



# Configuring User Accounts and RBAC

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This chapter describes how to configure user accounts and role-based access control (RBAC) on Cisco NX-OS devices.

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## About User Accounts and RBAC

You can create and manage users accounts and assign roles that limit access to operations on the Cisco NX-OS device. RBAC allows you to define the rules for an assign role that restrict the authorization that the user has to access management operations.

## User Accounts

You can configure up to a maximum of 256 user accounts. By default, the user account does not expire unless you explicitly configure it to expire. The expire option determines the date when the user account is disabled.

The following words are reserved and cannot be used to configure users: bin, daemon, adm, lp, sync, shutdown, halt, mail, news, uucp, operator, games, gopher, ftp, nobody, nscd, mailnull, root, rpc, rpcuser, xfs, gdm, mtsuser, ftpuser, man, and sys.



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**Note** User passwords are not displayed in the configuration files.

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**Caution** Usernames must begin with an alphanumeric character and can contain only these special characters: ( + = . \_ \ -). The # and ! symbols are not supported. If the username contains characters that are not allowed, the specified user is unable to log in.

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## Characteristics of Strong Passwords

A strong password has the following characteristics:




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**Note** Special characters, such as the dollar sign (\$) or the percent sign (%), can be used in Cisco Nexus device passwords.

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- Is at least eight characters long
- Does not contain many consecutive characters (such as abcd)
- Does not contain many repeating characters (such as aaabbb)
- Does not contain dictionary words
- Does not contain proper names
- Contains both uppercase and lowercase characters
- Contains numbers

The following are examples of strong passwords:

- If2CoM18
- 2004AsdfLkj30
- Cb1955S21




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**Note** Clear text passwords cannot include these special characters at the beginning of the password: quotation marks (" or '), vertical bars (|), or right angle brackets (>). If a password is trivial (such as a short, easy-to-decipher password), the Cisco NX-OS software will reject your password configuration if password-strength checking is enabled. Be sure to configure a strong password as shown in the sample configuration. Passwords are case-sensitive.

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**Note** All printable ASCII characters are supported in the password string if they are enclosed in quotation marks.

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### Related Topics

[Enabling Password-Strength Checking](#), on page 5

## User Roles

User roles contain rules that define the operations allowed for the user who is assigned the role. Each user role can contain multiple rules, and each user can have multiple roles. For example, if role1 allows access only to configuration operations, and role2 allows access only to debug operations, then users who belong to both role1 and role2 can access configuration and debug operations. You can also limit access to specific virtual routing and forwarding instances (VRFs), VLANs, and interfaces.

The Cisco NX-OS software provides the following user roles:

- network-admin—Complete read-and-write access to the entire Cisco NX-OS device
- network-operator or vdc-operator—Complete read access to the entire Cisco NX-OS device




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**Note**

- The Cisco Nexus 9000 Series switches do not support multiple VDCs; however, the vdc-operator role is available and has the same privileges and limitations as the network-operator role.
  - The Cisco Nexus 9000 Series switches support a single VDC due to which the vdc-admin has the same privileges and limitations as the network-admin.
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**Note**

You cannot change the user roles.

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**Note**

Some **show** commands may be hidden from network-operator users. In addition, some non-**show** commands (such as **telnet**) may be available for this user role.

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By default, the user accounts without an administrator role can access only the **show**, **exit**, **end**, and **configure terminal** commands. You can add rules to allow users to configure features.




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**Note**

If you belong to multiple roles, you can execute a combination of all the commands permitted by these roles. Access to a command takes priority over being denied access to a command. For example, suppose a user has RoleA, which denied access to the configuration commands. However, the user also has RoleB, which has access to the configuration commands. In this case, the user has access to the configuration commands.

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## User Role Rules

The rule is the basic element of a role. A rule defines what operations the role allows the user to perform. You can apply rules for the following parameters:

**Command**

A command or group of commands defined in a regular expression.

**Feature**

A command or group of commands defined in a regular expression.

**Feature group**

Default or user-defined group of features.

**OID**

An SNMP object identifier (OID).

