



CHAPTER 2

Getting Started with Application Performance Assurance

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Prerequisites for Application Performance Assurance

Router

- Plan software upgrades or downgrades for times when you can take all applications that run on the host router out of service or offline.
- Ensure that you have the appropriate Cisco access router to serve as the host router. The **Application Performance Assurance** is supported on the following Cisco access routers:
 - NME-APA-E2—Cisco 2811, 2821 and 2851 ISRs
 - NME-APA-E3—Cisco 3825 and 3845 ISRs
- Ensure that the host router is running Cisco IOS Release 12.4(20)YA or a later release. To learn which release your router is currently running, examine output from the **show version** command.



Note

When minimum release requirements are met, you can change images on either the router or the network modules without affecting performance.

Network Module

- To install the NME-APA use the *Network Modules Quick Start Guide* and *Cisco Network Modules and Interface Cards Regulatory Compliance and Safety Information*.
- The NME-APA ships from the factory with the hardware listed in [Table 2-1](#) pre installed.

Table 2-1 Network Module Hardware Requirements

Model	Hard Disk	Memory	GigE	USB	CompactFlash
NME-APA-E2	80 GB (SATA)	1 GB	Not supported	Not supported	Not supported
NME-APA-E3	80 GB (SATA)	1 GB	Not supported	Not supported	Not supported

- Make a note of the network module's location in the host router:
 - *slot*—Number of the router chassis slot for the module. After you install the module, you can get this information from the router's **show running-config** command output.
 - *unit*—Number of the daughter card on the module. This value should be 0.



Note You need this information for the “[Setting Up Network Module Interfaces](#)” section on [page 2-4](#).

File Server

- Verify that your download FTP or TFTP file server is accessible:
 - FTP file server—Use for installations, backups, and restores.
 - TFTP file server—Use (on the FTP-file-server machine) for boothelper operations to recover from a failed installation.

Restrictions for Application Performance Assurance

Upgrade or Downgrade

- You can do a software upgrade or downgrade only on an inactive system. You must therefore plan upgrades or downgrades for times when you can take all applications that run on the host router out of service or offline.

Configuration

- You can configure software on the network module only through the GUI or through a Telnet session.
- You can access the software running on the network module by using the NME-APA Device Console or by accessing the module's command-line interface (CLI) through a Telnet session.

See the *Cisco Application Performance Assurance Device Console User Guide* and the *Cisco Network Module Enhanced Application Performance Assurance CLI Command Reference* for further details.

Information About Application Performance Assurance

Application Performance Assurance is a Linux system-based application that resides on a network module that plugs into a host Cisco router running Cisco IOS software.

The network module is a standalone content engine with its own startup and run-time configurations that are independent of the Cisco IOS configuration on the router. The module does not have an external console port. Instead, you launch and configure the module through the router, by means of a configuration session on the module. After the session, you return to the router CLI and clear the session.

This arrangement—host router plus network module (the latter is also sometimes called an appliance or blade or, with installed software, a service or services engine)—provides a router-integrated application platform for accelerating data-intensive applications.

The NME-APA actively manages traffic flows based upon multiple criteria such as business priorities, application or protocol recognition, user awareness and others as described in the Application Performance Assurance User Guide.

Configuring Traffic Management on the Application Performance Assurance

Manage traffic on Application Performance Assurance by enabling or disabling the flow of packets through the router and the service module. There are two interfaces to configure for traffic management; the router interface and the service module interface.

Configure the router interface with the **service-module apa traffic-management [monitor | inline]** command. Configure the service module interface with the Application Performance Assurance (APA) graphical user interface (GUI). See the *Cisco Application Performance Assurance Device Console User Guide*.

Two traffic management modes are available to configure.

- Monitor— will copy the packet and designate the copy as the one forwarded to the NME-APA.
- Inline— will send the packet to the NME-APA, rather than a copy of the packet to the NME-APA. Once the NME-APA has finished processing the packet, it will send it back to the router.

