Using Configuration Groups for SD-Routing Devices

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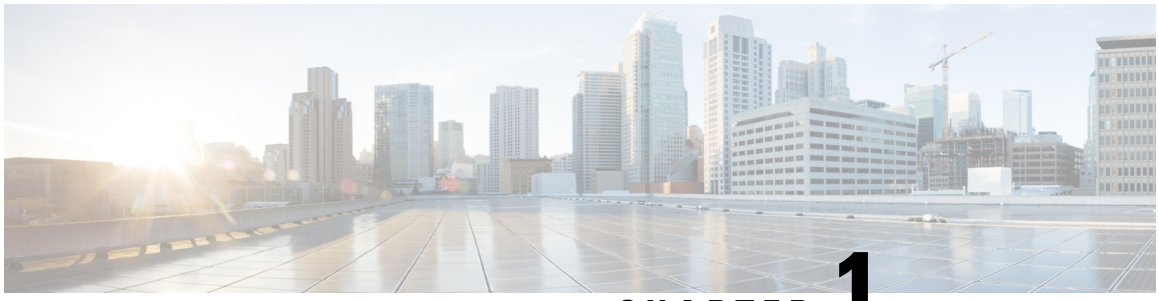
CONTENTS

Preface

This preface describes the audience, organization, and conventions of this document. It also provides information on how to obtain other documentation.

This preface includes the following sections:

Reference Preface Map here



CHAPTER 1

Introduction

Information About Configuration Groups

The Configuration Group feature enables you to do the following:

- Create a configuration group using one of the guided workflows—Create Configuration Group, Rapid Site Configuration Group, or Custom Configuration Group
- Deploy devices with a configuration group using the Deploy Configuration Group workflow

Overview of Configuration Groups

The Configuration Group feature provides a simple, reusable, and structured approach for the configurations in Cisco SD-Routing.

- **Configuration Group:** A configuration group is a logical grouping of features or configurations that can be applied to one or more devices in the network managed by Cisco SD-Routing. You can define and customize this grouping based on your business needs.

- **Feature Profile:** A feature profile is a flexible building block of configurations that can be reused across different configuration groups. You can create profiles based on features that are required, recommended, or uniquely used, and then put together the profiles to complete a device configuration.

Overview of Configuration Group Workflows

The workflow provides you with an improved configuration and troubleshooting experience. The workflow has the following features:

- You can specify a name and description for a configuration group and configure the basic settings to keep your network running.
- In addition to the basic settings, you can also configure advanced options at the time of creating a configuration group. For example, you can set up WAN and LAN routing; you can configure a BGP route, multiple static IPv4 routes, or both, for the WAN transport VRF. Similarly, you can configure a BGP route, an OSPF route, multiple static IPv4 routes, or all these routes, for a LAN service VRF. Thus, you can configure all the necessary options at the time of creating the configuration group itself, and do not have to modify the features separately after the group is created. As a result, any configuration created from the workflow is immediately deployable.
- You can review the various configuration settings on a single page within the workflow.
- When you specify an incorrect setting, it is highlighted in red. As a result, you can easily identify errors, if any, and fix them. In addition, an asterisk adjacent to the field names helps you identify the mandatory settings within the workflow.

Overview of the Deploy Configuration Group Workflow

The Deploy Configuration Group workflow enables you to associate devices to a configuration group and to deploy the configuration to the selected devices.

You can access the workflow from the **Workflow Library** in Cisco SD-Routing.

Benefits of Configuration Groups

- Simplicity: The workflow-based configuration guides you with step-by-step instructions. You can clearly identify what is necessary, what is optional, and what is the recommended Cisco networking best practice.

  In addition, the basic and advanced settings of a configuration group are auto-populated, which in turn, simplifies the process of a configuration.
- Day-zero Deployment: The day-zero setup of configuration groups helps you easily create a branch and deploy devices quickly.
- Reusability: You can reuse configuration components across an entire device family instead of one device model. This helps in easier management of configuration components.
- Structure: You can group devices based on a shared configuration in Cisco SD-WAN Rotuing.

- Visibility: A site-level topology is generated for Cisco SD-Routing devices that are attached to a configuration group.
- Findability: The tagging feature helps you easily identify a subset of devices from hundreds of devices in a configuration group.

Restrictions for Configuration Groups

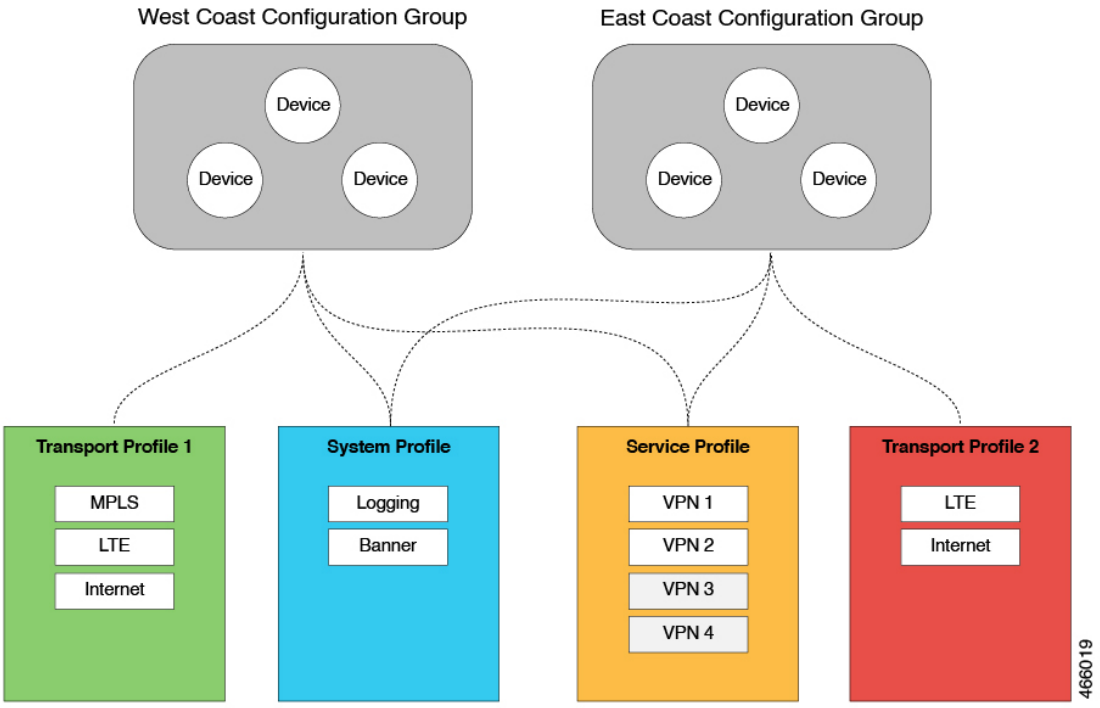
- You can add a device to only one configuration group.
- You can add only one tag rule to a configuration group.

Use Cases for Configuration Groups

You can create configuration groups according to your business needs. For example, if your organization operates in North America and has offices and network infrastructure on both the West Coast and the East Coast, you can create two configuration groups—the East Coast Configuration Group and the West Coast Configuration Group.

The following figure shows that both the East Coast Configuration Group and the West Coast Configuration Group use the same system profile and service profile. The transport profile is different for both the groups.

Figure 1: Example of Configuration Groups



In this figure,

- The East Coast Configuration Group and the West Coast Configuration Group are examples of configuration groups. Similarly, a supply chain organization can create configuration groups for different facilities, such as a retail store configuration group and a distribution center configuration group. A multinational company can create configuration groups to cater to its business needs in different regions, such as the Americas Configuration Group and the EMEA Configuration Group.
- System profile, transport profile, and service profile are examples of feature profiles.
- Logging; Banner; interfaces, such as MPLS, LTE, and Internet; VPN1; VPN2; and so on are examples of features.

Use the Configuration Group Workflows

Ensure that granular RBAC for each feature profile is specified by expanding it. With the set permissions to the usergroup, ensure that you are able to access required feature profiles from Cisco SD-WAN Manager, choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.

1. From the Cisco SD-WAN Manager menu, choose **Administration** > **Manage Users** > **User Groups**.
2. Click **Add User Group**.
3. Enter **User Group Name**.
4. Select the **Read** or **Write** check box against feature that you want to assign to a user group.
5. Click **Save**.

Note To create Service, System and Tranport feature profiles using configuration groups, you need to provide read and write permissions on the following features to access each configuration group.