The command, feature, and feature group parameters create a hierarchical relationship. The most basic control parameter is the command. The next control parameter is the feature, which represents all commands associated with the feature. The last control parameter is the feature group. The feature group combines related features and allows you to easily manage the rules. The Cisco NX-OS software also supports the predefined feature group L3 that you can use.

SNMP OID is supported for RBAC. You can configure a read-only or read-and-write rule for an SNMP OID.

You can configure up to 256 rules for each role. The user-specified rule number determines the order in which the rules are applied. Rules are applied in descending order. For example, if a role has three rules, rule 3 is applied before rule 2, which is applied before rule 1.

## Guidelines and Limitations for User Accounts and RBAC

User accounts and RBAC have the following configuration guidelines and limitations:

- You can add up to 256 rules to a user role.
- You can add up to 64 user-defined feature groups in addition to the default feature group, L3.
- You can configure up to 256 users.
- You can assign a maximum of 64 user roles to a user account.
- If you have a user account configured on the local Cisco NX-OS device that has the same name as a remote user account on an AAA server, the Cisco NX-OS software applies the user roles for the local user account to the remote user, not the user roles configured on the AAA server.
- You cannot delete the default admin and SNMP user accounts.
- You cannot remove the default user roles from the default admin user accounts.
- The network-operator role cannot run the **show running-config** and **show startup-config** commands.
- The Cisco Nexus 9000 Series switches support a single VDC due to which the vdc-admin has the same privileges and limitations as the network-admin.



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**Note** If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

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## Default Settings for User Accounts and RBAC

This table lists the default settings for user accounts and RBAC parameters.

*Table 1: Default User Accounts and RBAC Parameters*

Parameters	Default
User account password	Undefined
User account expiry date	None
User account role	Network-operator if the creating user has the network-admin role
Default user role	Network-operator
Interface policy	All interfaces are accessible
VLAN policy	All VLANs are accessible
VRF policy	All VRFs are accessible
Feature group	L3

## Enabling Password-Strength Checking

You can enable password-strength checking which prevents you from creating weak passwords for user accounts.



**Note** When you enable password-strength checking, the Cisco NX-OS software does not check the strength of existing passwords.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>password strength-check</b> <b>Example:</b> switch(config)# password strength-check	Enables password-strength checking. The default is enabled.  You can disable password-strength checking by using the <b>no</b> form of this command.

	Command or Action	Purpose
<b>Step 3</b>	<b>exit</b> <b>Example:</b> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
<b>Step 4</b>	(Optional) <b>show password strength-check</b> <b>Example:</b> <pre>switch# show password strength-check</pre>	Displays the password-strength check configuration.
<b>Step 5</b>	(Optional) <b>copy running-config startup-config</b> <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

**Related Topics**

[Characteristics of Strong Passwords](#), on page 2

## Configuring User Accounts

You can create a maximum of 256 user accounts on a Cisco NX-OS device. User accounts have the following attributes:

- Username
- Password
- Expiry date
- User roles

You can enter the password in clear text format or encrypted format. The Cisco NX-OS password encrypts clear text passwords before saving them to the running configuration. Encrypted format passwords are saved to the running configuration without further encryption.

SHA256 is the hashing algorithm used for password encryption. As a part of the encryption, a 5000 iteration of 64-bit SALT is added to the password.

User accounts can have a maximum of 64 user roles. The user can determine what commands are available by using the command-line interface (CLI) context sensitive help utility.




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**Note** Changes to user account attributes do not take effect until the user logs in and creates a new session.