**Note**

One traffic management mode can be enabled on the router, but not two concurrently.

How to Install Application Performance Assurance

This section contains the following information:

- [Setting Up Network Module Interfaces, page 2-4](#)
- [Installing Application Performance Assurance Software, page 2-6](#)

**Note**

- If you lose power or connection during any of the following procedures, the system usually detects the interruption and tries to recover. If it fails to do so, fully reinstall the system using the boothelper.
- You can configure the network module by means of either the CLI or the GUI. This document presents CLI configuration instructions; however, the preferred configuration method is to use the GUI. For GUI configuration instructions, see the GUI's online help.

Setting Up Network Module Interfaces

Your first configuration task is to set up network module interfaces to the host router and to its external links, which enables you to access the module to install and configure Application Performance Assurance.

**Note**

The first few steps open the host-router CLI and access the router's interface to the module. The subsequent steps configure the interface.

SUMMARY STEPS

From the Host-Router CLI

1. **enable**
2. **configure terminal**
3. **interface integrated-service-engine *slot/0***
4. **ip address *router-side-ip-address subnet-mask***
or
ip unnumbered *type number*
5. **service-module apa traffic-management [**monitor** | **inline**]**
6. **service-module ip address *module-side-ip-address subnet-mask***
7. **service-module ip default-gateway *gateway-ip-address***
8. **ip route ip-address subnet-mask integrated-service-engine slot/0**
9. **exit**
10. **copy running-config startup-config**
11. **show running-config**

DETAILED STEPS

	Command or Action	Purpose
	From the Host-Router CLI	
Step 1	enable	Enters privileged EXEC mode on the host router. Enter your password if prompted.
	Example: Router> enable	

	Command or Action	Purpose
Step 2	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	Enters global configuration mode on the host router.
Step 3	<p>interface integrated-service-engine slot/0</p> <p>Example: Router(config)# interface integrated-service-engine 1/0</p>	Enters interface configuration mode for the slot and port where the network module resides.
Step 4	<p>ip address router-side-ip-address subnet-mask</p> <p>or</p> <p>ip unnumbered type number</p> <p>Example: Router(config-if)# ip address 10.0.0.20 255.255.255.0</p> <p>or</p> <p>Router(config-if)# ip unnumbered ethernet 0</p>	<p>Specifies the router interface to the module. Arguments are as follows:</p> <ul style="list-style-type: none"> • <i>router-side-ip-address subnet-mask</i>—IP address and subnet mask for the interface. • <i>type number</i>—Type and number of another serial interface on which the router has an assigned IP address. It cannot be another unnumbered interface. Serial interfaces using High Level Data Link Control (HDLC), Point-to-Point Protocol (PPP), Link Access Procedure, Balanced (LAPB), Frame Relay encapsulations, Serial Line Internet Protocol (SLIP), and tunnel interfaces can be unnumbered.
Step 5	<p>service-module apa traffic-management [monitor inline]</p> <p>Example: Router(config-if)# service-module apa traffic-management inline</p>	Enables traffic management on the interface.
Step 6	<p>service-module ip address module-side-ip-address subnet-mask</p> <p>Example: Router(config-if)# service-module ip address 172.0.0.20 255.255.255.0</p>	<p>Specifies the IP address for the module interface to the router. Arguments are as follows:</p> <ul style="list-style-type: none"> • <i>module-side-ip-address</i>—IP address for the interface • <i>subnet-mask</i>—Subnet mask to append to the IP address; must be in the same subnet as the host router
Step 7	<p>service-module ip default-gateway gateway-ip-address</p> <p>Example: Router(config-if)# service-module ip default-gateway 10.0.0.40</p>	<p>Specifies the IP address for the default gateway router for the module. The argument is as follows:</p> <ul style="list-style-type: none"> • <i>gateway-ip-address</i>—IP address for the gateway router
Step 8	<p>ip route ip-address subnet-mask integrated-service-engine slot/0</p> <p>Example: Router(config)#ip route 10.1.1.41 255.255.255.255 integrated-service-engine 1/0 Or Router(config)#ip route 10.1.1.0 255.255.255.0 integrated-service-engine 1/0</p>	The static route corresponds to a discrete IP address, or a range of addresses for NME-APA traffic management.

