

# **Create User Profiles and Assign Privileges**

To provide controlled access to the XR and System Admin configurations on the router, user profiles are created with assigned privileges. The privileges are specified using command rules and data rules. The authentication, authorization, and accounting (aaa) commands are used for the creation of users, groups, command rules, and data rules. The adda commands are also used for changing the disaster-recovery password.

Note

You cannot configure the external AAA server and services from the System Admin VM. It can be configured only from the XR VM.

Configure AAA authorization to restrict users from uncontrolled access. If AAA authorization is not configured, the command and data rules associated to the groups that are assigned to the user are bypassed. An IOS-XR user can have full read-write access to the IOS-XR configuration through Network Configuration Protocol (NETCONF), google-defined Remote Procedure Calls (gRPC) or any YANG-based agents. In order to avoid granting uncontrolled access, enable AAA authorization before setting up any configuration.



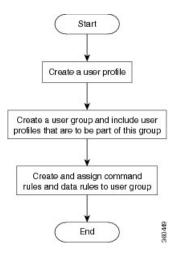
Note If any user on XR is deleted, the local database checks whether there is a first user on System Admin VM.

- If there is a first user, no syncing occurs.
- If there is no first user, then the first user on XR (based on the order of creation) is synced to System Admin VM.
- When a user is added in XR, if there is no user on System Admin mode, then the user is synced to sysadmin-vm. After the synchronization, any changes to the user on XR VM does not synchronize on the System Admin VM.
- A user added on the System Admin VM does not synchronize with XR VM.
- Only the first user or disaster-recovery user created on System Admin VM synchronizes with the host VM.
- Changes to credentials of first user or disaster-recovery user on System Admin VM synchronizes with the host VM.
- The first user or disaster-recovery user deleted on System Admin VM does not synchronize with the host VM. The host VM retains the user.

Users are authenticated using username and password. Authenticated users are entitled to execute commands and access data elements based on the command rules and data rules that are created and applied to user groups. All users who are part of a user group have such access privileges to the system as defined in the command rules and data rules for that user group.

The workflow for creating user profile is represented in this flow chart:

#### Figure 1: Workflow for Creating User Profiles



Note

The root-lr user, created for the XR VM during initial router start-up, is mapped to the root-system user for the System Admin VM. The root-system user has superuser permissions for the System Admin VM and therefore has no access restrictions.

Use the show run aaa command in the Config mode to view existing aaa configurations.

The topics covered in this chapter are:

- Create User Groups, on page 2
- Create Users, on page 6
- Create Command Rules, on page 10
- Create Data Rules, on page 12
- Change Disaster-recovery Username and Password, on page 15
- Recover Password using PXE Boot, on page 16

# **Create User Groups**

Create a new user group to associate command rules and data rules with it. The command rules and data rules are enforced on all users that are part of the user group.

For extensive information about creating user groups, task groups, RADIUS and TACACS configurations, see the *Configuring AAA Services* chapter in the *System Security Configuration Guide for Cisco ASR 9000 Series Routers*. For detailed information about commands, syntax and their description, see the *Authentication, Authorization, and Accounting Commands* chapter in the *System Security Command Reference for Cisco ASR 9000 Series Routers*.

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## Configure User Groups in XR VM

User groups are configured with the command parameters for a set of users, such as task groups. Entering the **usergroup** command accesses the user group configuration submode. Users can remove specific user groups by using the **no** form of the **usergroup** command. Deleting a usergroup that is still referenced in the system results in a warning.

#### Before you begin



Only users associated with the WRITE:AAA task ID can configure user groups. User groups cannot inherit properties from predefined groups, such as owner-sdr.

## **SUMMARY STEPS**

- 1. configure
- 2. usergroup usergroup-name
- **3.** description *string*
- 4. inherit usergroup usergroup-name
- 5. taskgroup taskgroup-name
- 6. Repeat Step for each task group to be associated with the user group named in Step 2.
- 7. Use the commit or end command.

## **DETAILED STEPS**

Step 1	configure			
	Example:			
	RP/0/RP0/CPU0:router# configure			
	Enters mode.			
Step 2	usergroup usergroup-name			
	Example:			
	RP/0/RP0/CPU0:router(config)# usergroup beta			
	Creates a name for a particular user group and enters user group configuration submode.			
	• Specific user groups can be removed from the system by specifying the <b>no</b> form of the <b>usergroup</b> command.			
Step 3	description string			
	Example:			
	RP/0/RP0/CPU0:router(config-ug)#			

description this is a sample user group description

(Optional) Creates a description of the user group named in Step 2.

