



Cisco Active Network Abstraction Shell User Guide

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Preface

This guide describes the Cisco Active Network Abstraction (Cisco ANA) shell interface, which is the command line interface of the Cisco ANA Shell Manage system. It supports a subset of the capabilities supported by the system including multi-level management of the network and VNEs, surveillance, and provisioning.

This guide describes the implementation guidelines for the Cisco ANA shell interface, the behavior of basic commands, and the various commands supported by Cisco ANA:

- [Chapter 1, “General”](#)—Provides a top-level view of the Cisco ANA shell.
- [Chapter 2, “Functional Definition”](#)—Describes the Cisco ANA shell modes, errors and output format. It also describes the basic commands, unit node management, and surveillance commands.
- [Chapter 3, “Regular Expressions”](#)—Details the regular expressions used in the Cisco ANA shell.
- [Appendix A, “Cisco ANA Shell Potential Errors”](#)—Details the error codes and messages that may occur in the Cisco ANA shell.

Introduction

Cisco ANA shell interface provides:

- An IOS based CLI.
- A flat command hierarchy with a limited number of modes and unlimited number of nesting levels.
- Embedded inline help and command completion.
- The option to export all commands supported by the system.
- The basis for a user’s guide.

Audience

This guide is intended for use by the following:

- **Project Managers**—In order to verify that the content of the product is consistent with the marketing requirements.
- **Implementers**—In order to verify implementation against the requirements.
- **Quality Control**—In order to gain perspective on the product’s capabilities and as a basis for test plans.

Document Conventions

The Cisco ANA shell documentation uses the following conventions:

Convention	Description
Ctrl	Ctrl represents the Control key. For example, the key combination Ctrl-D means hold down the Control key while you press the D key. Keys are indicated in capital letters but are not case sensitive.
string	A string is a set of characters shown in italics. You may use quotation marks for strings with spaces and other special characters

Command syntax descriptions use the following conventions:

Convention	Description
boldface	Boldface text indicates commands and keywords that you enter literally as shown.
italics	Italic text indicates arguments for which you supply values.
[x]	Square brackets enclose an optional element (keyword or argument).
	A vertical line indicates a choice within an optional or required set of keywords or arguments.
[x y]	Square brackets enclosing keywords or arguments separated by a vertical line indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical line indicate a required choice.

Nested sets of square brackets or braces indicate optional or required choices within optional or required elements. For example:

Convention	Description
[x {y z}]	Braces and a vertical line within square brackets indicate a required choice within an optional element.

Examples use the following conventions:

Convention	Description
screen	Examples of information displayed on the screen are set in Courier New font.
Boldface screen	Examples of text that you must enter are set in Courier New bold font.
< >	Angle brackets enclose text that is not printed to the screen, such as passwords.
[]	Square brackets enclose default responses to system prompts.
“x”	Quotation marks indicate parameters that have spaces. You must enter quotation marks in order for Shell to identify it as a single paragraph.

Each Cisco ANA shell command is described in a table with the following format:

Name			
Description			
Mode			
Usage			
General			
Example			
Output Format	Type		

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

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

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CHAPTER 1

General

The Cisco ANA shell comprises the following main components which require command-line management:

- Cisco ANA shell client.
- Unit process and VNE.

All these components should support the same interface behavior.

Users

Two types of users are expected to use the Cisco ANA shell interface:

- **Network Operators**—Responsible for network operation tasks such as surveillance and provisioning.
- **Cisco Technicians**—Responsible for low-level system maintenance, debugging, and fine tuning.

Description

The Cisco ANA shell serves as the front-end of the system and provides services to the end-user. It unifies the operations of all the system components and requires the following services to be supported by the system components:

Component	Services Required from the Component
Gateway	All required surveillance and provisioning commands should be supported by the gateway
AVM	Should support management operations at AVM level, such as starting a new AVM.
VNE	Should support VNE management operations, such as starting and stopping VNEs.

