



CHAPTER 4

Administering Application Networking Manager Virtual Appliance

This chapter describes how to administer Application Networking Manager (ANM) Virtual Appliance. This chapter includes the following sections:

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Changing Configuration Attributes After Installing ANM Virtual Appliance

You can modify the ANM Virtual Appliance software configuration attributes that you specified when installing the software. These attributes include the following:

- HTTP Port of Web Services
- Enable HTTP for Web Services
- HTTPS Port of Web Services
- Enable HTTPS for Web Services
- Idle session timeout in msec

For details about modifying the software configuration, see the following:

- Commands for modifying the configuration:
 - [anm-tool configure](#), page A-12
 - [application reset-config](#), page A-16
- Procedure for modifying the configuration—See the “Changing ANM Configuration Property Values” section in the ANM online help or the *User Guide for the Cisco Application Networking Manager 5.1*. This section also contains configuration examples.

Accessing the Command Line Interface

This section describes how to access the ANM Virtual Appliance command line environment.

Though the ANM web interface serves as the primary interface for ANM, the command line interface (CLI) offers features for performing many appliance administration tasks. These tasks include applying the ANM license, configuring network settings, and backing up the ANM application instance.

Before logging in to the ANM CLI, ensure that you have completed the hardware installation and configuration process outlined in [Chapter 2, “Installing or Upgrading ANM Virtual Appliance.”](#) In the installation procedures described in that chapter, you configured the access credentials for an administrative user of the CLI environment. The account is named `admin`, by default. You can use this account to log in to the system.

To log in to ANM Virtual Appliance and access the CLI, use an SSH secure shell client or the console tab in the vSphere Client.

Opening the CLI with Secure Shell

The following example shows how to log in with a Secure Shell (SSH) client. Though the steps may vary for different SSH clients, the general steps should be similar to the following procedure.

Procedure

-
- Step 1** Use any SSH client and start an SSH session.
The SSH window appears.
- Step 2** Press **Enter** or **Spacebar** to connect.
The Connect to Remote Host window appears.
- Step 3** Enter a hostname, username, port number, and authentication method.
At first login, the username should be the username of the operating system user account created during the ANM Virtual Appliance setup. The port number should be **22** and, for the authentication method, choose **Password**.
- Step 4** Click **Connect**, or press **Enter**.
The Enter Password window appears.
- Step 5** Enter the password for the operating system user account.

- Step 6** If desired, configure a connection profile for this connection.
The ANM prompt `anm-va/admin#` appears. You can now enter ANM CLI commands.

To exit the CLI, use the **exit** command from the EXEC mode. If you are currently in one of the configuration modes and you want to exit the CLI, enter the **end**, **exit**, **Ctrl-d**, or **Ctrl-z** command to return to the EXEC mode, and then enter the **exit** command.

User Accounts and Modes

To log in to the command line interface, you need to use a valid user account for the operating system environment.



Note

User accounts for the ANM Virtual Appliance operating system are different from ANM application users. Any users that you create from the ANM web interface cannot automatically log in to the ANM Virtual Appliance CLI. You must explicitly create users with access to the CLI.

When you set up ANM Virtual Appliance, you configured an administrative user account that you can use to set up additional user accounts. This user account is named `admin`, by default. To create additional users, you can log in to the CLI using the Admin account that you created during setup.

There are two types of accounts available on ANM Virtual Appliance:

- Admin (administrator)
- Operator (user)

An Admin user can perform all functions in the CLI. The Operator user role has limited privileges in ANM Virtual Appliance and is primarily intended for monitoring tasks. For more information about role privileges, see the [“User Accounts and Modes in ANM Virtual Appliance”](#) section on page A-2.

Logging in to ANM Virtual Appliance places you in the Operator (user) mode or the Admin (EXEC) mode. You can tell when you are either in the Operator mode or Admin mode by looking at the prompt. A right angle bracket (`>`) appears at the end of the Operator mode prompt and a pound sign (`#`) appears at the end of the Admin mode prompt, regardless of the submode.