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**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<p><b>configure terminal</b></p> <p><b>Example:</b></p> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<p>(Optional) <b>show role</b></p> <p><b>Example:</b></p> <pre>switch(config)# show role</pre>	Displays the user roles available. You can configure other user roles, if necessary.
<b>Step 3</b>	<p><b>username <i>user-id</i> [password [0   5] <i>password</i>] [expire <i>date</i>] [role <i>role-name</i>]</b></p> <p><b>Example:</b></p> <pre>switch(config)# username NewUser password 4Ty18Rnt</pre>	<p>Configures a user account. The <i>user-id</i> argument is a case-sensitive, alphanumeric character string with a maximum length of 28 characters. Valid characters are uppercase letters A through Z, lowercase letters a through z, numbers 0 through 9, hyphen (-), period (.), underscore (_), plus sign (+), and equal sign (=). The at symbol (@) is supported in usernames.</p> <p>Usernames must begin with an alphanumeric character.</p> <p>The default password is undefined. The <b>0</b> option indicates that the password is clear text, and the <b>5</b> option indicates that the password is encrypted. The default is <b>0</b> (clear text).</p> <p><b>Note</b> If you do not specify a password, the user might not be able to log in to the Cisco NX-OS device.</p> <p><b>Note</b> If you create a user account with the encrypted password option, the corresponding SNMP user will not be created.</p> <p>The <b>expire <i>date</i></b> option format is YYYY-MM-DD. The default is no expiry date.</p> <p>User accounts can have a maximum of 64 user roles.</p>
<b>Step 4</b>	<p><b>username <i>user-id</i> ssh-cert-dn <i>dn-name</i> {dsa   rsa}</b></p> <p><b>Example:</b></p> <pre>switch(config)# username NewUser ssh-cert-dn "/CN = NewUser, OU = Cisco Demo, O = Cisco, C = US" rsa</pre>	Specifies an SSH X.509 certificate distinguished name and DSA or RSA algorithm to use for authentication for an existing user account. The distinguished name can be up to 512 characters and must follow the format shown in the examples. Make sure the email address and state

	Command or Action	Purpose
	<b>Example:</b> <pre>switch(config)# username jsmith ssh-cert-dn "/O = ABCcompany, OU = ABC1, emailAddress = jsmith@ABCcompany.com, L = Metropolis, ST = New York, C = US, CN = jsmith" rsa</pre>	are configured as emailAddress and ST, respectively.
<b>Step 5</b>	<b>exit</b> <b>Example:</b> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
<b>Step 6</b>	<b>(Optional) show user-account</b> <b>Example:</b> <pre>switch# show user-account</pre>	Displays the role configuration.
<b>Step 7</b>	<b>(Optional) copy running-config startup-config</b> <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

**Related Topics**

[Configuring Roles](#), on page 8

[Creating User Roles and Rules](#), on page 8

## Configuring Roles

This section describes how to configure user roles.

### Creating User Roles and Rules

You can configure up to 64 user roles. Each user role can have up to 256 rules. You can assign a user role to more than one user account.

The rule number that you specify determines the order in which the rules are applied. Rules are applied in descending order. For example, if a role has three rules, rule 3 is applied before rule 2, which is applied before rule 1.

When processing an RBACL for a match, a partial match does not stop the evaluation process. Evaluation continues through each rule until an exact match is found. If no exact match is found, the most precise rule in the list will be chosen for the result. Also, if a permit and deny rule exists for the same match logic, the higher numbered rule (evaluated first) will be chosen for the result.




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**Note** Regardless of the read-write rule configured for a user role, some commands can be executed only through the predefined network-admin role.

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**Before you begin**

If you want to distribute the user role configuration, enable user role configuration distribution on all Cisco NX-OS devices to which you want the configuration distributed.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>role name <i>role-name</i></b>  <b>Example:</b> switch(config)# role name UserA switch(config-role)#	Specifies a user role and enters role configuration mode. The <i>role-name</i> argument is a case-sensitive, alphanumeric character string with a maximum length of 16 characters.
<b>Step 3</b>	<b>rule <i>number</i> {deny   permit} command <i>command-string</i></b>  <b>Example:</b> switch(config-role)# rule 1 deny command clear users	Configures a command rule.  The <i>command-string</i> argument can contain spaces and regular expressions. For example, interface ethernet includes all Ethernet interfaces.  Repeat this command for as many rules as needed.
<b>Step 4</b>	<b>rule <i>number</i> {deny   permit} {read   read-write}</b>  <b>Example:</b> switch(config-role)# rule 2 deny read-write	Configures a read-only or read-and-write rule for all operations.
<b>Step 5</b>	<b>rule <i>number</i> {deny   permit} {read   read-write} feature <i>feature-name</i></b>  <b>Example:</b> switch(config-role)# rule 3 permit read feature router-bgp	Configures a read-only or read-and-write rule for a feature.  Use the <b>show role feature</b> command to display a list of features.  Repeat this command for as many rules as needed.
<b>Step 6</b>	<b>rule <i>number</i> {deny   permit} {read   read-write} feature-group <i>group-name</i></b>  <b>Example:</b> switch(config-role)# rule 4 deny read-write feature-group L3	Configures a read-only or read-and-write rule for a feature group.  Use the <b>show role feature-group</b> command to display a list of feature groups.  Repeat this command for as many rules as needed.
<b>Step 7</b>	<b>rule <i>number</i> {deny   permit} {read   read-write} oid <i>snmp_oid_name</i></b>	Configures a read-only or read-and-write rule for an SNMP object identifier (OID). You can