Glossary

This section defines the different types of parameters that can be used as arguments in the Cisco ANA shell commands. All the parameters of the commands are strings in one of the formats provided in this document.

Type	string
Description	List of characters. If the string is not quoted, it must not contain white spaces. If the string contains white spaces, it must be quoted. To use quotes inside a string, escape them with a backslash.
Format	
Example	user1 "the string \"string\""
Remark	How to deal with strings with white spaces?

Type	name
Description	The same as string. Used for clarity, for example as device name.
Format	
Example	user1

Type	integer
Description	A string representing an integer.
Format	
Example	352

Type	vc
Description	Identifier of an ATM VC.
Format	<Integer>["/"]<Integer> Both integers must be at the range specified by ATM.
Example	1/102

Type	ip (=IPAddress)
Description	IP address.
Format	X.X.X.X
Example	192.168.1.2

Type	filename
Description	A valid filename on the operating system on which the client is running.

Format	String
Example	path1.snc /export/home/sheer1.3/Main/path2.snc

Type	Date
Description	String representing date and time.
Format	UNIX date format in the default C location.
Example	Mon Jul 22 16:56:25 IDT 2002



CHAPTER 2

Functional Definition

This chapter describes the Cisco ANA shell modes, errors, and output format. It also describes the basic commands, unit node management, and surveillance commands. The chapter includes the following information:

- [Interface Behavior](#)
- [Cisco ANA Shell Modes](#)
- [Cisco ANA Shell Errors](#)
- [Output Format](#)
- [Output Redirection](#)
- [Background Processing](#)
- [Basic Commands](#)
- [Node Management](#)
- [Surveillance](#)

Interface Behavior

The Cisco ANA shell CLI follows similar guidelines to the Cisco IOS interface.

The interface includes the following:

- **Command completion:** Pressing the Tab key completes the currently partially typed command. If there is more than one valid completion, the Cisco ANA shell will beep.
- **Fast help mechanism.** Press ? to list all valid completions.
- **Completion sound notification:** Short alarm notice is given when completion is not available.
- **Error messages,** see [Cisco ANA Shell Errors, page 2-2](#).
- **Case insensitive interface.**
- **Partial syntax recognition.**
- **Tests the validity of the input.**
- **The connection to both the Cisco ANA Manage and the unit machines will use Cisco ANA shell syntax.** This means that Telnet to a unit should allow all management functions relevant to a single machine.
- **Supports More and terminal length.**

Cisco ANA Shell Modes

This section describes the four Cisco ANA shell modes.

Mode Name	Description
exec	Entrance mode—Designed to show general details to the operator user. Activation of this mode is authenticated using a username and password on login to the Cisco ANA shell.
enable	Enhanced user mode—Allows further details and configuration. Activation of this mode is authenticated using a password.
configure	Configuration mode—Used to set different attributes. Activation of this mode is authenticated in and possible only from “enable” mode.
manage	Management mode—Used to perform management operations on the system. This mode requires authentication.



Note

Each level includes all previous levels.

Cisco ANA Shell Errors

This section describes error handling and error messages in the Cisco ANA shell.

Errors Style

Upon function termination with error, the printout should be:

ERROR (*error code*): *error message*

For example:

```
ERROR(10443): IP address already in use
```

In case of parsing or type-check errors (for example, string instead of integer), the command will be reprinted with an arrow pointing to the erroneous phrase. Otherwise, the command will not be reprinted.

Example: typing “show ip 192.168.1” will result with

```
ERROR (203): Invalid Value
show ip 192.168.1
^
```

Command Completion Errors

Error Example	Error Message
show momomo ^	Unknown command (a “^” character will mark the first letter that is unrecognized).

Error Example	Error Message
ip change <cr>	Incomplete command (when more arguments are needed).
s <TAB>	Beep if more then one command starts with “s”.

Output Format

This section describes the format of the output that the Cisco ANA shell may return.