- **Feature Profile** > **System**
- **Feature Profile** > **System** > **AAA**
- **Feature Profile** > **System** > **Banner**
- **Feature Profile** > **System** > **Logging**
- **Feature Profile** > **System** > **NTP**
- **Feature Profile** > **System** > **SNMP**
- **Feature Profile** > **Service** > **VRF**
- **Feature Profile** > **Service** > **DHCP**
- **Feature Profile** > **Transport** > **VRF**

Run the Create Configuration Group Workflow

From the Cisco SD-WAN Manager menu, choose **Workflows** > **Create Configuration Group**. Alternatively, do the following:

1. Choose **Workflows** > **Workflow Library**.
2. On the **Workflow Library** page, in the **Library** section, click **Create Configuration Group**.

   Alternatively, from Cisco IOS XE Catalyst SD-WAN Release 17.12.1a,choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu, and click **Add Configuration Group**.
3. Resume an in-progress workflow: In the **In-progress** section, click **Create SD-Routing Configuration** Group

The workflow creates the following components:

- A configuration Group
- Five feature profiles: System profile, Transport and Management profile, Service profile, CLI profile, and Policy Object profile.

Add Devices to a Configuration Group

After creating a configuration group, you can add devices to the group in one of the following ways:

- Add the devices manually.
- Use rules to automatically add devices to the group.

Add Devices to a Configuration Group Manually

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click **Associated Devices**, and then click **Add Devices**.

   The **Add Devices to Configuration** workflow starts.
4. Follow the instructions provided in the workflow.

   The selected devices are listed in the **Devices** table.

Add Devices to a Configuration Group Using Rules

Before You Begin

Ensure that you have added tags to devices. For more information about tagging, see *Device Tagging*.

Add Devices to a Configuration Group Using Rules

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-Routing menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click **Associated Devices**, and then click **Add and Edit Rules**.

   The **Automated Rules** sidebar is displayed.
4. In the **Rules** section, choose values for the following options:
   - **Rule Conditions**: Choose one of the following conditions: **Match All** or **Match Any**.
   - **Device Attribute**: Choose **Tags**.
   - **Condition**: Choose one of the following operators: **Equal**, **Contains**, **Not contain**, **Not equal**, **Starts with**, **Ends with**. For more information about these operators, see Examples of Applying Rules Using Tags.
   - **Select Value**: Select a tag from the list of available tags.

Note If a device matches a tag rule, the device is added to the configuration group. If you edit the tag rule by changing any of the specified values, the device is removed from the group.

5. Click **Apply**.

   A list displays the devices that will be added to the configuration group or removed from the group based on the rule.
6. Click **Confirm** to apply the changes.

Note
- You cannot create a new rule if it conflicts with an existing rule.
- You cannot add a tag to a device if it is already attached to a device template.
- If you have attached a template to a device, and the task is in progress, you can add a tag to the device. However, you cannot apply a rule to add this device to a configuration group using the same tag. To do this, you must either detach the device from the template or use a different tag.

Check Task Details

To check the status of all the active and completed tasks, do the following:

1. Click the + icon to view the details of a task.

   Cisco SD-Routing displays the status of the task and details of the device on which the task was performed.
2. From the Cisco SD-Routing toolbar, click the **Task-list** icon.

   Cisco SD-Routing displays a list of all the running tasks along with the total number of successes and failures.

Examples of Applying Rules Using Tags

Scenario: There are five devices in the network, and you want to add the devices to configuration groups based on tagging.

1. Tag each device. In the following example, tags have been added to five Cisco Catalyst 8000V devices.

   Table 1: Example of Device Tagging

Device UUID	Tags
C8K-0001	CA1, CA2
C8K-0002	CA1, CA2, CA3
C8K-0003	CA1, CA4, CA5
C8K-0004	CA3, CA4
C8K-0005	CA3, CA5

2. Choose any one of the following rule conditions:
   - **Match All**
   - **Match Any**

3. Use rules to add the devices to specific configuration groups based on the tags that you have added to each device.

   When applying a rule, you can use the following operators:
   - Equal: This operator checks for matching data.
   - Not equal: This operator checks for nonmatching data.
   - Contain: This operator finds a value anywhere in your data.
   - Not contain: This operator filters data that does not contain any of the specified values.
   - (Minimum supported release: Cisco Catalyst SD-WAN Manager Release 20.12.1)

     Starts with: This operator filters data that starts with any specified values.
   - (Minimum supported release: Cisco Catalyst SD-WAN Manager Release 20.12.1)

     Ends with: This operator filters data that ends with any specified values.

The following examples show the effects of using different operators when applying a rule, based on how devices are tagged.

Rule Example 1

Condition: Match Any

Operator: EQUAL

Specified tags: CA1, CA2

Effect: Matches any device containing these two tags.

Configuration group: A

Result: Devices C8K-0001 and C8K-0002 are added to configuration group A.

Rule Example 2

Condition: Match Any

Operator: NOT EQUAL

Specified tags: CA1, CA2

Effect: Matches any device that does not contain both of these tags.

Configuration group: B

Result: Devices C8K-0003, C8K-0004, and C8K-0005 are added to configuration group B.

Rule Example 3

Condition: Match Any

Operator: CONTAIN

Specified tags: CA1, CA2

Effect: Matches any device that contains any one of these tags.

Configuration group: C

Result: Devices C8K-0001, C8K-0002, and C8K-0003 are added to configuration group C.

Rule Example 4

Condition: Match Any

Operator: NOT CONTAIN

Specified tags: CA1, CA2

Effect: Matches any device that does not contain any one of these tags.

Configuration group: D

Result: Devices C8K-0004 and C8K-0005 are added to configuration group D.

Rule Example 5

Condition: Match Any

Operator: STARTS WITH

Specified tags: CA

Effect: Matches any device that has a tag that starts with the specified value.

Configuration group: E

Result: Devices C8K-0001, C8K-0002, C8K-0003, C8K-0004, and C8K-0005 are added to configuration group E.

Rule Example 6

Condition: Match All

Operator: ENDS WITH

Specified tags: 1

Effect: Matches all devices that have a tag that ends with the specified value.

Configuration group: F

Result: Devices C8K-0001, C8K-0002, and C8K-0003 are added to configuration group F.

Deploy Devices

Any field in a feature can be marked as device-specific which is referred as device variable. You can provide device variable values while adding devices for deploying them for any features.

Deploy Devices Manually

1. From Cisco IOS XE Catalyst SD-WAN Release 17.12.1a, choose **Configuration** > **Configuration Groups** in the Cisco SD-Routing menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click **Associated Devices**.
4. Choose one or more devices, and then click **Deploy**.

Deploy Devices Using the Deploy Configuration Group Workflow

Before You Begin

Ensure that one or more configuration groups are created so that you can choose a group from the list to deploy the associated devices.

Deploy Devices

1. From the Cisco SD-WAN Manager menu, choose **Workflows** > **Workflow Library**.
2. Start the **Deploy Configuration Group** workflow.
3. Follow the instructions provided in the workflow.

Configure Device Values

The **Change Device Values** workflow enables you to provide device variable values without deploying a configuration group to the devices. If you do not have RBAC permission for deploying, you can use **Change Device Values** workflow to modify device variable values.

You can associate devices of different models to the same configuration group. Not all of the associated devices necessarily support each feature configured in the configuration group. For example, Cisco Catalyst 8000v devices do not support the ThousandEyes feature. When you deploy a configuration group to devices, for each device, Cisco SD-WAN Manager applies only the features that the device supports.

Before You Begin

Role-Based Access Control (**Administration** > **Manage Users** > **User Group**) permissions determine which variables you can view and update.

Configure Device Values

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-Routing menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click **Associated Devices**.
4. Choose one or more devices, and click **Change Device Values**.

   The **Change Device Values** workflow starts.
5. Follow the instructions provided in the workflow.

   The **Devices** table lists the selected devices.
6. Click **Next**.

   The **Select Devices to Change Values** page is displayed.
7. Select the devices.
8. Click **Next**.

   The **Add and Review Device Configuration** page is displayed.
9. Follow the instructions and update the **Device Configuration** details.

   Modify the configurations as needed or edit the table to add system IPs and site IDs.
10. Click **Save**.

Remove Devices from a Configuration Group

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click **Associated Devices**.
4. In the **Devices** table, choose the devices that you want to remove from the configuration group.
5. Click **Remove Devices**.