	Command or Action	Purpose
	<p><b>Example:</b></p> <pre>switch(config-role)# rule 5 deny read-write oid 1.3.6.1.2.1.1.9</pre>	<p>enter up to 32 elements for the OID. This command can be used to allow SNMP-based performance monitoring tools to poll devices but restrict their access to system-intensive branches such as the IP routing table, MAC address tables, specific MIBs, and so on.</p> <p><b>Note</b> The deepest OID can be at the scalar level or at the table root level.</p> <p>Repeat this command for as many rules as needed.</p>
<b>Step 8</b>	<p>(Optional) <b>description</b> <i>text</i></p> <p><b>Example:</b></p> <pre>switch(config-role)# description This role does not allow users to use clear commands</pre>	Configures the role description. You can include spaces in the description.
<b>Step 9</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>switch(config-role)# exit switch(config)#</pre>	Exits role configuration mode.
<b>Step 10</b>	<p>(Optional) <b>show role</b></p> <p><b>Example:</b></p> <pre>switch(config)# show role</pre>	Displays the user role configuration.
<b>Step 11</b>	<p>(Optional) <b>show role</b> {<b>pending</b>   <b>pending-diff</b>}</p> <p><b>Example:</b></p> <pre>switch(config)# show role pending</pre>	Displays the user role configuration pending for distribution.
<b>Step 12</b>	<p>(Optional) <b>role commit</b></p> <p><b>Example:</b></p> <pre>switch(config)# role commit</pre>	Applies the user role configuration changes in the temporary database to the running configuration.
<b>Step 13</b>	<p>(Optional) <b>copy running-config startup-config</b></p> <p><b>Example:</b></p> <pre>switch(config)# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

## Creating Feature Groups

You can create custom feature groups to add to the default list of features provided by the Cisco NX-OS software. These groups contain one or more of the features. You can create up to 64 feature groups.



**Note** You cannot change the default feature group L3.

### Before you begin

If you want to distribute the user role configuration, enable user role configuration distribution on all Cisco NX-OS devices to which you want the configuration distributed.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>role feature-group name <i>group-name</i></b>  <b>Example:</b> switch(config)# role feature-group name GroupA switch(config-role-featuregrp)#	Specifies a user role feature group and enters role feature group configuration mode.  The <i>group-name</i> argument is a case-sensitive, alphanumeric character string with a maximum length of 32 characters.
<b>Step 3</b>	<b>feature <i>feature-name</i></b>  <b>Example:</b> switch(config-role-featuregrp)# feature radius	Specifies a feature for the feature group.  Repeat this command for as many features as needed.  <b>Note</b> Use the <b>show role component</b> command to display a list of features.
<b>Step 4</b>	<b>exit</b>  <b>Example:</b> switch(config-role-featuregrp)# exit switch(config)#	Exits role feature group configuration mode.
<b>Step 5</b>	(Optional) <b>show role feature-group</b>  <b>Example:</b> switch(config)# show role feature-group	Displays the role feature group configuration.
<b>Step 6</b>	(Optional) <b>show role {pending   pending-diff}</b>  <b>Example:</b> switch(config)# show role pending	Displays the user role configuration pending for distribution.