To create users, use the **username** command in the configuration mode. The syntax of this command is as follows:

```
username username password {hash password | plain password | remote} role {admin | user}
[disabled] [email email-address]
```

The keywords and arguments are as follows:

- *username*—Name of the user. Enter a maximum of 31 alphanumeric characters. Spaces and quotation marks (“”) are not allowed and the word “Cisco” cannot be used.
- **password**—Specifies the password type as follows:
 - **hash** *password* and **plain** *password*—Specifies the user password for local user authentication. If you have ANM configured to use a TACACS+ server for remote user authentication and the remote server cannot be accessed, user authentication is performed locally by ANM.

The *password* argument is alphanumeric and can contain spaces and special characters such as brackets, ampersand, and so forth. The password must contain the following:

- At least one lowercase letter.
- At least one uppercase letter.
- At least one digit.
- At least 6 characters.



Note The password cannot contain the word “Cisco” as part of the password.

You can change these default password requirements using the **password-policy** command (see the “password-policy” section on page A-119).

- **remote**—Specifies that user authentication is performed remotely by a TACACS+ server only. If the TACACS+ server cannot be accessed, users cannot log in to ANM.

For information about configuring ANM to use remote authentication, see the **aaa authentication tacacs+** command.

- **role**—Specifies the user privilege level as follows:
 - **admin**—Permits full access to the CLI functions.
 - **user**—Restricts access to the CLI functions (primarily show commands only).
- **disabled**—(Optional) Disables the user account.
- **email** *email-address*—(Optional) Specifies the user email address. For example, user1@mydomain.com.

To modify a user, enter the username of the existing user. To delete the user from the system, use the **no** form of this command.

Starting and Stopping ANM Virtual Appliance

You can start or stop ANM Virtual Appliance from the vSphere client. From the client, starting and stopping is equivalent to powering on or off the appliance. When the ANM Virtual Appliance operating system is running, you can restart or stop the instance from the command line.

To start the virtual appliance, click on the node that represents the ANM Virtual Appliance in the resource tree of the vSphere client and then click the **Power on the Virtual Machine** link in the Getting Started tab.

While the VM operating system is running, you have several options for the starting and stopping processes. The following commands restart, start, or stop the ANM application processes only:

- **anm-tool restart**
- **application start ANM**
- **application stop ANM**

The following commands apply to the operating system as well as the ANM processes:

- **reload**—Stops and starts the system
- **halt**—Stops the system

About VMware High Availability

You can implement ANM Virtual Appliance high availability using the VMware High Availability (VMware HA) feature. With VMware HA enabled for a ESX host cluster, if the ESX server that hosts the ANM Virtual Appliance VM fails, the ANM Virtual Appliance VM is deployed and started on another host in the same cluster.

You implement VMware HA through the configuration of clustered hosts in vCenter. A cluster consists of multiple hardware resources that are treated as a single entity for administration purposes.

To use VMware HA with ANM Virtual Appliance, you must deploy ANM Virtual Appliance on a clustered host for which high availability is enabled. After deployment, ANM Virtual Appliance is subject to the VMware HA feature.

In the event of a host failure, ANM Virtual Appliance is moved to a new host. Because its MAC address goes with it, there are no additional considerations involving the ANM license; the license will continue to work after the transfer.

For detailed information about administering VMware HA, see the *vSphere Availability Guide* for your VMware vSphere product line:

http://www.vmware.com/support/pubs/vs_pubs.html

Backing Up and Restoring ANM Virtual Appliance

To avoid losing data on ANM Virtual Appliance, Cisco recommends that you back up the system regularly. You can choose to back up the entire system or the ANM application data only. The result of the backup process is an archive that can be used to restore the system to its state at the time that the archive was generated.



Note

To restore an ANM Virtual Appliance, you can use a backup that you created from either ANM Virtual Appliance or ANM server. This section describes the procedures required for each restore type.

Backing up the system saves the running and startup configuration files, certificates, licenses, and other files needed to restore the system to its backed up state.

When you create a backup from the ANM Virtual Appliance, the system collects the data, puts it in a timestamped archive, and places the archive in a repository that you specify. A repository is a storage location either on the local disk or on a remote server. Before you create an ANM Virtual Appliance backup, you need to configure the repository, as described in the [“Creating a Repository for ANM Virtual Appliance Backups”](#) section on page 4-6.

You can also use the backup process to back up log files. You can use the **backup-logs** command or the **anm-data-export** command to back up various types of logs (see the [“Exporting Logs”](#) section on page 4-10).