## Step 4 inherit usergroup usergroup-name

```
RP/0/RP0/CPU0:router(config-ug)#
inherit usergroup sales
```

• Explicitly defines permissions for the user group.

**Step 5 taskgroup** *taskgroup-name* 

### Example:

RP/0/RP0/CPU0:router(config-ug)# taskgroup beta

Associates the user group named in Step 2 with the task group named in this step.

- The user group takes on the configuration attributes (task ID list and permissions) already defined for the entered task group.
- **Step 6** Repeat Step for each task group to be associated with the user group named in Step 2.
- **Step 7** Use the **commit** or **end** command.

commit ---Saves the configuration changes and remains within the configuration session.

end —Prompts user to take one of these actions:

- Yes Saves configuration changes and exits the configuration session.
- No —Exits the configuration session without committing the configuration changes.
- Cancel Remains in the configuration session, without committing the configuration changes.

## Create a User Group in System Admin VM

Create a user group for the System Admin VM.

The router supports a maximum of 32 user groups.

## Before you begin

Create a user profile. See the Create User section.

## **SUMMARY STEPS**

- 1. admin
- 2. config
- 3. aaa authentication groups group group\_name
- 4. users user\_name
- 5. gid group\_id\_value
- 6. Use the commit or end command.

## DETAILED STEPS

Step 1 admin

RP/0/RP0/CPU0:router# admin

#### Enters mode.

## Step 2 config

#### Example:

sysadmin-vm:0\_RP0#config

Enters System Admin Config mode.

## **Step 3** aaa authentication groups group group\_name

#### Example:

sysadmin-vm:0 RPO(config) #aaa authentication groups group gr1

Creates a new user group (if it is not already present) and enters the group configuration mode. In this example, the user group "gr1" is created.

**Note** By default, the user group "root-system" is created by the system at the time of root user creation. The root user is part of this user group. Users added to this group will get root user permissions.

#### Step 4 users user\_name

#### Example:

sysadmin-vm:0\_RP0(config-group-gr1)#users us1

Specify the name of the user that should be part of the user group.

You can specify multiple user names enclosed withing double quotes. For example, users "user1 user2 ...".

## **Step 5** gid group\_id\_value

#### Example:

sysadmin-vm:0\_RP0(config-group-gr1)#gid 50

Specify a numeric value. You can enter any 32 bit integer.

**Step 6** Use the **commit** or **end** command.

**commit**—Saves the configuration changes and remains within the configuration session.

end —Prompts user to take one of these actions:

- Yes Saves configuration changes and exits the configuration session.
- No —Exits the configuration session without committing the configuration changes.
- Cancel Remains in the configuration session, without committing the configuration changes.

#### What to do next

- Create command rules. See Create Command Rules, on page 10.
- Create data rules. See Create Data Rules, on page 12.

# **Create Users**

Create new users for the XR VM and System Admin VM.



**Note** Users created in the System Admin VM are different from the ones created in XR VM. As a result, the username and password of a System Admin VM user cannot be used to access the XR VM, and vice versa.

#### XR VM and System Admin VM User Profile Synchronization

When the user profile is created for the first time in XR VM, the user name and password are synced to the System Admin VM if no user already exists in System Admin VM.

However, the subsequent password change or user deletion in XR VM for the synced user is not synchronized with the System Admin VM.

Therefore, the passwords in XR VM and System Admin VM may not be the same. Also, the user synced with the System Admin VM will not be deleted if the user is deleted in XR VM.

For extensive information about creating user groups, task groups, RADIUS and TACACS configurations, see the *Configuring AAA Services* chapter in the *System Security Configuration Guide for Cisco ASR 9000 Series Routers*. For detailed information about commands, syntax and their description, see the *Authentication, Authorization, and Accounting Commands* chapter in the *System Security Command Reference for Cisco ASR 9000 Series Routers*.

## **Create a User Profile in XR VM**

Perform this task to configure a user.

