10.1.12.14	RTP Branch	10.0.250.13	Data Center - WAAS	sharepoint	240	1	20	758	28,776	82,278	98.06	1.18	36.56
10.1.12.14	RTP Branch	10.0.250.11	Data Center - WAAS	sharepoint	241	1	21	289	20,070	80,776	97.94	1.39	15.14
10.1.12.11	RTP Branch	10.0.250.14	Data Center - WAAS	sharepoint	216	1	20	569	73,382	110,876	97.80	1.16	24.35
10.1.12.12	RTP Branch	10.0.250.14	Data Center - WAAS	sharepoint	216	1	20	619	66,640	92,469	97.67	1.20	48.69
10.1.12.14	RTP Branch	10.0.250.12	Data Center - WAAS	sharepoint	241	0	21	516	30,335	80,377	97.67	1.38	60.88
10.1.12.13	RTP Branch	10.0.250.11	Data Center - WAAS	sharepoint	241	1	20	635	45,931	104,881	97.67	0.74	24.35
10.1.12.11	RTP Branch	10.0.250.13	Data Center - WAAS	sharepoint	213	1	20	449	53,550	87,165	97.65	0.93	24.35

Procedure 6 Troubleshoot a WAN-optimized network

If you notice any anomaly in the analysis in Procedure 5, “Monitor and analyze WAN optimized traffic,” you can invoke Cisco NAM’s packet capture to do a packet analysis. For details about how to set up a packet capture, see Procedure 6, “Set up packet capture session,” in the “Analyzing and Troubleshooting Application Performance” process earlier in this guide.

Summary

Cisco Prime NAM offers flexibility in different network deployments with various form factors. This—coupled with built-in analytics for real-time monitoring, historical analysis, and threshold-based proactive troubleshooting—provides unmatched visibility into existing networks, ensures reliable delivery of applications, provides a consistent user experience, improves operating efficiency, maximizes IT investments, anticipates infrastructure changes, and helps scale to an appropriate network.

Additional Information

Cisco Prime Network Analysis Module

http://www.cisco.com/go/nam

Cisco Prime Network Analysis Module Product Family data sheets

http://www.cisco.com/en/US/partner/products/ps5740/Products_Sub_Category_Home.html

Product portfolio:

Cisco Catalyst 6500 Series Network Analysis Module (NAM-3)

http://www.cisco.com/en/US/products/ps11659/index.html

Cisco NAM 2300 Series appliances

http://www.cisco.com/en/US/products/ps10113/index.html

Cisco Prime Network Analysis Module (NAM) for Cisco ISR G2 SRE

http://www.cisco.com/en/US/products/ps11658/index.html

Installation and configuration guides:

Cisco Catalyst 6500 Series Network Analysis Module (NAM-3)

http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/5.1_2/switch/installation/guide/instcfg.html

Cisco NAM 2300 Series appliances

http://www.cisco.com/en/US/partner/docs/net_mgmt/network_analysis_module_appliance/2300/installation/guide/2300-series-install-config.html

Cisco Prime Network Analysis Module (NAM) for Cisco ISR G2 SRE

http://www.cisco.com/en/US/docs/net_mgmt/network_analysis_module_software/5.1/sm_sre/SM_SRE_incfg_5_1.html

Cisco Prime Network Analysis Module 5.1(2) and 5.1(3) user guides

http://www.cisco.com/en/US/partner/docs/net_mgmt/network_analysis_module_software/5.1.3/user/guide/nam_ug_book.html

Cisco Prime Network Analysis Module 5.1(2) software download

http://www.cisco.com/cisco/software/navigator.html

Appendix A: Product List

Network Management

Functional Area	Product Description	Part Numbers	Software
LAN Core NAM Appliance	Cisco Prime NAM 2320 Appliance (With 16x1TB STAT II Drives)	NAM2320-K9	5.1(3)
LAN Core NAM 6500 Module	Cisco Catalyst 6500 Series Network Analysis Module (NAM-3)	WS-SVC-NAM3-6G-K9	5.1(2)
Remote-Site NAM SRE	Cisco SRE 910 with 4-8 GB RAM, 2x 500 GB 7,200 rpm HDD, RAID 0/1, dual-core CPU configured with ISR G2	SM-SRE-910-K9	5.1(2)
	Cisco Prime NAM Software 5.1 for ISR G2 SRE SM	SM-NAM-SW-5.1-K9	
	Cisco SRE 710 with 4 GB RAM, 500 GB 7,200 rpm HDD, single-core CPU configured with Cisco ISR G2	SM-SRE-710-K9	
	Cisco Prime NAM Software 5.1 for ISR G2 SRE SM	SM-NAM-SW-5.1-K9	

Access Control

Functional Area	Product Description	Part Numbers	Software
Authentication Services	ACS 5.3 VMware Software and Base License	CSACS-5.3-VM-K9	5.3

LAN Core Layer

Functional Area	Product Description	Part Numbers	Software
Modular Core Layer Switch	Cisco Catalyst 6500 E-Series 6-Slot Chassis	WS-C6506-E	15.0(1)SY1 IP services license
	Cisco Catalyst 6500 VSS Supervisor 2T with 2 ports 10GbE and PFC4	VS-S2T-10G	
	Cisco Catalyst 6500 24-port GbE SFP Fiber Module w/ DFC4	WS-X6824-SFP-2T	
	Cisco Catalyst 6500 8-port 10GbE Fiber Module w/ DFC4	WS-X6908-10G-2T	

Data Center Core

Functional Area	Product Description	Part Numbers	Software
Core Switch	Cisco Nexus 5596 up to 96-port 10GbE, FCoE, and Fibre Channel SFP+	N5K-C5596UP-FA	NX-OS 5.1(3)N1(1a) Layer 3 License
	Cisco Nexus 5596 Layer 3 Switching Module	N55-M160L30V2	

WAN Remote Site

Functional Area	Product Description	Part Numbers	Software
Modular WAN Remote-site Router	Cisco 3945 Voice Sec. Bundle, PVDM3-64, UC and SEC License PAK	C3945-VSEC/K9	15.1(4)M5 securityk9 license datak9 license
	Cisco 3925 Voice Sec. Bundle, PVDM3-64, UC and SEC License PAK	C3925-VSEC/K9	
	Data Paper PAK for Cisco 3900 series	SL-39-DATA-K9	
	Cisco 2951 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2951-VSEC/K9	
	Cisco 2921 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2921-VSEC/K9	
	Cisco 2911 Voice Sec. Bundle, PVDM3-32, UC and SEC License PAK	C2911-VSEC/K9	
	Data Paper PAK for Cisco 2900 series	SL-29-DATA-K9	

Feedback

Please use the feedback form to send comments and suggestions about this guide.

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