Note

- If a device is automatically added to a configuration group based on a tag rule, you cannot remove the device from the group using the above method. To do this, you must edit the tag rule or delete the rule.

Features and Subfeatures

The following procedures relate to adding, editing, and removing features and subfeatures from a feature profile within a configuration group.

Add a Feature to a Feature Profile

Before You Begin

Adding a feature to a feature profile requires a configuration group.

Add a Feature to a Feature Profile

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-Routing menu.
2. Click **…** adjacent to a configuration group name and choose **Edit**.
3. Click a feature profile to open it.
4. Click **Add Feature**.
5. From the feature drop-down list, choose a feature.

Note Features that have already been added are grayed out.

6. In the **Name** field, enter a name for the feature.

   The name can be up to 128 characters and can contain only alphanumeric characters.

7. In the **Description** field, enter a description of the feature.

   The description can be up to 2048 characters and can contain only alphanumeric characters and spaces.

8. Configure the options as needed.

   Some parameter have a scope drop-down list that enables you to choose **Global**, **Device Specific**, or **Default** for the parameter value. Choose one of the following options, as described in the table below:

Parameter Scope	Scope Description
Global (indicated by a globe icon)	Enter a value for the parameter to apply the value to all devices. Examples of parameters that you might apply globally to a group of devices are DNS server, syslog server, and interface MTUs.

Parameter Scope	Scope Description
Device Specific (indicated by a host icon)	Use a device-specific value for the parameter. Choose **Device Specific** to provide a value for the key in the field. The key is a unique string that helps identify the parameter. To change the default key, enter a new string in the field. Examples of device-specific parameters are system IP address, host name, GPS location, and site ID.
Default (indicated by a check mark)	The default value is shown for parameters that have a default setting.

9. Click **Save**.

Add a Subfeature

Before You Begin

Some features include subfeature options.

Add a Subfeature

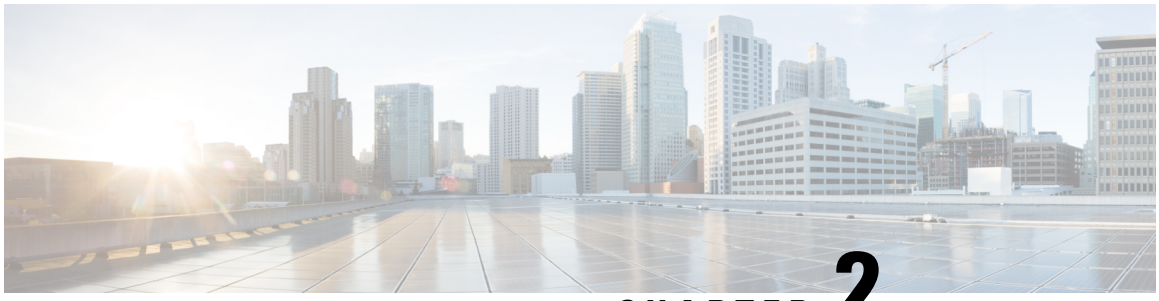
1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.
2. Click **…** adjacent to a configuration group name and choose **Edit**.
3. Click a feature profile to open it.
4. Click **…** adjacent to a feature and choose **Add Sub-Feature**.
5. From the drop-down list, choose a subfeature.
6. In the **Name** field, enter a name for the feature.
7. In the **Description** field, enter a description of the feature.
8. Configure the options as needed.
9. Click **Save**.

Edit a Feature

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click a feature profile to open it.
4. Click **…** adjacent to a feature and choose **Edit Feature**.
5. Configure the options as needed.
6. Click **Save**.

Delete a Feature

1. Choose **Configuration** > **Configuration Groups** in the Cisco SD-WAN Manager menu.
2. Click **…** adjacent to the configuration group name and choose **Edit**.
3. Click the desired feature profile.
4. Click **…** adjacent to the feature and choose **Delete Feature**.



CHAPTER 2

System Profile

AAA

The authentication, authorization, and accounting (AAA) feature helps authenticate users logging in to the Cisco SD-Routing device, decide what permissions to give them, and perform accounting of their actions.

The following tables describe the options for configuring the AAA feature.

Local

Field	Description
Add AAA User	
Name	Enter a name for the user. It can be 1 to 128 characters long, and it must start with a letter. The name can contain only lowercase letters, the digits 0 through 9, hyphens (-), underscores (_), and periods (.). The name cannot contain any uppercase letters. The following usernames are reserved, so you cannot configure them: backup, basic, bin, daemon, games, gnats, irc, list, lp, mail, man, news, nobody, proxy, quagga, root, sshd, sync, sys, uucp, and www-data. Also, names that start with viptela-reserved are reserved.
Password	Enter a password for the user. The password is an MD5 digest string, and it can contain any characters, including tabs, carriage returns, and linefeeds. For more information, see Section 9.4 in RFC 7950, The YANG 1.1 Data Modeling Language. Each username must have a password. Users are allowed to change their own passwords. The default password for the admin user is admin. We strongly recommended that you change this password.

Field	Description
Confirm Password	Re-enter the password for the user.
Privilege	Select between privilege level 1 or 15. • Level 1: User EXEC mode. Read-only, and access to limited commands, such as the ping command. • Level 15: Privileged EXEC mode. Full access to all commands, such as the reload command, and the ability to make configuration changes. By default, the EXEC commands at privilege level 15 are a superset of those available at privilege level 1.
Add Public Key Chain	
SSH RSA Key	Choose **ssh-rsa**.

Radius

Field	Description
Add Radius Server	
IP Address (v4 or v6)	Enter the IP address of the RADIUS server host.
Acct Port	Enter the UDP port to use to send 802.1X and 802.11i accounting information to the RADIUS server. Range: 0 through 65535. Default: 1813
Auth Port	Enter the UDP destination port to use for authentication requests to the RADIUS server. If the server is not used for authentication, configure the port number to be 0. Default: 1812
Retransmit	Enter the number of times the device transmits each RADIUS request to the server before giving up. Default: 3 seconds
Timeout	Enter the number of seconds a device waits for a reply to a RADIUS request before retransmitting the request. Default: 5 seconds Range: 1 through 1000
Key*	Enter the key the Cisco SD-Routing device passes to the RADIUS server for authentication and encryption.
Key Type	Choose Protected Access Credential (PAC) or key type.

TACACS Server

Field	Description
Add TACACS Server	
IP Address (v4 or v6)	Enter the IP address of the TACACS+ server host.
Authentication Port	Enter the UDP destination port to use for authentication requests to the TACACS+ server. If the server is not used for authentication, configure the port number to be 0. Default: 49
Timeout [second]	Enter the number of seconds a device waits for a reply to a TACACS+ request before retransmitting the request. Default: 5 seconds Range: 1 through 1000
Key	Enter the key the Cisco SD-Routing device passes to the TACACS+ server for authentication and encryption. You can type the key as a text string from 1 to 31 characters long, and it is immediately encrypted, or you can type an AES 128-bit encrypted key. The key must match the AES encryption key used on the TACACS+ server.

Accounting

Field	Description
Add Accounting Rule	
Rule Id	Enter the accounting rule ID.
Method	Specifies the accounting method list. Choose one of the following: • **commands**: Provides accounting information about specific, individual EXEC commands associated with a specific privilege level. • **exec**: Provides accounting records about user EXEC terminal sessions on the network access server, including username, date, and start and stop times. • **network**: Runs accounting for all network-related service requests. • **system**: Performs accounting for all system-level events not associated with users, such as reloads. **Note** When system accounting is used and the accounting server is unreachable at system startup time, the system will not be accessible for approximately two minutes.
Start Stop	Enable this option to if you want the system to send a start accounting notice at the beginning of an event and a stop record notice at the end of the event.

Field	Description
Groups	Choose a previously configured TACACS group. The parameters that this accounting rule defines are used by the TACACS servers that are associated with this group.

Authorization

Field	Description
Console	Enable this option to perform authorization for console access commands.
Config Commands	Enable this option to perform authorization for configuration commands.
Add Authorization Rule	
Rule Id	Enter the authorization rule ID.
Method	Choose **Commands**, which causes commands that a user enters to be authorized.
Level	Choose the privilege level (1 or 15) for commands to be authorized. Authorization is provided for commands entered by users with this privilege level.
Authenticated	Enable this option to apply the authorization rule parameters only to the authenticated users. If you do not enable this option, the rule is applied to all users.
Group(s)	Choose a previously configured TACACS group. The parameters that this authorization rule defines are used by the TACACS servers that are associated with this group.