	Command or Action	Purpose
Step 9	<code>exit</code> Example: Router(config-if)# <code>exit</code>	Returns to global configuration mode on the host router.
Step 10	<code>copy running-config startup-config</code> Example: Router# <code>copy running-config startup-config</code>	Saves the router's new running configuration.
Step 11	<code>show running-config</code> Example: Router# <code>show running-config</code>	Displays the router's running configuration, so that you can verify address configurations.

Examples

The following commands show how to configure a router interface for inline traffic management.

```
Router> enable
Router# configure terminal
Router(config)# interface gigabitethernet 0/1
Router(config-if)# ip address 10.10.10.43 255.255.255.0
Router(config-if)# service-module apa traffic-management inline
Router(config-if)# exit
```

Installing Application Performance Assurance Software

You can now install Application Performance Assurance licenses and software on the network module. During installation and on subsequent startups, you use two items of boot software:

- **Bootloader**—A small set of system software that runs when the system first powers up. It loads the operating system (from the disk, network, external compact flash, or external USB flash), which loads and runs the Application Performance Assurance application. The bootloader may optionally load and run the boothelper.
- **Boothelper**—A small subset of the system software that runs on the module. It boots the module from the network and assists in software installation and upgrades, disaster recovery, and other operations when the module cannot access its software.

This section contains the following information:

- [Software Installation, page 2-6](#)

Software Installation

Software installation involves installing, configuring, and starting a boothelper image. The boothelper, in turn, starts the Application Performance Assurance installation wizard, which installs the software.

Prerequisites

- (Optional) Have available the IP address of your TFTP file server.
- (Optional) Have available the IP address of your FTP file server.

SUMMARY STEPS

1. Download the required software.
2. If needed, copy the boothelper image to a TFTP server.

From the Host-Router CLI

3. **service-module integrated-service-engine slot/0 reload**
4. **service-module integrated-service-engine slot/0 session**

From the NME-APA Interface

5. **config**
6. **show config**
7. **boot helper**
8. Follow boothelper instructions for installing software.
9. **Control-Shift-6 x**

From the Host-Router CLI

10. **service-module integrated-service-engine slot/0 session clear**

DETAILED STEPS

-
- Step 1** Download the Application Performance Assurance installation-package files (containing a kernel image, a boothelper image, and the Application Performance Assurance application software files) as follows:
- a. Go to the Application Performance Assurance page of the Cisco Software Center website at the following location: <http://www.cisco.com/cgi-bin/tablebuild.pl/nme-apa>
 - b. Locate the following files:
 - Boothelper file—NME-APA-installer.<version>.bryce
 - Package files:
 - NME-APA.<version>.bryce.pkg
 - NME-APA-full.<version>.bryce.prt1
 - NME-APA-installer.<version>.bryce.prt1
 - c. Download the boothelper file to the TFTP file server.
 - d. Download the package files to the FTP server.
- Step 2** The system downloads the files in the background. After the download completes Reset the system:
- ```
Router> enable
Router# service-module integrated-service-engine slot/0 reload
```
- Step 3** Connect to the NME-APA console port:
- ```
Router# service-module integrated-service-engine slot/0 session
```
- Step 4** Interrupt the auto-boot sequence and access the bootloader by typing ******* when the following message appears:
- ```
Please enter '***' to change boot configuration

ServicesEngine Bootloader Version : 2.1.15.0
```

```
ServicesEngine boot-loader>
```

**Step 5** Configure the bootloader to load and launch the boothelper:

```
ServicesEngine boot-loader> config
```

Prompts for the following appear in the order listed. For each, enter a value or accept the previously stored input that appears inside square brackets by pressing **Enter**.