Table

- Each table should have a header that lists the names of the columns.
- The header should appear only once at the beginning of the table, and not on each page.
- A vertical ruler should separate the header from the rows of the table.
- All table fields should be left aligned.

Example:

No.	IP	Name	Type	Uptime
1	192.168.2.3	asam1	ASAM1000	29.04.02 13:12
10	192.168.2.4	asam2	ASAM1000	1.05.02 9:43
11	192.168.2.45	RedBack2	SMS500	1.05.02 9:44
100	192.168.2.46	RedBack3	SMS500	1.05.02 9:44

Properties

Text paragraph with the following format:

```
<objectname>:
  <attribute name> = <value>
...
```

Example:

```
192.168.2.3:
  IP address = 192.168.2.3
  Name = asam1
  Type = ASAM1000
  Vendor = Alcatel
  Uptime = 1.05.02 13:13
Status = OK
```

Output Redirection

Output redirection enables sending the output of a command to a file.

There are two options for output redirection:

1. "> <filename>" at the end of the command will create a new file and redirect the command output to it. If the file already exists, the new file will override the old one. In case of an error in creating the output file, the command will not be run. For example: `show device > out.txt`
2. ">> <filename>" at the end of the command will append the output to an existing file. The file should be created if it does not already exist.

Background Processing

Each Cisco ANA shell command may be run in the background using the "&" symbol at the end of the command. For example: `show link > links.txt &` will run the command "show link" in the background, redirecting all output to the file "links.txt". By default, unless redirection is specified, the output of a background command is redirected to the Cisco ANA shell terminal

Basic Commands

This section describes the basic commands.

Inline Help ("?")

Name	Inline help
Description	Supplies command completion while typing.
Mode	All modes
Usage	?
General	That command executes with out typing <cr>.
Example	<pre>show ? path find path from source to destination blabla a command that generates a very long description that exceeds a single line and therefore should properly wraparound to the next line</pre>
Output Format	<p>List of valid options with a short description for each option.</p> <p>If the description exceeds a single line, the lines after the first one should be indented with the first description line.</p>
Remarks	
Priority	High

Enable

Name	Enable
Description	Enter enable mode.
Mode	exec

Usage	enable
General	Demands authentication. After entering enable mode the interface prompt is suffixed with a hash (#) sign.
Example	enable
Output Format	None
Remarks	
Priority	High

Configure

Name	Configure
Description	Enter configure mode.
Mode	enable
Usage	configure <cr>
General	After entering configure mode, the interface prompt is suffixed with a “conf”.
Example	configure <cr>
Output Format	None
Remarks	
Priority	High

Exit Cisco ANA Shell

Name	Exit Cisco ANA shell
Description	Exit Cisco ANA shell interface.
Mode	exec
Usage	exit <cr>
General	
Example	exit
Output Format	None
Remarks	If the Cisco ANA shell serves as the shell for the machine, it should return to the login window.
Priority	High

Exit Current Mode

Name	Exit current mode
Description	Exit current Cisco ANA shell mode and return to the previous mode.

Mode	enable, config, manage
Usage	exit <cr>
General	Running exit in enable mode returns to exec mode. Running exit in config mode returns to enable mode. Running exit in manage mode will return to the mode from which the user entered it (could be enable or configure).
Example	exit
Output Format	None
Remarks	
Priority	

Help

Name	Help
Description	Prints general help. Lists all the commands with a short description line for each command.
Mode	All modes
Usage	help <cr>
General	
Example	help
Output Format	A fixed help message.
Remarks	
Priority	Medium

Terminal Length

Name	Terminal length
Description	Set terminal length.
Mode	all modes
Usage	terminal length <integer> <cr>
General	Use length 0 for no pausing.
Example	terminal length 40
Output Format	None
Remarks	
Priority	Low

Show History

Name	Show history		
Description	Show previously run command		
Mode	all modes		
Usage	history <cr>		
General	The history should contain the last 100 commands. This is not configurable.		
Example	history		
Output Format	Type	Table	
	Columns	Column	Description
		Index	The index of the command. Index 1 refers to the previous command.
		Command	The string of the command.
Remarks			
Priority			