802.1x

Field	Description
Authentication Param	Enable authentication parameters.
Accounting Param	Enable accounting parameters

Authentication and Authorization Order

Field	Description
Server Auth Order	Select **local**.

Banner

The Banner feature helps you to configure the system login banner.

For each parameter of the feature that has a default value, the scope is set to Default (indicated by a check mark), and the default setting or value is shown. To change the default or to enter a value, click the scope drop-down to the left of the parameter field and choose one of the following:

The following table describes the options for configuring the Banner feature.

Field	Description
Name	Enter a name for the feature.
Description	Enter a description of the feature. The description can contain any characters and spaces.
Login	Enter the text to display before the login prompt. The string can be up to 2048 characters long. To insert a line break, type \n.
Message of the Day	Enter the message-of-the-day text to display before the login banner. The string can be up to 2048 characters long. To insert a line break, type \n.

Global

The Global feature helps you enable or disable various services on the devices such as HTTP, HTTPS, Telnet, IP domain lookup, and several other device settings.

The following tables describe the options for configuring the Global feature.

Services

Field	Description
HTTP Server	Enable or disable HTTP server.
HTTPS Server	Enable or disable secure HTTPS server.
FTP Passive	Enable or disable passive FTP.
Domain Lookup	Enable or disable Domain Name System (DNS) lookup.
ARP Proxy	Enable or disable proxy ARP.
RSH/RCP	Enable or disable remote shell (RSH) and remote copy (rcp) on the device.
Line Virtual Teletype (Configure Outbound Telnet)	Enable or disable outbound telnet.
Cisco Discovery Protocol (CDP)	Enable or disable Cisco Discovery Protocol (CDP).
Link Layer Discovery Protocol (LLDP)	Enable or disable Link Layer Discovery Protocol (LLDP).
HTTP Client Source Interface	Enter the address of the source interface in all HTTPS client connections.

NAT

Field	Description
NAT 64 UDP Timeout	Specify the NAT64 translation timeout for UDP. Range: 1 to 536870 (seconds) Default: 300 seconds (5 minutes)
NAT 64 TCP Timeout	Specify the NAT64 translation timeout for TCP. Range: 1 to 536870 (seconds) Default: 3600 seconds (1 hour)
NAT TCP Timeout	Specify when NAT translations over TCP sessions time out Range: 1 through 8947 minutes Default: 3600 seconds (1 hour)
NAT 64 UDP Timeout	Specify when NAT translations over UDP sessions time out. Range: 1 through 8947 minutes Default: 300 seconds (5 minutes)

Authentication

Field	Description
HTTP Authentication	Choose the HTTP authentication mode. Accepted values: Local, AAA Default: Local

SSH Version

Field	Description
SSH Version	Choose the SSH version. Default: Disabled

Other Settings

Field	Description
TCP Keepalives (In)	Enable or disable generation of keepalive timers when incoming network connections are idle.
TCP Keepalives (Out)	Enable or disable generation of keepalive timers when outgoing network connections are idle.

Field	Description
TCP Small Servers	Enable or disable small TCP servers (for example, ECHO).
UDP Small Servers	Enable or disable small UDP servers (for example, ECHO).
Console Logging	Enable or disable console logging. By default, the router sends all log messages to its console port.
IP Source Routing	Enable or disable IP source routing. IP source routing is a feature that enables the originator of a packet to specify the path for the packet to use to get to the destination.
VTY Line Logging	Enable or disable the device to display log messages to a vty session in real time.
SNMP IFINDEX Persist	Enable or disable SNMP IFINDEX persistence, which provides an interface index (ifIndex) value that is retained and used when the device reboots.
Ignore BOOTP	Enable or disable BOOTP server. When enabled, the device listens for the BOOTP packet that comes in sourced from 0.0.0.0. When disabled, the device ignores these packets.

Logging

The Logging feature helps you configure logging to either the local hard drive or a remote host.

The following tables describe the options for configuring the Logging feature.

Field	Description
Max File Size(In Megabytes)	Enter the maximum size of syslog files. The syslog files are rotated on an hourly basis based on the file size. When the file size exceeds the configured value, the file is rotated and the syslog process is notified. Range: 1 to 20 MB Default: 10 MB
Rotations	Enter the number of syslog files to create before discarding the oldest files. Range: 1 to 10 Default: 10

TLS Profile

Field	Description
Add TLS Profile	
TLS Profile Name	Enter the name of the TLS profile.

Field	Description
TLS Version	Choose a TLS version: • **TLSv1.1** • **TLSv1.2**
Authentication Type*	Choose **Server**.
Cipher Suite List	Choose groups of cipher suites (encryption algorithm) based on the TLS version. The following is the list of cipher suites. • **aes-128-cbc-sha**: Encryption type tls_rsa_with_aes_cbc_128_sha • **aes-256-cbc-sha**: Encryption type tls_rsa_with_aes_cbc_256_sha • **dhe-aes-cbc-sha2**: Encryption type tls_dhe_rsa_with_aes_cbc_sha2 (TLS1.2 and above) • **dhe-aes-gcm-sha2**: Encryption type tls_dhe_rsa_with_aes_gcm_sha2 (TLS1.2 and above) • **ecdhe-ecdsa-aes-gcm-sha2**: Encryption type tls_ecdhe_ecdsa_aes_gcm_sha2 (TLS1.2 and above) SuiteB • **ecdhe-rsa-aes-cbc-sha2**: Encryption type tls_ecdhe_rsa_aes_cbc_sha2 (TLS1.2 and above) • **ecdhe-rsa-aes-gcm-sha2**: Encryption type tls_ecdhe_rsa_aes_gcm_sha2 (TLS1.2 and above) • **rsa-aes-cbc-sha2**: Encryption type tls_rsa_with_aes_cbc_sha2 (TLS1.2 and above) • **rsa-aes-gcm-sha2**: Encryption type tls_rsa_with_aes_gcm_sha2 (TLS1.2 and above)

Server

Field	Description
Add Server	
IPv4 Address	Enter the DNS name, hostname, or IP address of the system on which to store syslog messages. To add another syslog server, click the plus sign (+). To delete a syslog server, click the trash icon to the right of the entry.
VRF	Enter the identifier of the VPN in which the syslog server is located or through which the syslog server can be reached. Range: 0 through 65530

Field	Description
Source Interface	Enter the specific interface to use for outgoing system log messages. The interface must be located in the same VPN as the syslog server. Otherwise, the configuration is ignored. If you configure multiple syslog servers, the source interface must be the same for all of them.
Severity	Select the severity of the syslog message to save. The severity indicates the seriousness of the event that generated the message. Priority can be one of the following: • **informational**: Routine condition (the default) (corresponds to syslog severity 6) • **debugging**: Prints additional logs to help debugging the issue. • **notice**: A normal, but significant condition (corresponds to syslog severity 5) • **warn**: A minor error condition (corresponds to syslog severity 4) • **error**: An error condition that does not fully impair system usability (corresponds to syslog severity 3) • **critical**: A serious condition (corresponds to syslog severity 2) • **alert**: Action must be taken immediately (corresponds to syslog severity 1) • **emergency**: System is unusable (corresponds to syslog severity 0)
TLS Enable	Enable this option to allow syslog over TLS. When you enable this option, the following field appears: **TLS Properties Custom Profile**: Enable this option to choose a TLS profile. When you enable this option, the following field appears: **TLS Properties Profile**: Choose a TLS profile that you have created for server or mutual authentication in the IPv4 server configuration.
Add IPv6 Server	
IPv6 Address*	Enter the DNS name, hostname, or IP address of the system on which to store syslog messages. To add another syslog server, click the plus sign (+). To delete a syslog server, click the trash icon to the right of the entry.
VRF	Enter the identifier of the VPN in which the syslog server is located or through which the syslog server can be reached. Range: 0 through 65530
Source Interface	Enter the specific interface to use for outgoing system log messages. The interface must be located in the same VPN as the syslog server. Otherwise, the configuration is ignored. If you configure multiple syslog servers, the source interface must be the same for all of them.