You can automate backups by scheduling jobs to run periodically. A scheduled backup runs automatically as specified in the running configuration. For more information about scheduling automated tasks, see the [“Scheduling Tasks with Kron”](#) section on page 4-11.

This section includes the following topics:

- [Creating a Repository for ANM Virtual Appliance Backups](#), page 4-6
- [Creating an ANM Virtual Appliance Backup](#), page 4-7
- [Restoring ANM Virtual Appliance Using an ANM Virtual Appliance Backup](#), page 4-8
- [Restoring ANM Virtual Appliance Using an ANM Server Backup](#), page 4-9
- [Creating an ANM Virtual Appliance Backup for Use with ANM Server](#), page 4-10

Creating a Repository for ANM Virtual Appliance Backups

This section describes how to set up a repository to use when creating a backup of ANM Virtual Appliance. The repository is a remote or local directory location where the backup file is placed. You can have more than one repository in the configuration.



Note

You do not use the repository for storing a backup that you created from ANM server and intend to use to restore ANM Virtual Appliance (see the [“Restoring ANM Virtual Appliance Using an ANM Server Backup”](#) section on page 4-9).

Procedure

- Step 1** At the command line, enter **configure**.
- Step 2** Enter the **repository** command, passing a name for the repository, as follows:

repository *name*

For the *name* argument, enter a unique name for the repository consisting of up to 30 alphanumeric characters.

Step 3 Enter the location of the repository using the **url** command.

For example, to specify a location on disk, use this format:

url disk://dirlocation

For a remote server, specify the hostname of the remote server and path to the repository directory:

url sftp://example.com/repository/system1

Step 4 (Optional) If required by the remote server, configure a username and password to access the server. (Local disk storage does not require a username/password.)

Step 5 Enter **Exit** to exit from configuration mode.

The repository is now configured.



Note

For more information about the repository command, see the “[repository](#)” section on page A-121.

Creating an ANM Virtual Appliance Backup

You can create a backup of the ANM Virtual Appliance application and operating system data using the **backup** command. The command syntax is as follows:

```
backup backup-name repository repository-name [application appl-name]
```

The command keywords and arguments are as follows:

- *backup-name*—Name of the archive file. The actual filename of the resulting archive consists of the filename value you specify plus a timestamp representing when the file was generated, in the format *YYMMDD-HHMM*.
- *repository-name*—Name of the repository that you created (see the “[Creating a Repository for ANM Virtual Appliance Backups](#)” section on page 4-6).
- **application** *appl-name*—(Optional) Specifies that the backup consists of the ANM inventory and application data only. For ANM Virtual Appliance, the value for *appl-name* is ANM.

The following example creates a backup of the ANM application and operating system data:

```
anm-va/admin# backup mybackup repository myrepository
% Creating backup with timestamped filename: mybackup-100811-2050.tar.gpg
Backing up ANM information to /opt/backupbackup-mybackup-1281559857/backup/ANM/anm.bak
(this may take a while)
ANM backed up to /opt/backup/backup-mybackup-1281559857/backup/ANM/anm.bak
Finished
anm-va/admin#
```

Notice that the command output indicates that the information is being backed up to a file in the /opt directory. This directory is not accessible on the virtual appliance. The finished archive is actually placed in the location specified by the repository URL location.

The following example creates a backup of the ANM application only:

```
anm-va/admin# backup mybackup repository myrepository application ANM
```

You can view the results of past backup operations using the **show backup history** command. The command lists successful and failed backup attempts.



Note

For **backup** command details, see the “[backup](#)” section on page A-21.

Restoring ANM Virtual Appliance Using an ANM Virtual Appliance Backup

This procedure describes how to restore ANM Virtual Appliance using a backup that you create from ANM Virtual Appliance.



Note

To restore ANM Virtual Appliance using a backup that you create from ANM server, see the “[Restoring ANM Virtual Appliance Using an ANM Server Backup](#)” section on page 4-9.

You can restore the ANM Virtual Appliance system to the state of a previously generated backup archive by using the **restore** command, passing it the full name of the backup archive file. The restore command takes an archive file that you created from an ANM Virtual Appliance and applies it to the system, restoring it to the state it was in when the backup was created.