	Command or Action	Purpose
<b>Step 7</b>	(Optional) <b>role commit</b>  <b>Example:</b> switch(config)# role commit	Applies the user role configuration changes in the temporary database to the running configuration.
<b>Step 8</b>	(Optional) <b>copy running-config startup-config</b>  <b>Example:</b> switch(config)# copy running-config startup-config	Copies the running configuration to the startup configuration.

## Changing User Role Interface Policies

You can change a user role interface policy to limit the interfaces that the user can access. By default, a user role allows access to all interfaces.

### Before you begin

Create one or more user roles.

If you want to distribute the user role configuration, enable user role configuration distribution on all Cisco NX-OS devices to which you want the configuration distributed.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>role name <i>role-name</i></b>  <b>Example:</b> switch(config)# role name UserA switch(config-role)#	Specifies a user role and enters role configuration mode.
<b>Step 3</b>	<b>interface policy deny</b>  <b>Example:</b> switch(config-role)# interface policy deny switch(config-role-interface)#	Enters role interface policy configuration mode.
<b>Step 4</b>	<b>permit interface <i>interface-list</i></b>  <b>Example:</b> switch(config-role-interface)# permit interface ethernet 2/1-4	Specifies a list of interfaces that the role can access.  Repeat this command for as many interfaces as needed.

	Command or Action	Purpose
<b>Step 5</b>	<b>exit</b> <b>Example:</b> switch(config-role-interface)# exit switch(config-role)#	Exits role interface policy configuration mode.
<b>Step 6</b>	(Optional) <b>show role</b> <b>Example:</b> switch(config-role)# show role	Displays the role configuration.
<b>Step 7</b>	(Optional) <b>show role {pending   pending-diff}</b> <b>Example:</b> switch(config-role)# show role pending	Displays the user role configuration pending for distribution.
<b>Step 8</b>	(Optional) <b>role commit</b> <b>Example:</b> switch(config-role)# role commit	Applies the user role configuration changes in the temporary database to the running configuration.
<b>Step 9</b>	(Optional) <b>copy running-config startup-config</b> <b>Example:</b> switch(config-role)# copy running-config startup-config	Copies the running configuration to the startup configuration.

**Related Topics**

[Creating User Roles and Rules](#), on page 8

## Changing User Role VLAN Policies

You can change a user role VLAN policy to limit the VLANs that the user can access. By default, a user role allows access to all VLANs.

**Before you begin**

Create one or more user roles.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>role name <i>role-name</i></b> <b>Example:</b>	Specifies a user role and enters role configuration mode.

	Command or Action	Purpose
	<pre>switch(config)# role name UserA switch(config-role)#</pre>	
<b>Step 3</b>	<b>vlan policy deny</b>  <b>Example:</b> <pre>switch(config-role)# vlan policy deny switch(config-role-vlan)#</pre>	Enters role VLAN policy configuration mode.
<b>Step 4</b>	<b>permit vlan <i>vlan-list</i></b>  <b>Example:</b> <pre>switch(config-role-vlan)# permit vlan 1-4</pre>	Specifies a range of VLANs that the role can access.  Repeat this command for as many VLANs as needed.
<b>Step 5</b>	<b>exit</b>  <b>Example:</b> <pre>switch(config-role-vlan)# exit switch(config-role)#</pre>	Exits role VLAN policy configuration mode.
<b>Step 6</b>	(Optional) <b>show role</b>  <b>Example:</b> <pre>switch(config)# show role</pre>	Displays the role configuration.
<b>Step 7</b>	(Optional) <b>show role {pending   pending-diff}</b>  <b>Example:</b> <pre>switch(config-role)# show role pending</pre>	Displays the user role configuration pending for distribution.
<b>Step 8</b>	(Optional) <b>role commit</b>  <b>Example:</b> <pre>switch(config-role)# role commit</pre>	Applies the user role configuration changes in the temporary database to the running configuration.
<b>Step 9</b>	(Optional) <b>copy running-config startup-config</b>  <b>Example:</b> <pre>switch(config-role)# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

**Related Topics**

[Creating User Roles and Rules](#), on page 8

## Changing User Role VRF Policies

You can change a user role VRF policy to limit the VRFs that the user can access. By default, a user role allows access to all VRFs.