Field	Description
Priority	Select the severity of the syslog message to save. The severity indicates the seriousness of the event that generated the message. Priority can be one of the following: • **informational**: Routine condition (the default) (corresponds to syslog severity 6) • **debugging**: Prints additional logs to help debugging the issue. • **notice**: A normal, but significant condition (corresponds to syslog severity 5) • **warn**: A minor error condition (corresponds to syslog severity 4) • **error**: An error condition that does not fully impair system usability (corresponds to syslog severity 3) • **critical**: A serious condition (corresponds to syslog severity 2) • **alert**: Action must be taken immediately (corresponds to syslog severity 1) • **emergency**: System is unusable (corresponds to syslog severity 0)
TLS Enable	Enable this option to allow syslog over TLS.
TLS Properties Custom Profile*	Enable this option to choose a TLS profile.
TLS Properties Profile	Choose a TLS profile that you have created for server or mutual authentication in the IPv6 server configuration.

NTP

Network Time Protocol (NTP) is a protocol that allows a distributed network of servers and clients to synchronize the timekeeping across the network. The NTP feature helps you configure NTP settings on the Cisco SD-WAN network.

The following tables describe the options for configuring the NTP feature.

Server

Field	Description
Add Server	
Hostname/IP address	Enter the IP address of an NTP server, or a DNS server that knows how to reach the NTP server.
VRF to reach NTP Server*	Enter the VRF name used to reach the NTP server, can be up to 32 alphanumeric characters

Field	Description
Set authentication key for the server	Specify the MD5 key associated with the NTP server, to enable MD5 authentication. For the key to work, you must mark it as trusted in the **Trusted Key** field under **Authentication**.
Set NTP version	Enter the version number of the NTP protocol software. Range: 1 to 4 Default: 4
Set interface to use to reach NTP server	Enter the name of a specific interface to use for outgoing NTP packets. The interface must be located in the same VPN as the NTP server. If it is not, the configuration is ignored.
Prefer this NTP server*	Enable this option if multiple NTP servers are at the same stratum level and you want one to be preferred. For servers at different stratum levels, Cisco SD-Routing chooses the one at the highest stratum level.

Authentication

Field	Description
Add Authentication Keys	
Key Id	Enter an MD5 authentication key ID. Range: 1 to 65535
MD5 Value*	Enter an MD5 authentication key. Enter either a cleartext key or an AES-encrypted key.

Advanced

Field	Description
Authoritative NTP Server	Choose **Global** from the drop-down list, and enable this option if you want to configure one or more supported routers as a primary NTP router. When you enable this option, the following field appears: **Stratum**: Enter the stratum value for the primary NTP router. The stratum value defines the hierarchical distance of the router from its reference clock. Valid values: Integers 1 to 15. If you do not enter a value, the system uses the router internal clock default stratum value, which is 8.
Source	Enter the name of the exit interface for NTP communication. If configured, the system sends NTP traffic to this interface. For example, enter **`GigabitEthernet1`** or **`Loopback0`**.

SNMP

The application-layer Simple Network Management Protocol (SNMP) provides a communication standard for interaction between SNMP managers and agents. The protocol defines a standardized language that is commonly used for monitoring and managing devices in a network. The SNMP feature helps you configure the SNMP functionality on the Cisco SD-Routing devices.

The following tables describe the options for configuring the SNMP feature.

SNMP

Table 2: Advanced

Field	Description
Shutdown	By default, SNMP is enabled.
Contact Person	Enter the name of the network management contact person in charge of managing the Cisco SD-Routing device. It can be a maximum of 255 characters.
Location of Device	Enter a description of the location of the device. It can be a maximum of 255 characters.

SNMP Version

Table 3: Basic

Field	Description
SNMP Version	Choose one of the following SNMP versions: • **SNMP v2** • **SNMP v3**
SNMP v2: Add View	
Name	Enter a name for the view. A view specifies the MIB objects that the SNMP manager can access. The view name can be a maximum of 255 characters. You must add a view name for all views before adding a community.
Add OID	Click this option to add object identifiers (OID) and configure the following parameters: • **Id**: Enter the OID of the object. For example, to view the internet portion of the SNMP MIB, enter the OID 1.3.6.1. To view the private portion of the Cisco SD-Routing device MIB, enter the OID 1.3.6.1.4.1.41916. Use the asterisk wildcard (*) in any position of the OID subtree to match any value at that position rather than matching a specific type or name. • **Exclude**: Enable this option to include the OID in the view or disable this option to exclude the OID from the view.

Flexible Port Speed

The Flexible Port Speed feature is applicable only to the Cisco Catalyst 8500-12X4QC router. Use this feature to configure interfaces to work as 100GE, 40GE, 10GE, or 1GE based on your requirement. Any changes made to the port type take effect only after applying the configuration group to devices.

Updating the port configuration using the Flexible Port Speed feature may enable some ports and disable others. For instance, by default , C8500-12X4QC operates Bay 1 in 10GE mode and Bay 2 in 40GE mode. The Bay 1 mode can be 10GE, 40GE, or 100GE. Setting Bay 1 to 100GE disables all ports of Bay 0. For more information, see Bay Configuration of the Cisco Catalyst 8500-12X4QC device.

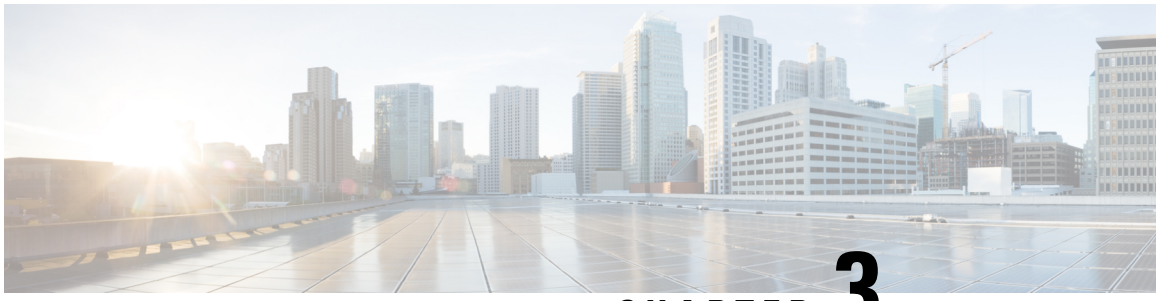
For more information about the Cisco Catalyst 8500-12X4QC platform's port options in each of its bays, see the C8500-12X4QC product overview in the *Cisco Catalyst 8500 Series Edge Platforms Data Sheet*.

Some parameters have a scope drop-down list that enables you to choose **Global**, **Device Specific**, or **Default** for the parameter value. Choose one of the following options, as described in the table below:

Parameter Scope	Scope Description
Global (Indicated by a globe icon)	Enter a value for the parameter and apply that value to all devices. Examples of parameters that you might apply globally to a group of devices are DNS server, syslog server, and interface MTUs.
Device Specific (Indicated by a host icon)	Use a device-specific value for the parameter. Choose **Device Specific** to provide a value for the key in the field. The key is a unique string that helps identify the parameter. To change the default key, enter a new string in the field. Examples of device-specific parameters are system IP address, host name, GPS location, and site ID.
Default (indicated by a check mark)	The default value appears for parameters that have a default setting.

Basic Settings

Parameter Name	Description
Port Type	Choose from one of the following port combinations: • **12 ports of 1/10GE + 3 ports of 40GE** • **8 ports of 1/10GE + 4 ports of 40GE** • **2 ports of 100GE** • **12 ports of 1/10GE + 1 port of 100GE** • **8 ports of 1/10GE + 1 port of 40GE + 1 port of 100GE** • **3 ports of 40GE + 1 port of 100GE** Default is 12 ports of 1/10GE + 3 ports of 40GE.



CHAPTER 3

Transport and Management

The Transport and Management Profile helps you configure a VRF at WAN level. For each parameter of the feature that has a default value, the scope is set to Default (indicated by a check mark), and the default setting or value is shown.

Transport VRF

The Transport VRF feature helps you configure the VRF for WAN.

For each parameter of the feature that has a default value, the scope is set to Default (indicated by a check mark), and the default setting or value is shown.

The following table describes the options for configuring the Transport VPN feature.

Basic Configuration

Field	Description
VRF	Enter the identifier of the VRF.
Enhance ECMP Keying	Enable the use in the ECMP hash key of Layer 4 source and destination ports, in addition to the combination of the source IP address, destination IP address, protocol, and DSCP field, as the ECMP hash key. Default: Disabled

DNS

Field	Description
Add DNS	
Primary DNS Address (IPv4)	Enter the IP address of the primary IPv4 DNS server in this VRF.
Secondary DNS Address (IPv4)	Enter the IP address of a secondary IPv4 DNS server in this VRF.
Add DNS IPv6	
Primary DNS Address (IPv6)	Enter the IP address of the primary IPv6 DNS server in this VRF.
Secondary DNS Address (IPv6)	Enter the IP address of a secondary IPv6 DNS server in this VRF.