A restore can be performed for the entire system or for the application data only. You can perform a full system restore only with a backup file created from an ANM Virtual Appliance full system backup (see the “[Creating an ANM Virtual Appliance Backup](#)” section on page 4-7). Before it applies a backup file, the restore command makes sure that the backup archive you specify in the command contains system data, not just application data.

Restoring an archive overwrites the existing configuration. Cisco recommends that you back up the system before initiating a restore of an older configuration. Also, the procedure requires a system restart, which interrupts active connections to the ANM.

Prerequisites

Make sure that the ANM Virtual Appliance backup file that you want to apply is in a defined repository location (see the “[Creating a Repository for ANM Virtual Appliance Backups](#)” section on page 4-6).

Procedure

Step 1 As an admin user, enter the **restore** command at the CLI.

The command syntax is as follows:

```
restore name-YYMMDD-HHMM.tar.gz repository repository-name
```

To restore the ANM inventory and application data only, include the optional **application appl-name** keyword and argument option as follows:

```
restore name-YYMMDD-HHMM.tar.gz repository repository-name application ANM
```

The following prompt appears:

```
Restore may require a reboot to successfully complete. Continue? (yes/no) [yes]
```


- Step 2** Press **Enter** to continue with the restoration or type no to cancel the procedure.
The configuration is applied to the system, which then restarts.
- Step 3** When the system finishes restarting, log in to the system and enter the **show restore history** command to verify the success of the restoration process.

Restoring ANM Virtual Appliance Using an ANM Server Backup

This procedure describes how to restore ANM Virtual Appliance using a backup that you create from ANM server.



Note

To restore ANM Virtual Appliance using a backup that you create from ANM Virtual Appliance, see the [“Restoring ANM Virtual Appliance Using an ANM Virtual Appliance Backup”](#) section on page 4-8.

Prerequisites

Both ANM Virtual Appliance and ANM server must have ANM software version 5.1 loaded.

Procedure

- Step 1** From ANM server, create a backup by doing the following:
- From the Linux command line, log in as the root user as follows:



Caution

As the root user, you can adversely affect your operating environment if you are unaware of the effects of the commands that you use. If you are an inexperienced Linux user, you should limit your activities as the root user to the tasks described in this procedure.

- If you are not logged in, log in as the root user:


```
>login: root
>Password: root-password
```
 - If you are already logged in, but not as the root user, use the **su** - command to change your login to root:


```
# su -
# Password: root-password
```
 - From the command line, verify that the ANM server is running by entering the following command:


```
/opt/CSCOanm/bin/anm-tool info-services
```
 - From the command line, back up the ANM configuration by entering the following command:


```
/opt/CSCOanm/bin/anm-tool backup backup-file
```

 where *backup-file* is the name of the file that you want to back up.
 - Copy the backup to a location that ANM Virtual Appliance can access.
- Step 2** Copy the backup that you created in [Step 1](#) to disk: of ANM Virtual Appliance.
To copy the file, use any file transfer protocol supported by Cisco ADE-OS, such as TFTP or SFTP.

For example:

```
copy tftp://staging-server/backups/anm-5.1-backup.tar.gz disk:
```

- Step 3** Load the inventory of network devices from the ANM server backup by entering the following command:

```
anm-tool load-inventory disk:filename
```

Creating an ANM Virtual Appliance Backup for Use with ANM Server

You can create a backup from ANM Virtual Appliance that you can use to restore an ANM server application by using the following command:

```
anm-tool save-inventory disk:filename
```

where *filename* is the name of the backup. The backup file is saved to disk: on ANM Virtual Appliance, where you can copy it to a remote server or a flash drive for use with ANM server.

For information about how to use the backup to restore an ANM server application, see Chapter 5, “Backing Up and Restoring Data” in the [Installation Guide for Cisco Application Networking Manager 5.1](#).

Exporting Logs

You can export ANM Virtual Appliance system log files to a repository by using the **backup-logs** command. This command creates an archive containing system level logs generated on the Virtual Appliance and includes files generated by the data export feature. Unlike archives generated by the **backup** command, log backups are intended for external analysis or archiving only, and are not subject to the restore procedure.

The syntax of this command is as follows:

```
backup-logs backup-name repository repository-name
```

This command creates a file named *backup-name-YYMMDD-HHMM.tar.gz* in the specified repository. For information about creating a repository, see the “[Creating a Repository for ANM Virtual Appliance Backups](#)” section on page 4-6.