Each user is identified by a username that is unique across the administrative domain. Each user should be made a member of at least one user group. Deleting a user group may orphan the users associated with that group. The AAA server authenticates orphaned users but most commands are not authorized.

For extensive information about AAA, and creating users, see the *Configuring AAA Services* chapter in the *System Security Configuration Guide for Cisco ASR 9000 Series Routers*. For detailed information about commands, syntax and their description, see the *Authentication, Authorization, and Accounting Commands* chapter in the *System Security Command Reference for Cisco ASR 9000 Series Routers*.

## Step 1 configure

#### Example:

RP/0/RP0/CPU0:router# configure

Enters mode.

## Step 2 username user-name

#### Example:

RP/0/RP0/CPU0:router(config)# username user1

Creates a name for a new user (or identifies a current user) and enters username configuration submode.

- The user-name argument can be only one word. Spaces and quotation marks are not allowed.
- **Step 3** Do one of the following:

```
• password {0 | 7} password
```

```
• secret {0 | 5 | 8 | 9 | 10} secret
```

```
RP/0/RP0/CPU0:router(config-un) # password 0 pwd1
```

or

RP/0/RP0/CPU0:router(config-un) # secret 0 sec1

Specifies a password for the user named in step 2.

- Use the secret command to create a secure login password for the user names specified in step 2.
- Entering 0 following the password command specifies that an unencrypted (clear-text) password follows. Entering
  7 following the password command specifies that an encrypted password follows.
- For the secret command, the following values can be entered:
  - 0 : specifies that a secure unencrypted (clear-text) password follows
  - 5 : specifies that a secure encrypted password follows
  - 8 : specifies that Type 8 password that uses SHA256 hashing algorithm follows
  - 9 : specifies that Type 9 password that uses scrypt hashing algorithm follows
  - **Note** The Type 8 and Type 9 passwords are supported on the IOS XR 64-bit operating system starting from Cisco IOS XR Software Release 7.0.1. Prior to this release, it was supported only on the 32-bit operating system.
  - 10 : specifies that Type 10 password that uses SHA512 hashing algorithm follows
  - Note
- Type 10 password is supported only for Cisco IOS XR 64 bit platform.
  - Backward compatibility issues such as configuration loss, authentication failure, and so on, are expected when you downgrade to lower versions that still use **MD5** or **SHA256** encryption algorithms. Convert the passwords to Type 10 before version downgrades to minimize the impact of such issues.
  - In a first user configuration scenario or when you reconfigure a user, the system synchronises only the Type 5 and Type 10 passwords from XR VM to System Admin VM and Host VM. It does not synchronize the Type 8 and Type 9 passwords in such scenarios.
- Type **0** is the default for the **password** and **secret** commands.
- From Cisco IOS XR Software Release 7.0.1 and later, the default hashing type is 10 (SHA512) when clear text secret is configured without choosing the type in the configuration.

#### **Step 4** group group-name

#### Example:

RP/0/RP0/CPU0:router(config-un)# group sysadmin

Assigns the user named in step 2 to a user group that has already been defined through the **usergroup** command.

- The user takes on all attributes of the user group, as defined by that user group's association to various task groups.
- Each user must be assigned to at least one user group. A user may belong to multiple user groups.
- **Step 5** Repeat step 4 for each user group to be associated with the user specified in step 2.
- **Step 6** Use the **commit** or **end** command.
  - commit ---Saves the configuration changes and remains within the configuration session.
  - end —Prompts user to take one of these actions:
    - Yes Saves configuration changes and exits the configuration session.
    - No --Exits the configuration session without committing the configuration changes.
    - Cancel Remains in the configuration session, without committing the configuration changes.

## Create a User Profile in System Admin VM

Create new users for the System Admin VM. Users are included in a user group and assigned certain privileges. The users have restricted access to the commands and configurations in the System Admin VM console, based on assigned privileges.

The router supports a maximum of 1024 user profiles.

The root-Ir user of XR VM can access the System Admin VM by entering **Admin** command in the XR EXEC mode. The router does not prompt you to enter any username and password. The XR VM root-Ir user is provided full access to the System Admin VM.

## SUMMARY STEPS

- 1. admin
- 2. config
- 3. aaa authentication users user user\_name
- 4. password password
- 5. uid user\_id\_value
- **6.** gid group\_id\_value
- 7. ssh\_keydir ssh\_keydir
- 8. homedir homedir
- 9. Use the commit or end command.