Host Mapping

Field	Description
Add New Host Mapping	
Hostname	Enter the hostname of the DNS server. The name can be up to 128 characters.
List of IP	Enter up to 14 IP addresses to associate with the hostname. Separate the entries with commas.

Route

Field	Description
Add IPv4 Static Route	
Network address	Enter the IPv4 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv4 static route to configure in the VRF.
Subnet Mask*	Enter the subnet mask.

Field	Description

Gateway*	Choose one of the following options to configure the next hop to reach the static route:
	• **nextHop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address**: Enter the next-hop IPv4 address.
	  • **Administrative distance**: Enter the administrative distance for the route.
	• **dhcp**
	• **null0**: When you choose this option, the following field appears:
	  • **Administrative distance**: Enter the administrative distance for the route.

Add IPv6 Static Route	
Prefix	Enter the IPv6 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv6 static route to configure in the VRF.

Next Hop/Null 0/NAT	Choose one of the following options to configure the next hop to reach the static route:
	• **Next Hop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address**: Enter the next-hop IPv6 address.
	  Administrative distance: Enter the administrative distance for the route.
	• **Null 0**: When you choose this option, the following field appears:
	  • **IPv6 Route Null 0**: Enable this option to set the next hop to be the null interface. All packets sent to this interface are dropped without sending any ICMP messages.
	• **NAT**: When you choose this option, the following field appears:
	  • **IPv6 NAT***: Choose NAT64 or NAT66.

ACL IPv4

The following table describe the options for configuring the ACL IPv4 feature.

Field	Description
ACL Sequence Name	Specifies the name of the ACL sequence.

Field	Description
Standard	Standard ACLs control traffic by the comparison of the source address of the IP packets to the addresses configured in the ACL.
Extended	Extended ACLs control traffic by the comparison of the source and destination addresses of the IP packets to the addresses configured in the ACL.
Add ACL Sequence	Sequential collection of permit and deny conditions that apply to an IP packet
Import ACL Sequence	Import an ACL sequence into the device
Drop or Accept	Action to perform if match exists or not.
Edit ACL Sequence	
ACL Sequence Name	Enter a name for the ACL Sequence.
Source Address	Source address of IP packets
Source Address Host	A single source address host
Action Type	The default value is accept
Accept Actions	Select log from the drop-down list to log messages about packets that are permitted or denied by a standard IP access list.

You can select the specific ACL sequence in the ACL Policy window to edit, delete or add.

Note You can also configure **ACL Policy** features from Transport and Service Profile configuration groups.

Management VRF

The following table describes the options for configuring the Management VRF feature.

Field	Description
Type	Choose a feature from the drop-down list.
Feature Name	Enter a name for the feature.
Description	Enter a description of the feature. The description can contain any characters and spaces.

DNS

Field	Description
Add DNS	
Primary DNS Address (IPv4)	Enter the IPv4 address of the primary DNS server in this VPN.

Host Mapping

Field	Description
Hostname	Enter the hostname of the DNS server. The name can be up to 128 characters.
List of IP Address	Enter IP addresses to associate with the hostname. Separate the entries with commas.

IPv4/IPv6 Static Route

Field	Description
Add IPv4 Static Route	
Network Address*	Enter the IPv4 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv4 static route to configure in the VRF.
Subnet Mask*	Enter the subnet mask.

Gateway*	Choose one of the following options to configure the next hop to reach the static route:
	• **nextHop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address***: Enter the next-hop IPv4 address.
	  • **Administrative distance***: Enter the administrative distance for the route.
	• **dhcp**
	• **null0**: When you choose this option, the following field appears:
	  • **Administrative distance**: Enter the administrative distance for the route.

Add IPv6 Static Route	
Prefix*	Enter the IPv6 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv6 static route to configure in the VRF.

Field	Description
Next Hop/Null 0	Choose one of the following options to configure the next hop to reach the static route: • **Next Hop**: When you choose this option and click **Add Next Hop**, the following fields appear: • **Address***: Enter the next-hop IPv6 address. **Administrative distance***: Enter the administrative distance for the route. • **Null 0**: When you choose this option, the following field appears: • **NULL0***: Enable this option to set the next hop to be the null interface. All packets sent to this interface are dropped without sending any ICMP messages.

Object Tracker

Use the Tracker feature to track the status of the tracker endpoints

The following table describes the options for configuring the Object Tracker feature.

Basic Settings

Parameter Name	Description
Name	Name of the tracker. The name can be up to 128 alphanumeric characters. You can configure up to eight trackers.
Description	Enter a description for the Object Tracker
Object Tracker ID	Name of the object tracker
Interface Name	Enter the global or device-specific tracker interface name. For example, Gigabitethernet1 or Gigabitethernet2
Interface Track Type	Duration to wait for the probe to return a response before declaring that the transport interface is down. Range: 100 through 1000 milliseconds. Default: 300 milliseconds . The options are: • Line-protocol • Ip-routing • Ipv6-routing
Route IP	Route IP prefix of the network
Route IP Mask	Subnet mask of the network

Parameter Name	Description
VRF Name	VRF name to be used as the basis to track route reachability
Delay Up (Seconds)	Sets delay of from 0 to 180 seconds before communication of up status of the tracked object or list of objects
Delay Down (Seconds)	Sets delay of from 0 to 180 seconds before communication of down status of the tracked object or list of objects

Object Tracker Group

Use this feature to configure an object tracker group. To ensure accurate tracking, add at least two object trackers before creating an object tracker group.

Basic Settings

Parameter Name	Description
Object tracker ID	Enter an ID for the object tracker group. Range: 1 through 1000
Object tracker	Select a minimum of two previously created object trackers from the drop-down list.
Reachable	Choose one of the following values: • **Either**: Ensures that the transport interface status is reported as active if either one of the associated trackers of the tracker group reports that the route is active. • **Both**: Ensures that the transport interface status is reported as active if both the associated trackers of the tracker group report that the route is active.
Delay Up (Seconds)	Sets delay of from 0 to 180 seconds before communication of up status of the tracked object or list of objects
Delay Down (Seconds)	Sets delay of from 0 to 180 seconds before communication of down status of the tracked object or list of objects

Route Policy

Use this feature to configure the policy-based routing if you want certain packets to be routed through a specific path other than the obvious shortest path.

The following table describes the options for configuring the route policy feature.

Field	Description
Routing Sequence Name	Specifies the name of the routing sequence.
Protocol	Specifies the internet protocol. The options are IPv4, IPv6, or Both.
Condition	Specifies the routing condition. The options are: • Address • AS Path List • Community List • Extended Community List • BGP Local Preference • Metric • Next Hop • Interface • OSPF Tag
Action Type	Specifies the action type. The options are: Accept or Reject.
Accept Condition	Specifies the accept condition type. The options are: • AS Path • Community • Local Preference • Metric • Metric Type • Next Hop • Origin • OSPF Tag • Weight

VRF Service Profile

DNS

The following table describes the options for configuring the Management VRF feature.

Field	Description
VRF Name	Enter a name for the VRF.
RD	Specify a route distinguisher for the VRF
DNS	
IP Address	Enter the IPv4 address of the primary DNS server in this VRF

Host Mapping

Field	Description
Add New Host Mapping	
Hostname	Enter the hostname of the DNS server. The name can be up to 128 characters.
List of IP	Enter up to 14 IP addresses to associate with the hostname. Separate the entries with commas.

Route

Field	Description
Add IPv4 Static Route	
Network address	Enter the IPv4 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv4 static route to configure in the VRF.
Subnet Mask*	Enter the subnet mask.

Gateway*	Choose one of the following options to configure the next hop to reach the static route:
	• **nextHop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address**: Enter the next-hop IPv4 address.
	  • **Administrative distance**: Enter the administrative distance for the route.
	• **dhcp**
	• **null0**: When you choose this option, the following field appears:
	  • **Administrative distance**: Enter the administrative distance for the route.