**Before you begin**

Create one or more user roles.

If you want to distribute the user role configuration, enable user role configuration distribution on all Cisco NX-OS devices to which you want the configuration distributed.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>configure terminal</b> <b>Example:</b> switch# configure terminal switch(config)#	Enters global configuration mode.
<b>Step 2</b>	<b>role name <i>role-name</i></b> <b>Example:</b> switch(config)# role name UserA switch(config-role)#	Specifies a user role and enters role configuration mode.
<b>Step 3</b>	<b>vrf policy deny</b> <b>Example:</b> switch(config-role)# vrf policy deny switch(config-role-vrf)#	Enters role VRF policy configuration mode.
<b>Step 4</b>	<b>permit vrf <i>vrf-name</i></b> <b>Example:</b> switch(config-role-vrf)# permit vrf vrf1	Specifies the VRF that the role can access. Repeat this command for as many VRFs as needed.
<b>Step 5</b>	<b>exit</b> <b>Example:</b> switch(config-role-vrf)# exit switch(config-role)#	Exits role VRF policy configuration mode.
<b>Step 6</b>	(Optional) <b>show role</b> <b>Example:</b> switch(config-role)# show role	Displays the role configuration.
<b>Step 7</b>	(Optional) <b>show role {pending   pending-diff}</b> <b>Example:</b> switch(config-role)# show role pending	Displays the user role configuration pending for distribution.
<b>Step 8</b>	(Optional) <b>role commit</b> <b>Example:</b> switch(config-role)# role commit	Applies the user role configuration changes in the temporary database to the running configuration.
<b>Step 9</b>	(Optional) <b>copy running-config startup-config</b> <b>Example:</b> switch(config-role)# copy running-config startup-config	Copies the running configuration to the startup configuration.

**Related Topics**

[Creating User Roles and Rules](#), on page 8

# About No Service Password-Recovery

The No Service Password-Recovery feature enables anyone with console access, the ability to access the router and its network. The No Service Password-Recovery feature prevents the password recovery with standard procedure as described in the [Cisco Nexus 9000 Series NX-OS Troubleshooting Guide](#).

## Enabling No Service Password-Recovery

If the no service password-recovery feature is enabled, then none except the administrator with network privileges will be able to modify the administrator password.

**Before you begin**

If you plan to enter the no service password-recovery command, Cisco recommends that you save a copy of the system configuration file in a location away from the device.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<b>configure terminal</b>  <b>Example:</b> <pre>switch# configure terminal switch(config)#</pre>	Enters global configuration mode.
<b>Step 2</b>	<b>no service password-recovery</b>  <b>Example:</b> <pre>switch(config)# no service password-recovery WARNING: Executing this command will disable the password recovery mechanism. Do not execute this command without another plan for password recovery. Are you sure you want to continue? (y/n) : [y] y switch(config)# copy run start [#####] 100% Copy complete, now saving to disk (please wait)... Copy complete.</pre>	Disables the password recovery mechanism.
<b>Step 3</b>	<b>(Optional) copy running-config startup-config</b>  <b>Example:</b> <pre>switch# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.
<b>Step 4</b>	<b>Reload</b>	

	Command or Action	Purpose
	<p><b>Example:</b></p> <pre>switch(config)# Reload This command will reboot the system. (y/n)? [n] y 2018 Jun 26 16:23:19 BAR %\$ VDC-1 %\$ %PLATFORM-2-PFM_SYSTEM_RESET: Manual system restart from Command Line Interface  CISCO SWITCH Ver 8.34  CISCO SWITCH Ver 8.34 Manual system restart from Command Line Interface writing reset reason 9, .. ..  switch(boot)# config t Enter configuration commands, one per line. End with CNTL/Z. switch(boot) (config)# admin-password Abcd!123\$ ERROR: service password-recovery disabled. Cannot change password! switch(boot) (config)#</pre>	
<b>Step 5</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>switch(config)# exit switch#</pre>	Exits global configuration mode.
<b>Step 6</b>	<p>(Optional) <b>show user-account</b></p> <p><b>Example:</b></p> <pre>switch# show user-account</pre>	Displays the role configuration.
<b>Step 7</b>	<p>(Optional) <b>copy running-config startup-config</b></p> <p><b>Example:</b></p> <pre>switch# copy running-config startup-config</pre>	Copies the running configuration to the startup configuration.