## **DETAILED STEPS**

#### Step 1 admin

#### Example:

RP/0/RP0/CPU0:router# admin

	Enters mode.
Step 2	config
	Example:
	sysadmin-vm:0_RP0#config
	Enters System Admin Config mode.
Step 3	aaa authentication users user _name
	Example:
	sysadmin-vm:0_RP0(config)#aaa authentication users user us1
	Creates a new user and enters user configuration mode. In the example, the user "us1" is created.
Step 4	password password
	Example:
	sysadmin-vm:0_RP0(config-user-us1)#password pwd1
	Enter the password that will be used for user authentication at the time of login into System Admin VM.
Step 5	uid user_id_value
	Example:
	sysadmin-vm:0_RP0(config-user-us1)#uid 100
	Specify a numeric value. You can enter any 32 bit integer.
Step 6	gid group_id_value
	Example:
	<pre>sysadmin-vm:0_RP0(config-user-us1)#gid 50</pre>
	Specify a numeric value. You can enter any 32 bit integer.
Step 7	ssh_keydir ssh_keydir
	Example:
	sysadmin-vm:0_RP0(config-user-us1)#ssh_keydir dir1
	Specify any alphanumeric value.
Step 8	homedir homedir
	Example:
	sysadmin-vm:0_RP0(config-user-us1)#homedir dir2
	Specify any alphanumeric value.
Step 9	Use the <b>commit</b> or <b>end</b> command.
	commit —Saves the configuration changes and remains within the configuration session.
	end —Prompts user to take one of these actions:
	• Yes — Saves configuration changes and exits the configuration session.
	• No —Exits the configuration session without committing the configuration changes.

• Cancel —Remains in the configuration session, without committing the configuration changes.

## What to do next

- Create user group that includes the user created in this task. See Create a User Group in System Admin VM, on page 4.
- Create command rules that apply to the user group. See Create Command Rules, on page 10.
- Create data rules that apply to the user group. See Create Data Rules, on page 12.

# **Create Command Rules**

Command rules are rules based on which users of a user group are either permitted or denied the use of certain commands. Command rules are associated to a user group and get applied to all users who are part of the user group.

A command rule is created by specifying whether an operation is permitted, or denied, on a command. This table lists possible operation and permission combinations:

Operation	Accept Permission	Reject Permission
Read (R)	Command is displayed on the CLI when "?" is used.	Command is not displayed on the CLI when "?" is used.
Execute (X)	Command can be executed from the CLI.	Command cannot be executed from the CLI.
Read and execute (RX)	Command is visible on the CLI and can be executed.	Command is neither visible nor executable from the CLI.

By default, all permissions are set to **Reject**.

Each command rule is identified by a number associated with it. When multiple command rules are applied to a user group, the command rule with a lower number takes precedence. For example, cmdrule 5 permits read access, while cmdrule10 rejects read access. When both these command rules are applied to the same user group, the user in this group gets read access because cmdrule 5 takes precedence.

As an example, in this task, the command rule is created to deny read and execute permissions for the "show platform" command.

#### Before you begin

Create an user group. See Create a User Group in System Admin VM, on page 4.

## **SUMMARY STEPS**

- 1. admin
- 2. config
- 3. aaa authorization cmdrules cmdrule command\_rule\_number
- 4. command command\_name
- **5.** ops  $\{r | x | rx\}$

- 6. action {accept | accept\_log | reject}
- 7. group user\_group\_name
- **8. context** *connection\_type*
- 9. Use the commit or end command.