Add IPv6 Static Route	

Field	Description
Prefix	Enter the IPv6 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv6 static route to configure in the VRF.
Next Hop/Null 0/NAT	Choose one of the following options to configure the next hop to reach the static route: • **Next Hop**: When you choose this option and click **Add Next Hop**, the following fields appear: • **Address**: Enter the next-hop IPv6 address. **Administrative distance**: Enter the administrative distance for the route. • **Null 0**: When you choose this option, the following field appears:
NAT	Enable this option to have the interface act as a NAT device

Ethernet Interface

This feature helps you configure Ethernet Interface in the VRF.

The following table describes the options for configuring the Ethernet Interface feature.

Field	Description
Type	Choose a VRF from the drop-down list
Associated VRF	Choose a VRF

Basic Configuration

Field	Description
Shutdown	Enable or disable the interface.
Control Connection	Select on to enable control connections on the tunnel.
Bind Interface	Enter the name of a physical interface to bind to a loopback interface
Interface Name	Enter a name for the interface. Spell out the interface names completely (for example, GigabitEthernet0/0/0). Configure all the interfaces of the router, even if you are not using them, so that they are configured in the shutdown state and so that all default values for them are configured.
Description	Enter a description for the interface

Field	Description
IPv4 Settings	Configure an IPv4 VRF interface. • **Dynamic**: Choose **Dynamic** to set the interface as a Dynamic Host Configuration Protocol (DHCP) client so that the interface receives its IP address from a DHCP server. • **Static**: Choose **Static** to enter an IP address that doesn't change.
Dynamic DHCP Distance	Enter an administrative distance value for routes learned from a DHCP server. This option is available when you choose **Dynamic**. Default: 1
IPv4 Settings	Enter a static IPv4 address. This option is available when you choose **Static**. .
Subnet Mask	Enter the subnet mask
Configure Secondary IP Address	Enter up to four secondary IPv4 addresses for a service-side interface. • IP Address: Enter the IP address • Subnet Mask: Enter the subnet mask
DHCP Helper	To designate the interface as a DHCP helper on a router, enter up to eight IP addresses, separated by commas, for DHCP servers in the network. A DHCP helper interface forwards BOOTP (broadcast) DHCP requests that it receives from the specified DHCP servers
IPv6 Settings	Configure an IPv6 VPN interface. • **Dynamic**: Choose **Dynamic** to set the interface as a Dynamic Host Configuration Protocol (DHCP) client so that the interface receives its IP address from a DHCP server. • **Static**: Choose **Static** to enter an IP address that doesn't change. • **None**
IPv6 Address Primary	Enter a static IPv6 address. This option is available when you choose **Static**.

BFD

Field	Description
Enable BFD	Enable this option to detect link failures

ARP

Field	Description
IP Address	Enter the IP address for the ARP entry in dotted decimal notation or as a fully qualified host name.
MAC Address	Enter the MAC address in colon-separated hexadecimal notation.

ACL

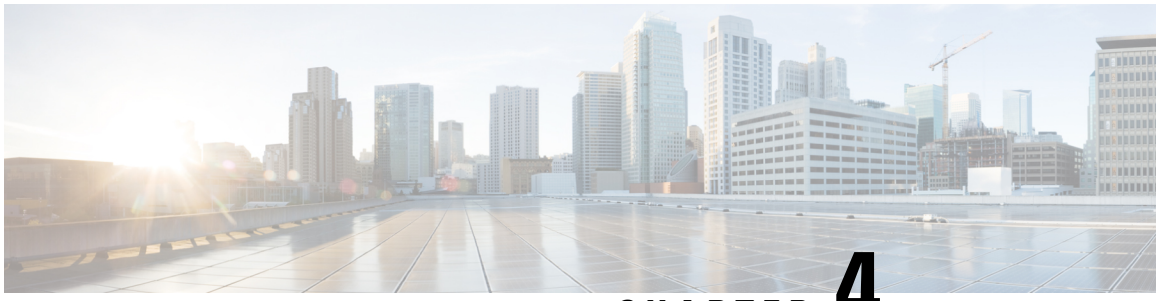
Field	Description
ACL IPv4 Ingress	Enter the name of an IPv4 access list to packets being received on the interface
ACL IPv4 Egress	Enter the name of an IPv4 access list to packets being transmitted on the interface
ACL IPv6 Ingress	Enter the name of an IPv6 access list to packets being received on the interface
ACL IPv6 Egress	Enter the name of an IPv6 access list to packets being transmitted on the interface

Advanced

Field	Description
Duplex	Specify whether the interface runs in full-duplex or half-duplex mode. Default: full
MAC Address	Specify a MAC address to associate with the interface, in colon-separated hexadecimal notation.
IP MTU	Specify the maximum MTU size of packets on the interface. Range: 576 through 9216 Default: 1500 bytes
Interface MTU	Enter the maximum transmission unit size for frames received and transmitted on the interface. Range: 1500 through 1518 (GigabitEthernet0), 1500 through 9216 (other GigabitEthernet) Default: 1500 bytes

Field	Description
TCP MSS	Specify the maximum segment size (MSS) of TPC SYN packets passing through the router. By default, the MSS is dynamically adjusted based on the interface or tunnel MTU such that TCP SYN packets are never fragmented. Range: 500 to 1460 bytes Default: None
Speed	Specify the speed of the interface, for use when the remote end of the connection does not support autonegotiation. Values: 10, 100, 1000, 2500, or 10000 Mbps
ARP Timeout	ARP timeout controls how long we maintain the ARP cache on a router. Specify how long it takes for a dynamically learned ARP entry to time out. Range: 0 through 2147483 seconds Default: 1200 seconds
Autonegotiate	Enable this option to turn on autonegotiation.
Media Type	Specify the physical media connection type on the interface. Choose one of the following: • **auto-select**: A connection is automatically selected. • **rj45**: Specifies an RJ-45 physical connection. • **sfp**: Specifies a small-form factor pluggable (SFP) physical connection for fiber media.
Load Interval	Enter an interval value for interface load calculation
IP Directed Broadcast	An IP directed broadcast is an IP packet whose destination address is a valid broadcast address for some IP subnet, but which originates from a node that is not itself part of that destination subnet. A device that is not directly connected to its destination subnet forwards an IP directed broadcast in the same way it would forward unicast IP packets destined to a host on that subnet. When a directed broadcast packet reaches a device that is directly connected to its destination subnet, that packet is broadcast on the destination subnet. The destination address in the IP header of the packet is rewritten to the configured IP broadcast address for the subnet, and the packet is sent as a link-layer broadcast. If directed broadcast is enabled for an interface, incoming IP packets whose addresses identify them as directed broadcasts intended for the subnet to which that interface is attached are broadcast on that subnet.

Field	Description
ICMP Redirect Disable	ICMP redirects are sent by a router to the sender of an IP packet when a packet is being routed sub-optimally. The ICMP redirect informs the sending host to forward subsequent packets to that same destination through a different gateway. By default, an interface allows ICMP redirect messages.



CHAPTER 4

ACL IPv4

The following table describe the options for configuring the ACL IPv4 feature.

Field	Description
ACL Sequence Name	Specifies the name of the ACL sequence.
Standard	Standard ACLs control traffic by the comparison of the source address of the IP packets to the addresses configured in the ACL.
Extended	Extended ACLs control traffic by the comparison of the source and destination addresses of the IP packets to the addresses configured in the ACL.
Add ACL Sequence	Sequential collection of permit and deny conditions that apply to an IP packet
Import ACL Sequence	Import an ACL sequence into the device
Drop or Accept	Action to perform if match exists or not.
Edit ACL Sequence	
ACL Sequence Name	Enter a name for the ACL Sequence.
Source Address	Source address of IP packets
Source Address Host	A single source address host
Action Type	The default value is accept
Accept Actions	Select log from the drop-down list to log messages about packets that are permitted or denied by a standard IP access list.

You can select the specific ACL sequence in the ACL Policy window to edit, delete or add.

Note You can also configure **ACL Policy** features from Transport and Service Profile configuration groups.

• DHCP Server, on page 44

DHCP Server

This feature allows an interface to be configured as a DHCP helper so that it forwards the broadcast DHCP requests that it receives from the DHCP servers.