- NME-APA IP address and subnet mask
- TFTP file-server IP address
- Gateway-router IP address (normally the IP address for the ISR)
- Default boothelper image filename
- Ethernet interface: internal or external
- Default boot option (listed alphabetically in [Table 2-2](#)):

**Table 2-2** Default Boot Options

| Boot Option | Function                                |                    |
|-------------|-----------------------------------------|--------------------|
|             | Loads This Software...                  | From This Location |
| disk        | Application Performance Assurance image | Disk               |

- Default bootloader file to be used on subsequent boot: primary or secondary



**Note**

*Primary* causes the application to launch normally. *Secondary* causes the application to start the primary bootloader; the primary bootloader then checks the secondary bootloader location and, if it finds the secondary bootloader and if the checksum is correct, uses the secondary bootloader.

**Example:**

```
ServicesEngine boot-loader> config
IP Address [10.100.20.81] >
Subnet mask [255.255.255.0] >
TFTP server [10.107.150.30] >
Gateway [10.100.20.80] >
Default Helper-file [cue-installer.10.2.0.13] >
Ethernet interface [internal] >
Default Boot [none|disk] >
Default bootloader [primary|secondary] [primary] >
ServicesEngine boot-loader>
```

**Step 6** (Optional) Verify your bootloader configuration settings:

```
ServicesEngine boot-loader> show config
```

**Step 7** Start the boothelper:

```
ServicesEngine boot-loader> boot helper
```

**Step 8** Follow boothelper instructions and choose option 1 and follow wizard instructions to install the Application Performance Assurance software.



**Note** The package name that you must specify is NME-APA.<version>.bryce.pkg and the server URL is the URL of the FTP server where the three package files reside.

- If the network module does not automatically reboot after the software is installed, reload it (choose option 2).

**Step 9** Close the session by pressing **Control-Shift-6 x**.

**Step 10** From the host-router CLI, clear the session:

```
Router# service-module integrated-service-engine slot/0 session clear
```

## How to Operate, Maintain, and Troubleshoot Application Performance Assurance

To operate, maintain, troubleshoot, configure, and administer Application Performance Assurance, see the *Cisco Application Performance Assurance Device Console User Guide*.

## Additional References

The following sections provide references related to Application Performance Assurance.

## Related Documents

| Related Topic      | Document Title                                                                                                                                                                                                                     |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cisco IOS software | <i>Cisco IOS Software</i> website at <a href="http://www.cisco.com/en/US/products/sw/iosswrel/tsd_products_support_category_home.html">http://www.cisco.com/en/US/products/sw/iosswrel/tsd_products_support_category_home.html</a> |

| Related Topic               | Document Title                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Network modules             | <i>Installing Cisco Network Modules in Cisco Access Routers</i> at <a href="http://www.cisco.com/en/US/products/hw/modules/ps2797/products_module_installation_guide_chapter09186a008007c8ec.html">http://www.cisco.com/en/US/products/hw/modules/ps2797/products_module_installation_guide_chapter09186a008007c8ec.html</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Voice and IP communications | <p><i>Cisco Voice and IP Communications</i> website at <a href="http://www.cisco.com/en/US/products/sw/voicesw/tsd_products_support_category_home.html">http://www.cisco.com/en/US/products/sw/voicesw/tsd_products_support_category_home.html</a></p> <p><b>Tip</b> To ensure that you are displaying the most current information on the Cisco.com website, force your browser to refresh by pressing <b>Ctrl-F5</b>.</p> <p>To narrow your Cisco.com search to technical documents, from the Cisco.com home page on the upper right under the Search box, click <b>Advanced Search &gt; Technical Support &amp; Documentation</b> and enter your search criteria.</p> <p>To provide feedback about the Cisco.com website or a particular technical document, from the top of any Cisco.com web page, click <b>Feedback</b>.</p> |