## **DETAILED STEPS**

Step 1	admin					
	Example:					
	RP/0/RP0/CPU0:router# admin					
	Enters r	node.				
Step 2	config					
	Example	e:				
	sysadmi	in-vm:0_RPO#config				
	Enters S	System Admin Config mode.				
Step 3	aaa authorization cmdrules cmdrule command_rule_number					
	Example:					
	sysadmi	sysadmin-vm:0_RP0(config)#aaa authorization cmdrules cmdrule 1100				
	Specify	a numeric value as the command rule number. You can enter a 32 bit integer.				
	Important Do no use numbers between 1 to 1000 because they are reserved by Cisco.					
		This command creates a new command rule (if it is not already present) and enters the command rule configuration mode. In the example, command rule "1100" is created.				
	Note	By default "cmdrule 1" is created by the system when the root-system user is created. This command rule provides "accept" permission to "read" and "execute" operations for all commands. Therefore, the root user has no restrictions imposed on it, unless "cmdrule 1" is modified.				
Step 4	command command_name					
	Example:					
	sysadmi	in-vm:0_RP0(config-cmdrule-1100)#command "show platform"				
	Specify	the command for which permission is to be controlled.				
	If you e	nter an asterisk '*' for <b>command</b> , it indicates that the command rule is applicable to all commands.				
Step 5	ops { $\mathbf{r} + \mathbf{x}   \mathbf{rx}$ }					
	Example:					
	sysadmi	in-vm:0_RP0(config-cmdrule-1100)#ops rx				
	Specify	the operation for which permission has to be specified:				
	• r –	– Read				
	• x –	- Execute				

- **rx** Read and execute
- **Step 6** action {accept | accept\_log | reject}

sysadmin-vm:0 RP0(config-cmdrule-1100)#action reject

Specify whether users are permitted or denied the use of the operation.

- accept users are permitted to perform the operation
- accept\_log— users are permitted to perform the operation and every access attempt is logged.
- reject— users are restricted from performing the operation.
- **Step 7** group user\_group\_name

#### Example:

sysadmin-vm:0 RP0(config-cmdrule-1100)#group gr1

Specify the user group on which the command rule is applied.

#### **Step 8 context** *connection\_type*

## **Example:**

sysadmin-vm:0 RP0(config-cmdrule-1100)#context \*

Specify the type of connection to which this rule applies. The connection type can be *netconf* (Network Configuration Protocol), *cli* (Command Line Interface), or *xml* (Extensible Markup Language ). It is recommended that you enter an asterisk '\*'; this indicates that the command rule applies to all connection types.

**Step 9** Use the **commit** or **end** command.

**commit**—Saves the configuration changes and remains within the configuration session.

end —Prompts user to take one of these actions:

- Yes Saves configuration changes and exits the configuration session.
- No —Exits the configuration session without committing the configuration changes.
- Cancel Remains in the configuration session, without committing the configuration changes.

## What to do next

Create data rules. See Create Data Rules, on page 12.

# **Create Data Rules**

Data rules are rules based on which users of the user group are either permitted, or denied, accessing and modifying configuration data elements. The data rules are associated to a user group. The data rules get applied to all users who are part of the user group.

Each data rule is identified by a number associated to it. When multiple data rules are applied to a user group, the data rule with a lower number takes precedence.

## Before you begin

Create an user group. See Create a User Group in System Admin VM, on page 4.

## **SUMMARY STEPS**

- 1. admin
- **2**. config
- **3**. **aaa authorization datarules datarule** *data\_rule\_number*
- 4. keypath keypath
- **5. ops** operation
- 6. action {accept | accept\_log | reject}
- 7. group user\_group\_name
- **8. context** *connection type*
- 9. namespace namespace
- **10.** Use the **commit** or **end** command.

## **DETAILED STEPS**

Step 1	admin				
	Example:				
	RP/0/R	PO/CPU0:router# admin			
	Enters 1	mode.			
Step 2	config				
	Exampl	e:			
	sysadm	in-vm:0_RPO#config			
	Enters S	System Admin Config mode.			
Step 3	aaa authorization datarules datarule data_rule_number				
	Example:				
	sysadmin-vm:0_RP0(config)#aaa authorization datarules datarule 1100				
Specify a numeric value as the data rule number. You can enter a 32 bit integer.		a numeric value as the data rule number. You can enter a 32 bit integer.			
	Importa	nt Do no use numbers between 1 to 1000 because they are reserved by Cisco.			
This command creates a new data rule (if it is not already present) and enters the example, data rule "1100" is created.		mmand creates a new data rule (if it is not already present) and enters the data rule configuration mode. In the e, data rule "1100" is created.			
	Note	By default "datarule 1" is created by the system when the root-system user is created. This data rule provides "accept" permission to "read", "write", and "execute" operations for all configuration data. Therefore, the root user has no restrictions imposed on it, unless "datarule 1" is modified.			
0. 0					

Step 4 keypath keypath

sysadmin-vm:0 RP0(config-datarule-1100)#keypath /aaa/disaster-recovery

Specify the keypath of the data element. The keypath is an expression defining the location of the data element. If you enter an asterisk '\*' for **keypath**, it indicates that the command rule is applicable to all configuration data.