For each parameter of the feature that has a default value, the scope is set to Default (indicated by a check mark), and the default setting or value is shown. To change the default or to enter a value, click the scope drop-down to the left of the parameter field and choose one of the following:

Basic Configuration

Field	Description
Address Pool	Enter the IPv4 prefix range, in the format **`prefix/length`**, for the pool of addresses in the service-side network for which the router interface acts as the DHCP server.
Exclude	Enter one or more IP addresses to exclude from the DHCP address pool. To specify multiple individual addresses, list them separated by a comma. To specify a range of addresses, separate them with a hyphen.
Lease Time(seconds)	Specify how long a DHCP-assigned IP address is valid. Range: 60 through 31536000 seconds Default: 86400

Static Lease

Field	Description
Add Static Lease	
MAC Address	Enter the MAC address of the client to which the static IP address is being assigned.
IP	Enter the static IP address to assign to the client.

DHCP Options

Field	Description
Add Option Code	

Field	Description
Code	Configure the option code. Range: 1-254
Type	Choose one of the three types: • **ASCII**: Specify an ASCII value. • **Hex**: Specify a hex value. • **IP**: Specify IP addresses. You can specify up to eight IP addresses.

Advanced

Field	Description
Interface MTU	Specify the maximum MTU size of packets on the interface. Range: 68 to 65535 bytes
Domain Name	Specify the domain name that the DHCP client uses to resolve hostnames.
Default Gateway	Enter the IP address of a default gateway in the service-side network.
DNS Servers	Enter one or more IP address for a DNS server in the service-side network. Separate multiple entries with a comma. You can specify up to eight addresses.
TFTP Servers	Enter the IP address of a TFTP server in the service-side network. You can specify one or two addresses. If two, separate them with a comma.

Object Tracker

Use the Tracker feature to track the status of the tracker endpoints

The following table describes the options for configuring the Object Tracker feature.

Basic Settings

Parameter Name	Description
Name	Name of the tracker. The name can be up to 128 alphanumeric characters. You can configure up to eight trackers.
Description	Enter a description for the Object Tracker
Object Tracker ID	Name of the object tracker
Interface Name	Enter the global or device-specific tracker interface name. For example, Gigabitethernet1 or Gigabitethernet2

Parameter Name	Description
Interface Track Type	Duration to wait for the probe to return a response before declaring that the transport interface is down. Range: 100 through 1000 milliseconds. Default: 300 milliseconds . The options are: • Line-protocol • Ip-routing • Ipv6-routing
Route IP	Route IP prefix of the network
Route IP Mask	Subnet mask of the network
VRF Name	VRF name to be used as the basis to track route reachability
Delay Up (Seconds)	Sets delay of from 0 to 180 seconds before communication of up status of the tracked object or list of objects
Delay Down (Seconds)	Sets delay of from 0 to 180 seconds before communication of down status of the tracked object or list of objects

Object Tracker Group

Use this feature to configure an object tracker group. To ensure accurate tracking, add at least two object trackers before creating an object tracker group.

Basic Settings

Parameter Name	Description
Object tracker ID	Enter an ID for the object tracker group. Range: 1 through 1000
Object tracker	Select a minimum of two previously created object trackers from the drop-down list.
Reachable	Choose one of the following values: • **Either**: Ensures that the transport interface status is reported as active if either one of the associated trackers of the tracker group reports that the route is active. • **Both**: Ensures that the transport interface status is reported as active if both the associated trackers of the tracker group report that the route is active.
Delay Up (Seconds)	Sets delay of from 0 to 180 seconds before communication of up status of the tracked object or list of objects

Parameter Name	Description
Delay Down (Seconds)	Sets delay of from 0 to 180 seconds before communication of down status of the tracked object or list of objects

Route Policy

Use this feature to configure the policy-based routing if you want certain packets to be routed through a specific path other than the obvious shortest path.

The following table describes the options for configuring the route policy feature.

Field	Description
Routing Sequence Name	Specifies the name of the routing sequence.
Protocol	Specifies the internet protocol. The options are IPv4, IPv6, or Both.
Condition	Specifies the routing condition. The options are: • Address • AS Path List • Community List • Extended Community List • BGP Local Preference • Metric • Next Hop • Interface • OSPF Tag
Action Type	Specifies the action type. The options are: Accept or Reject.

Field	Description
Accept Condition	Specifies the accept condition type. The options are: • AS Path • Community • Local Preference • Metric • Metric Type • Next Hop • Origin • OSPF Tag • Weight

VRF Service Profile

DNS

The following table describes the options for configuring the Management VRF feature.

Field	Description
VRF Name	Enter a name for the VRF.
RD	Specify a route distinguisher for the VRF
DNS	
IP Address	Enter the IPv4 address of the primary DNS server in this VRF

Host Mapping

Field	Description
Add New Host Mapping	
Hostname	Enter the hostname of the DNS server. The name can be up to 128 characters.
List of IP	Enter up to 14 IP addresses to associate with the hostname. Separate the entries with commas.

Route

Field	Description
Add IPv4 Static Route	
Network address	Enter the IPv4 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv4 static route to configure in the VRF.
Subnet Mask*	Enter the subnet mask.

Gateway*	Choose one of the following options to configure the next hop to reach the static route:
	• **nextHop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address**: Enter the next-hop IPv4 address.
	  • **Administrative distance**: Enter the administrative distance for the route.
	• **dhcp**
	• **null0**: When you choose this option, the following field appears:
	  • **Administrative distance**: Enter the administrative distance for the route.

Add IPv6 Static Route	
Prefix	Enter the IPv6 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv6 static route to configure in the VRF.

Next Hop/Null 0/NAT	Choose one of the following options to configure the next hop to reach the static route:
	• **Next Hop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address**: Enter the next-hop IPv6 address.
	  Administrative distance: Enter the administrative distance for the route.
	• **Null 0**: When you choose this option, the following field appears:

NAT	Enable this option to have the interface act as a NAT device

IPv4/IPv6 Static Route Service

IPv4/IPv6 Static Route

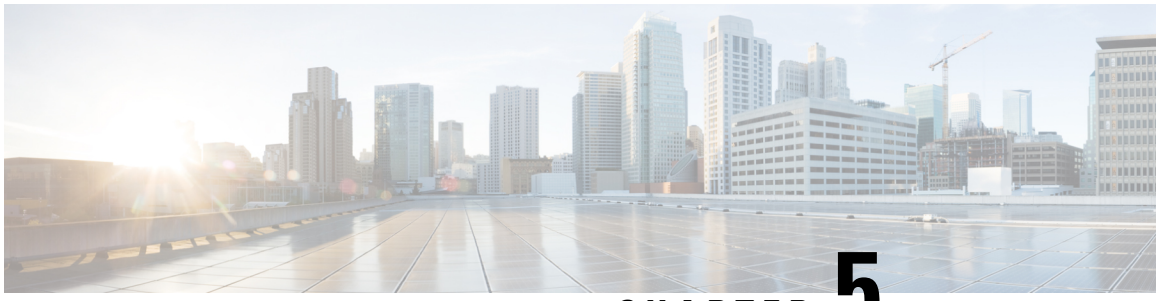
Field	Description
Add IPv4 Static Route	
IP Address*	Enter the IPv4 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv4 static route to configure in the VPN.
Subnet Mask*	Enter the subnet mask.

Gateway*	Choose one of the following options to configure the next hop to reach the static route:
	• **nextHop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address***: Enter the next-hop IPv4 address.
	  • **Administrative distance***: Enter the administrative distance for the route.
	• **dhcp**
	• **null0**: When you choose this option, the following field appears:
	  • **Administrative distance**: Enter the administrative distance for the route.

Add IPv6 Static Route	
Prefix*	Enter the IPv6 address or prefix, in decimal four-point-dotted notation, and the prefix length of the IPv6 static route to configure in the VPN.

Field	Description

Next Hop/Null 0/NAT	Choose one of the following options to configure the next hop to reach the static route:
	• **Next Hop**: When you choose this option and click **Add Next Hop**, the following fields appear:
	  • **Address***: Enter the next-hop IPv6 address.
	  Administrative distance*: Enter the administrative distance for the route.
	• **Null 0**: When you choose this option, the following field appears:
	  • **NULL0***: Enable this option to set the next hop to be the null interface. All packets sent to this interface are dropped without sending any ICMP messages.
	• **NAT**: When you choose this option, the following field appears:
	  • **IPv6 NAT**: Choose NAT64 or NAT66.



CHAPTER 5

Policy Object Profile

The Policy Object feature profile enables you to attach policy configurations to a device.

The following table describes the options for configuring the policy profile.

Table 4:

Field	Description
Choose existing	Choose an existing profile from the Profiles table.
Create new	When you choose this option, the following fields appear: • Name: Enter a name for the profile. • Description: Enter a description of the profile. The description can contain any characters and spaces.