Clear History

Name	Clear history		
Description	Clear the command list stored in the history buffer.		
Mode	all modes		
Usage	history clear<cr>		
General			
Example	history clear		
Output Format	None		
Remarks			
Priority			

Access History

Name	Access history		
Description	Runs against a command in the history buffer.		
Mode	all modes		
Usage	history <integer> <cr>		
General	1 in the index is the last command (not including the current history command), the command before is 2 and so on.		
Example	history 3		
Output Format	None		

Remarks	
Priority	

Execute Script

Name	Execute script
Description	Run a script file of Cisco ANA shell commands.
Mode	All modes
Usage	run <filename> [async] [silent] <cr>
General	<p>The scripts must reside on the UNIX machine running the Cisco ANA shell on the directory /Main. This directory resides under the directory where the system was installed. The files should be transferred to this directory or its subdirectories using FTP. The scripts may reside in subdirectories of the base directory /Main, in which case the name of the script should include the relative path of the script.</p> <p>"silent" indicates suppressing any output that the command sends to the terminal.</p> <p>Note The script can be run in the background using "&".</p>
Example	<pre>run provision.cmd run scripts/provision.cmd</pre>
Output Format	None
Remarks	
Priority	

Node Management

This section describes the commands needed to manage a unit node. Unit node management includes management of the AVM processes and VNEs within the AVMs.

AVM Management

Show AVM List

Name	Show AVM list
Description	Show a list of AVMs with their minimum set of properties.
Mode	manage
Usage	show [unit [<IPAddress>]] avm <cr>
General	<p>If an IP address is given, shows only AVMs on the specified machine. Otherwise, shows AVMs on all machines.</p> <p>If no unit is given, then the command refers to the current machine.</p>
Example	show unit avm <cr>

Output Format	Type	Table	
	Columns	Column	Description
		Machine	IP address of the machine where the AVM resides.
		ID	AVM ID
		PID	Process ID
		Port	Management port
		Uptime	Process uptime (date format)
Version		AVM version	
Remarks			
Priority	High		

Show AVM VNEs

Name	Show AVM VNEs		
Description	List all the VNEs of a specific AVM.		
Mode	manage		
Usage	show [unit <IPAddress>] avm <integer> all agent [detailed] <cr>		
General	<p>Lists all the VNEs in the AVM.</p> <p>If no unit is given, then the command refers to the current machine.</p> <p>If detailed is not given, only DAs are displayed. Otherwise, all VNE types (DA, CA, IA) are displayed.</p> <p>all refers to all AVMs in the current machine.</p> <p>The command should also display configured VNEs, which are configured in the XML but are not loaded. In this case, all the non-relevant fields should be empty.</p>		
Example	show unit 192.168.2.10 avm 32 agent		
Output Format	Type	Table	
	Columns	Column	Description
		IP address	VNE leading IP.
		Type	VNE Type (DA, IA, CA).
		State	VNE state (idle, wait, block, running, configured).
		Runtime	The total time spent by the VNE processing messages.
		Wait time	The total time spent by the VNE waiting to process messages.
		Last run	The last time the VNE visited the scheduler. Units are milliseconds relative to now.
		Transport address	The VNE's transport address in hexadecimal format.
Parent		Parent VNE. Transport address of the parent VNE.	