**Step 5 ops** operation

#### Example:

sysadmin-vm:0 RP0(config-datarule-1100)#ops rw

Specify the operation for which permission has to be specified. Various operations are identified by these letters:

- c—Create
- d—Delete
- u—Update
- w— Write (a combination of create, update, and delete)
- r—Read
- x—Execute

## Step 6 action {accept | accept\_log | reject}

#### Example:

sysadmin-vm:0 RP0(config-datarule-1100)#action reject

Specify whether users are permitted or denied the operation.

- accept users are permitted to perform the operation
- accept\_log— users are permitted to perform the operation and every access attempt is logged
- reject— users are restricted from performing the operation
- **Step 7** group user\_group\_name

#### Example:

sysadmin-vm:0 RP0(config-datarule-1100)#group gr1

Specify the user group on which the data rule is applied. Multiple group names can also be specified.

#### **Step 8 context** *connection type*

#### Example:

sysadmin-vm:0 RP0(config-datarule-1100)#context \*

Specify the type of connection to which this rule applies. The connection type can be *netconf* (Network Configuration Protocol), *cli* (Command Line Interface), or *xml* (Extensible Markup Language). It is recommended that you enter an asterisk '\*', which indicates that the command applies to all connection types.

**Step 9 namespace** *namespace* 

#### **Example:**

sysadmin-vm:0\_RP0(config-datarule-1100)#namespace \*

Enter asterisk '\*' to indicate that the data rule is applicable for all namespace values.

**Step 10** Use the **commit** or **end** command.

commit ---Saves the configuration changes and remains within the configuration session.

end —Prompts user to take one of these actions:

- Yes Saves configuration changes and exits the configuration session.
- No —Exits the configuration session without committing the configuration changes.
- Cancel Remains in the configuration session, without committing the configuration changes.

# **Change Disaster-recovery Username and Password**

When you define the root-system username and password initially after starting the router, the same username and password gets mapped as the disaster-recovery username and password for the System Admin console. However, it can be changed.

The disaster-recovery username and password is useful in these scenarios:

- Access the system when the AAA database, which is the default source for authentication in System Admin console is corrupted.
- Access the system through the management port, when, for some reason, the System Admin console is not working.
- Create new users by accessing the System Admin console using the disaster-recovery username and password, when the regular username and password is forgotten.



Note

On the router, you can configure only one disaster-recovery username and password at a time.

## SUMMARY STEPS

- 1. admin
- **2**. config
- 3. aaa disaster-recovery username username password password
- 4. Use the commit or end command.

## **DETAILED STEPS**

Step 1 admin

#### Example:

RP/0/RP0/CPU0:router# admin

Enters mode.

#### Step 2 config

## Example:

sysadmin-vm:0\_RP0#config

Enters System Admin Config mode.

#### **Step 3** aaa disaster-recovery username username password password

#### Example:

sysadmin-vm:0 RP0(config)#aaa disaster-recovery username us1 password pwd1

Specify the disaster-recovery username and the password. You have to select an existing user as the disaster-recovery user. In the example, 'us1' is selected as the disaster-recovery user and assigned the password as 'pwd1'. The password can be entered as a plain text or md5 digest string.

When you need to make use of the disaster recovery username, you need to enter it as username@localhost.

**Step 4** Use the **commit** or **end** command.

commit —Saves the configuration changes and remains within the configuration session.

end —Prompts user to take one of these actions:

- Yes Saves configuration changes and exits the configuration session.
- No —Exits the configuration session without committing the configuration changes.
- Cancel Remains in the configuration session, without committing the configuration changes.

# **Recover Password using PXE Boot**

If you are unable to login or lost your XR and System administration passwords, use the following steps to create new password. A lost password cannot be recovered, instead a new username and password must be created with a non-graceful PXE boot.

**Step 1** Boot the router using PXE.

**Note** PXE boot is fully intrusive. The router state, configuration and image is reset.

To PXE boot a router, see Boot the Router Using iPXE.

**Step 2** Reset the password.