## Verifying User Accounts and RBAC Configuration

To display user account and RBAC configuration information, perform one of the following tasks:

Command	Purpose
<b>show cli syntax roles network-admin</b>	Displays the syntax of the commands that the network-admin role can use.

Command	Purpose
<code>show cli syntax roles network-operator</code>	Displays the syntax of the commands that the network-operator role can use.
<code>show role</code>	Displays the user role configuration.
<code>show role feature</code>	Displays the feature list.
<code>show role feature-group</code>	Displays the feature group configuration.
<code>show startup-config security</code>	Displays the user account configuration in the startup configuration.
<code>show running-config security [all]</code>	Displays the user account configuration in the running configuration. The <b>all</b> keyword displays the default values for the user accounts.
<code>show user-account</code>	Displays user account information.

## Configuration Examples for User Accounts and RBAC

The following example shows how to configure a user role:

```
role name User-role-A
  rule 2 permit read-write feature bgp
  rule 1 deny command clear *
```

The following example shows how to create a user role that can configure an interface to enable and show BGP and show EIGRP:

```
role name iftest
  rule 1 permit command config t; interface *; bgp *
  rule 2 permit read-write feature bgp
  rule 3 permit read feature eigrp
```

In the above example, rule 1 allows you to configure BGP on an interface, rule 2 allows you to configure the **config bgp** command and enable the exec-level **show** and **debug** commands for BGP, and rule 3 allows you to enable the exec-level **show** and **debug eigrp** commands.

The following example shows how to configure a user role that can configure only a specific interface:

```
role name Int_Eth2-3_only
  rule 1 permit command configure terminal; interface *
  interface policy deny
    permit interface Ethernet2/3
```

The following example shows how to configure a user role feature group:

```
role feature-group name Security-features
  feature radius
  feature tacacs
  feature aaa
  feature acl
  feature access-list
```

The following example shows how to configure a user account:

```
username user1 password A1s2D4f5 role User-role-A
```

The following example shows how to add an OID rule to restrict access to part of the OID subtree:

```
role name User1
  rule 1 permit read feature snmp
  rule 2 deny read oid 1.3.6.1.2.1.1.9
show role name User1
```

```
Role: User1
Description: new role
Vlan policy: permit (default)
Interface policy: permit (default)
Vrf policy: permit (default)
```

Rule	Perm	Type	Scope	Entity
2	deny	read	oid	1.3.6.1.2.1.1.9
1	permit	read	feature	snmp

The following example shows how to give write permission to a specified OID subtree:

```
role name User1
rule 3 permit read-write oid 1.3.6.1.2.1.1.5
show role name User1
```

```
Role: User1
Description: new role
Vlan policy: permit (default)
Interface policy: permit (default)
Vrf policy: permit (default)
```

Rule	Perm	Type	Scope	Entity
3	permit	read-write	oid	1.3.6.1.2.1.1.5
2	deny	read	oid	1.3.6.1.2.1.1.9
1	permit	read	feature	snmp

## Additional References for User Accounts and RBAC

This section includes additional information related to implementing user accounts and RBAC.

**Related Documents**

Related Topic	Document Title
Cisco NX-OS Licensing	<i>Cisco NX-OS Licensing Guide</i>
VRF configuration	<i>Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide</i>

**Standards**

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

**MIBs**

MIBs	MIBs Link
MIBs related to user accounts and RBAC	To locate and download supported MIBs, go to the following URL: <a href="ftp://ftp.cisco.com/pub/mibs/supportlists/nexus9000/Nexus9000MIBSupportList.html">ftp://ftp.cisco.com/pub/mibs/supportlists/nexus9000/Nexus9000MIBSupportList.html</a>