Remarks	
Priority	

VNE Management

Show All VNEs

Name	Show all VNEs in the unit
Description	Show the basic information about all the VNEs in the system (all AVMs).
Mode	manage
Usage	show agent [detailed] <cr>
General	If detailed is not given, only DAs are displayed. Otherwise, all VNE types (DA, CA, IA) are displayed.
Example	show agent <cr>
Output Format	See Show AVM VNEs, page 2-9 .
Remarks	
Priority	

Show VNE Information (-)

Name	Show VNE information
Description	Show the information for a specific VNE.
Mode	manage
Usage	show agent <IPAddress name> <cr>
General	The parameter can be the leading IP of the VNE, or the device name.
Example	show agent 192.168.2.2 <cr>

Output Format	Type	Properties	
	Fields	Field	Description
		IP Address	VNE leading IP
		Type	VNE Type (DA, IA, CA)
		Machine	IP address of the machine where the VNE is installed.
		AVM	AVM number where the VNE is installed.
		Transport address	The VNE's transport address in hexadecimal format.
		State	VNE state (idle, wait, block, running, configured).
		Runtime	The total time spent by the VNE processing messages.
		Wait time	The total time spent by the VNE waiting to process messages.
		Last run	The last time the VNE visited the scheduler. Units are milliseconds relative to now.
		Parent	Parent VNE. Transport address of the parent VNE.
Remarks			
Priority			

Add AVM

Name	Add AVM
Description	Add a new AVM to a unit.
Mode	manage
Usage	unit <IPAddress> avm <integer> add <cr>
General	The parameter represents the ID of the AVM that is to be added.
Example	unit 192.168.2.10 avm 32 add
Output Format	None
Remarks	
Priority	

Remove AVM

Name	Remove AVM
Description	Remove an AVM from a unit machine.
Mode	manage
Usage	unit <IPAddress> avm <integer> remove<cr>
General	The parameter represents the ID of the AVM to be deleted.

Example	<code>unit 192.168.2.10 avm 32 remove</code>
Output Format	None
Remarks	
Priority	

Load AVM

Name	Load AVM
Description	Add a configured AVM to the unit bootstrap list.
Mode	manage
Usage	<code>unit <IPAddress> avm <integer> load <cr></code>
General	The parameter represents the ID of the AVM to be loaded. The newly loaded AVM starts immediately, and in addition, it will be started in all consecutive restarts of the system.
Example	<code>unit 192.168.2.10 avm 32 load</code>
Output Format	None
Remarks	
Priority	

Unload AVM

Name	Unload AVM
Description	Remove an AVM from the bootstrap list.
Mode	manage
Usage	<code>unit <IPAddress> avm <integer> unload <cr></code>
General	The AVM will be automatically stopped, if currently executing. The parameter represents the ID of the AVM to be unloaded.
Example	<code>unit 192.168.2.10 avm 32 unload</code>
Output Format	None
Remarks	
Priority	

Add VNE

Name	Add VNE
Description	Add a VNE to the configuration database of a given AVM.
Mode	manage
Usage	<code>agent <IPAddress> add unit <IPAddress> avm <integer> name <name> vendor <string> type <string> <cr></code>

General	If no name is given, the IP address will be used as the device name.
Example	agent 192.168.2.3 add unit 192.168.2.10 avm 32 vendor alcatel type asam1000
Output Format	None
Remarks	
Priority	

Remove VNE

Name	Remove VNE
Description	Remove a VNE from a given AVM.
Mode	manage
Usage	agent <IPAddress> remove <cr>
General	
Example	agent 192.168.2.3 remove
Output Format	None
Remarks	If the VNE is currently running, it will stop. If the VNE is loaded, it should be unloaded from the bootstrap list.
Priority	

Load VNE

Name	Load VNE
Description	The newly loaded VNE starts immediately. It will be loaded every time the system restarts.
Mode	manage
Usage	agent <IPAddress> load <cr>
General	
Example	agent 192.168.2.3 load
Output Format	None
Remarks	
Priority	

Unload VNE

Name	Unload VNE
Description	Unload an VNE from the AVM bootstrap list. If the VNE is currently running, it is stopped before unloading from the bootstrap list.
Mode	manage

Usage	agent <IPAddress> unload <cr>
General	
Example	agent 192.168.2.3 unload
Output Format	None
Remarks	
Priority	