The data export feature collects and archives this information:

- History logs, which are the logs related to traffic processing activities of the devices managed by ANM
- Audit logs, which are the logs reflecting network management configuration changes on ANM.

For more information, see the “[EXEC Commands](#)” section on page A-6.

Scheduling Tasks with Kron

The ADE OS includes CLI commands for configuring scheduled (kron) jobs. Configuring scheduled jobs involves defining the action to be performed (that is, the policy) and the time when it is performed (the occurrence). A scheduled job can occur once only or on a recurring basis.

As with other Cisco IOS shells, scheduling commands are specified in the configuration mode. A policy can contain one or more CLI commands, which comprise the actions to be performed.

Policies are defined using the **kron policy-list** command. Each policy can have one or more CLI commands supplied after the CLI keyword.

You configure the scheduling basis using the **kron occurrence** command, which specifies the policy to run, the time it should be run, and if it is recurring.

For example:

```
kron policy-list log-backup-policy
  cli backup-logs bl repository log-backup-repository
kron occurrence log-backup-job
  at 16:33 Monday
  recurring
  policy-list log-backup-policy
```

When applied to ANM Virtual Appliance, this configuration directs the system to back up system log files every Monday afternoon.

**Note**

When using scheduled tasks, the system clock must be accurately set or configured to use an NTP server for time synchronization because kron jobs are run based on the system clock. You typically configure an NTP server for ANM Virtual Appliance at the time of initial setup. To verify the configuration or add additional servers, use the **ntp server** command described in the “[ntp server](#)” section on page A-118.

Monitoring ANM Virtual Appliance

You monitor ANM Virtual Appliance similarly to the ANM server. In both cases, the ANM GUI displays ANM process information in the Statistics window (Admin > ANM management > Statistics).

At the ANM Virtual Appliance command line, you can use **show** commands to inspect several types of information on the status and activities of ANM Virtual Appliance. For example, you can inspect the CPU and memory utilization of ANM Virtual Appliance using the **show cpu** and **show memory** commands.

For remote monitoring, ANM Virtual Appliance supports standard monitoring tools, including SNMP and syslog.

SNMP

ANM Virtual Appliance supports remote monitoring with SNMP.

The OID for ANM Virtual Appliance differs from that of the ANM Server. The unique object ID for ANM Virtual Appliance is OID 1.3.6.1.4.1.9.1.1296.

The full object definition is as follows:

```
CISCO-PRODUCTS-MIB.my

ciscoAnmVirtualApp      OBJECT IDENTIFIER ::= { ciscoProducts 1296 } -- \
Cisco Application Networking Manager Virtual Appliance
CISCO-ENTITY-VENDORTYPE-OID-MIB.my

OLD-CISCO-CHASSIS-MIB.my
```

ANM Virtual Appliance supports the following MIBs:

- SNMPv2-MIB
- RFC1213-MIB
- IF-MIB
- IP-MIB
- TCP-MIB
- UDP-MIB
- CISCO-CDP-MIB (version 1)
- HOST-RESOURCES-MIB

The ADE OS CLI includes commands for configuring SNMP settings, such as the trap destination host (see the “[snmp-server host](#)” section on page A-126) and community string (see the “[snmp-server community](#)” section on page A-124).

Syslog Integration

The ANM appliance can receive and generate syslog information.

To view syslog status on ANM Virtual Appliance, use the **show logging internal** command. Enter the **show logging** command to view existing syslog entries on the system.

A sample output of the **show logging internal** command is as follows:

```
log server:                localhost
Global loglevel           6
Status:                   Disabled
```

You can set the log server (the system to which ANM forward syslog entries) using the **logging** command in configuration mode. In the command, specify the address of the remote system.

ANM Virtual Appliance can receive syslog data generated by managed devices. These syslogs appear in the ANM GUI Alarms window. For more information, see the *User Guide for the Cisco Application Networking Manager 5.1*.

CDP support

The Cisco Discovery Protocol (CDP) is a protocol that Cisco developed to share information between directly connected Cisco equipment, such as the operating system version and IP address.