## RFCs

| RFC      | Title                                       |
|----------|---------------------------------------------|
| RFC 768  | User Datagram Protocol                      |
| RFC 793  | Transmission Control Protocol               |
| RFC 826  | <i>Ethernet Address Resolution Protocol</i> |
| RFC 959  | <i>File Transfer Protocol</i>               |
| RFC 1165 | Network Time Protocol                       |
| RFC 1350 | The TFTP Protocol                           |
| RFC 3164 | The BSD Syslog Protocol                     |

## Technical Assistance

| Description                                                                                                                                                                                                                                                                         | Link                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>                                                                                                                                                                |
| Cisco Feature Navigator website                                                                                                                                                                                                                                                     | <a href="http://www.cisco.com/go/cfn">http://www.cisco.com/go/cfn</a><br>Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. An account on Cisco.com is not required. |
| Cisco Software Center                                                                                                                                                                                                                                                               | <a href="http://www.cisco.com/public/sw-center/">http://www.cisco.com/public/sw-center/</a>                                                                                                                                                    |

## Glossary

|                       |                                                                                                                                                                                                                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>appliance</b>      | Alternate term for network module.                                                                                                                                                                                                                                                                                  |
| <b>ARP</b>            | Address Resolution Protocol. Internet protocol used to map an IP address to a MAC address.                                                                                                                                                                                                                          |
| <b>blade</b>          | Alternate term for network module.                                                                                                                                                                                                                                                                                  |
| <b>boothelper</b>     | A small subset of the system software that runs on the module. It boots the module from the network and assists in software installation and upgrades, disaster recovery, and other operations when the module cannot access its software.                                                                          |
| <b>bootloader</b>     | A small set of system software that runs when the system first powers up. It loads the operating system (from the disk, network, external compact flash, or external USB flash), which loads and runs the Application Performance Assurance application. The bootloader may optionally load and run the boothelper. |
| <b>content engine</b> | Content-networking product (hardware plus software) that accelerates content delivery, ensuring maximum scalability and availability of content.                                                                                                                                                                    |
| <b>FTP</b>            | File Transfer Protocol. Application protocol, part of the TCP/IP protocol stack, used for transferring files between network nodes.                                                                                                                                                                                 |
| <b>network module</b> | Type of network module.                                                                                                                                                                                                                                                                                             |

|                                     |                                                                                                                                                                                                                                                                          |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP</b>                          | Network Time Protocol. Protocol built on top of TCP that ensures accurate local time-keeping with reference to radio and atomic clocks located on the Internet. This protocol is capable of synchronizing distributed clocks within milliseconds over long time periods. |
| <b>service (or services) engine</b> | Alternate term for network module with installed application software.                                                                                                                                                                                                   |
| <b>service module</b>               | Standalone content engine with its own startup and run-time configurations that are independent of the Cisco IOS configuration on the router.                                                                                                                            |
| <b>syslog</b>                       | Industry-standard protocol for capturing log information for devices on a network.                                                                                                                                                                                       |
| <b>TCP</b>                          | Transmission Control Protocol. Connection-oriented transport-layer protocol that provides reliable full-duplex data transmission. TCP is part of the TCP/IP protocol stack.                                                                                              |
| <b>TFTP</b>                         | Trivial File Transfer Protocol. Simplified version of FTP that allows files to be transferred from one computer to another over a network, usually without the use of client authentication (for example, username and password).                                        |
| <b>UDP</b>                          | User Datagram Protocol. Connectionless transport-layer protocol in the TCP/IP protocol stack that exchanges datagrams without acknowledgments or guaranteed delivery, requiring that error processing and retransmission be handled by other protocols.                  |

**Note**

For terms not included in this glossary, see the following references:

- [Cisco IOS Voice Configuration Library Glossary](#)
- [Internetworking Terms and Acronyms](#)

## Command Reference

For full details of the command-line interface, see the *Cisco NME-APA CLI Command Reference*.

**Note**

All other Cisco IOS software commands are documented in the Cisco IOS Release 12.4(9) T command reference publication at Cisco.com, <http://www.cisco.com/en/US/products/ps6441/index.html>.