Add Static Topology Link

Name	Add static topology link
Description	Add a static link between two devices in the network.
Mode	manage
Usage	topology link source <IPAddress> [shelf <integer>] module <integer> [submodule <integer>] port <integer> destination <IPAddress> [shelf <integer>] module <integer> [submodule <integer>] port <integer> add [unidirectional] <cr>
General	By default, the link is bidirectional and enabled automatically. Unidirectional represents a unidirectional link.
Example	topology link source 192.168.2.3 module 1 port 1 destination 192.168.2.4 module 2 port 1 add
Output Format	None
Remarks	
Priority	

Remove Static Topology Link

Name	Remove static topology link
Description	Remove an existing static topology link.
Mode	manage
Usage	topology link source <IPAddress> [shelf <integer>] module <integer> [submodule <integer>] port <integer> destination <IPAddress> [shelf <integer>] module <integer> [submodule <integer>] port <integer> remove [unidirectional] <cr>
General	
Example	topology link source 192.168.2.3 module 1 port 1 destination 192.168.2.4 module 2 port 1 remove
Output Format	None
Remarks	
Priority	

Surveillance

This section describes the surveillance commands that should be supported by the Cisco ANA shell interface.

Show Links

Name	Show links		
Description	Show the topological links managed by the unit.		
Mode	enable		
Usage	show link <cr>		
General			
Example	show link		
Output Format	Type	Table	
	Columns	Column	Description
		Index	Unique running index.
		From	A-side location.
		To	Z-side location.
State		Automatic, Static, Configured.	
Priority			

Drools Rules Management

For more information about the Drools Rules Engine, refer to the *Cisco Active Network Abstraction Administrator Guide*.

Show Rules

Name	Show rules
Description	Show all rules.
Mode	enable
Usage	show rule
General	
Example	show rule
Output Format	contextID, ruleName, isValid
Remarks	
Priority	

Show Rules

Name	Show rules
Description	Show rules of a specific context.
Mode	enable
Usage	show rule <contextID>
General	
Example	show rule aaa
Output Format	contextID, ruleName, isValid
Remarks	
Priority	

Reload Rules

Name	Reload rules
Description	Reloads all rules of a specific context.
Mode	config
Usage	rule <contextID> reload
General	
Example	rule aaa reload
Output Format	
Remarks	
Priority	

Validate Rule

Name	Validate rule
Description	Validate a specific rule.
Mode	
Usage	rule <contextID> <ruleName> validate
General	
Example	rule aaa bbb validate
Output Format	
Remarks	
Priority	



CHAPTER 3

Regular Expressions

Wildcard	Meaning
*	Matches any string of zero or more characters.
-	Matches any one character.
[token]	Brackets enclose ranges or sets, such as [1-9] or [klmnopq]. There are two ways to format a token: <ol style="list-style-type: none">1. Range Start-stop: Start is the beginning of the character range. “-” is a special character indicating a range. Stop is the end of the character range.2. Set Comprises discrete character values in any order. Examples - [a4Bc],[abcdefg]
[^token]	The caret “^” before a token indicates non-inclusion. Examples - [^c-g] means any character that is not a ‘c’, ‘d’, ‘e’, ‘f’, or ‘g’.





APPENDIX **A**

Cisco ANA Shell Potential Errors

The error codes and messages are described below:

Code	Error Constant	Description
0	NO_ERROR	Operation completed successfully.
1000	GENERAL_ERROR	General error. This is the most generic error and should be reported only when a more concrete error code does not exist.
2000	EXECUTION_FAILED	General error caused by an error while trying to execute a command. This can be, for example, because the VNE does not exist, a wrong parameter, etc.
3000	CONNECTION_FAILED	General connection failures. Use more concrete subtypes when possible.
3100	CONNECTION_WITH_MM_FAILED	Cisco ANA could not connect to the MM server.
3101	CONNECTION_WITH_MC_FAILED	Cisco ANA could not connect to a unit server.
4000	COMMAND_NOT_SUPPORTED	The command is not supported by the MM or the unit.
5000	INVALID_VALUE	General error for an invalid parameter value.