CDP broadcasting is enabled by default on the ANM Virtual Application at an interval of every 60 seconds. You can disable it or manually enable it in configuration mode. To enable CDP support, use the **cdp run GigabitEthernet 0** command. To disable it, use **no cdp run GigabitEthernet 0** command.

You can check the status of CDP support by running the **show cdp all** command.

Troubleshooting

When troubleshooting an issue with ANM Virtual Appliance, try to determine whether the source of the issue is rooted in the ANM and ADE OS software running in the virtual machine or in the underlying VMware virtualization platform.

The [VMware knowledge base web site](#) contains extensive troubleshooting information, which can assist in troubleshooting ANM Virtual Appliance issues.

To troubleshoot issues related to the operation of the ANM application, use the following tools:

- The **show tech-support** command produces a detailed report of system information and resources, including everything collected by the ANM lifeline.
- You can view CPU/memory usage on an ANM virtual appliance using the **show cpu** or **show memory** commands. The **show process** command displays information about all running processes on the system.
- For ANM-specific process details, you can check the ANM process information from the ANM GUI and the Statistics window (Admin > ANM management > Statistics).
- If an error occurs in the use of CLI commands, use the **debug** command to determine the cause of the error. For more information about this command, see the “[debug](#)” section on page A-28.
- All the system logs are exported by the **backup-logs** command, including ANM audit logs and historical data. This information can be useful for troubleshooting the system.

Using the show tech-support Command

When using the **show tech-support** command, Cisco recommends that you save the output to a file.

The syntax of this command is as follows:

```
show tech-support file file-name.tar.gz
```

where *file-name.tar.gz* is the name of the file where the output information is placed on the file system under disk. You can copy it from there using the **copy** command.

Showing TCP Package Contents

ANM Virtual Appliance includes tools for examining the TCP packets that flow over its interface. This information can be useful for troubleshooting networking issues. To print Transmission Control Protocol (TCP) traffic to the console, use the **tech dumptcp** command in EXEC mode, specifying the interface identifier. This command prints traffic information to the screen until you exit by pressing **Ctrl-c**.

In most cases, this command would be used in consultation with Cisco TAC.

```
anm-va/admin#tech dumptcp 0
...
22:06:18.339712 arp who-has copper.eng.example.com tell ibis.eng.example.com
22:06:18.504692 00:50:56:9d:46:96 (oui Unknown) > Broadcast SNAP Unnumbered, ui, Flags
[Command], length 114 |22:06:18.504694 00:50:56:9d:46:96 (oui Unknown) > Broadcast SNAP
Unnumbered, ui, Flags [Command], length 146
22:06:19.465784 IP (tos 0x0, ttl 64, id 33129, offset 0, flags [DF], proto: UDP (17),
```

```
length: 52) copper.eng.example.com.temp > 10.1.255.255.http-alt: [udp sum ok] UDP, length
24
191 packets captured
191 packets received by filter
0 packets dropped by kernel
anm-va/admin#
```

Using the Debug Command

The **debug** command helps you identify failures in the ADE OS. The types of failures that may occur in the OS include setup failures or configuration failures.

This syntax of this command is as follows:

```
debug keyword
```

where *keyword* is one of the options described in [Table 4-1](#).

Table 4-1 Arguments for the debug Command

Keyword	Description
all	Enable all debugging
application	Application debugging
backup-restore	Backup and restore
cdp	Cisco Discovery Protocol
config	Configuration
copy	Copy commands
icmp	ICMP echo response configuration
locks	Resource locking
logging	Logging configuration
snmp	SNMP configuration
system	System
transfer	File transfer
user	User Management
utils	Utilities

To disable debug output, use the **undebug** command.

OutOfMemoryException Errors

Out of memory exception errors in the ANM logs typically indicate that there is insufficient memory allocated to ANM Virtual Appliance in vSphere Client. If you encounter this issue, you should increase the RAM allocation from the default 2 GB to 4 GB.

Procedure

- Step 1** Log in to the vSphere Client.
- Step 2** Shut down the VM for ANM Virtual Appliance.
- Step 3** In the Hosts and Clusters tree, right-click the ANM Virtual Appliance node and click **Edit Settings**.
The Virtual Machine dialog box appears.
- Step 4** From the Hardware tab, change the Memory Size value from 2 to 4.
- Step 5** Click **OK**.
- Step 6** When finished, restart ANM Virtual Appliance.
-

