



CHAPTER 7

Configuring SDM Templates

This chapter describes how to configure the Switch Database Management (SDM) templates on the switch.



Note

For complete syntax and usage information for the commands used in this chapter, see the command reference for this release.

This chapter consists of these sections:

- [Understanding the SDM Templates, page 7-1](#)
- [Configuring the Switch SDM Template, page 7-3](#)
- [Displaying the SDM Templates, page 7-5](#)

Understanding the SDM Templates

You can use SDM templates to configure system resources in the switch to optimize support for specific features, depending on how the switch is used in the network. You can select a template to provide maximum system usage for some functions or use the default template to balance resources. For example, you could use access template to obtain maximum ACL usage.

To allocate ternary content addressable memory (TCAM) resources for different usages, the switch SDM templates prioritize system resources to optimize support for certain features. You can select SDM templates for IP Version 4 (IPv4) to optimize these features:

- **Access**—The access template maximizes system resources for access control lists (ACLs) to accommodate a large number of ACLs.
- **Routing**—The routing template maximizes system resources for unicast routing, typically required for a router or aggregator in the center of a network.
- **VLANs**—The VLAN template disables routing and supports the maximum number of unicast MAC addresses. It would typically be selected for a Layer 2 switch.
- **Default**—The default template gives balance to all functions.

You can also select a dual IPv4 and IPv6 template to support a dual-stack environment. See the “[Dual IPv4 and IPv6 SDM Templates](#)” section on [page 7-2](#). You must enable a dual-stack template to configure IPv6 host or IPv6 MLD snooping.

[Table 7-1](#) lists the approximate numbers of each resource supported in each IPv4 template.

Table 7-1 Approximate Number of IPv4 Features Allowed by Each Template

Resource	Access	Default	Routing	VLAN
Unicast MAC addresses	4 K	6 K	3 K	12 K
IGMP groups and multicast routes	1 K	1 K	1 K	1 K
Unicast routes	6 K	8 K	11 K	0
• Directly connected hosts	4 K	6 K	3 K	0
• Indirect routes	2 K	2 K	8 K	0
Policy-based routing ACEs ¹	0.5 K	0	0.5 K	0
QoS classification ACEs	0.75K	0.75K	0.75K	0.75K
Security ACEs	2 K	1 K	1 K	1 K

1. Policy-based routing is not supported in the IP base image on the switch.

The rows in the table represent approximate hardware boundaries set when a template is selected. The template optimizes resources in the switch to support the indicated level of features for 8 routed interfaces and 1024 Layer 2 VLANs. If a section of a hardware resource is full, all processing overflow is sent to the CPU, seriously impacting switch performance.

Dual IPv4 and IPv6 SDM Templates

You can select SDM templates to support IP Version 6 (IPv6). For more information about IPv6, see [Chapter 36, “Configuring IPv6 Host Functions.”](#) The switch does not support IPv6 routing and QoS. This release does support IPv6 host and IPv6 Multicast Listener Discovery (MLD) snooping.

The dual IPv4 and IPv6 template allows the switch to be used in dual stack environments (supporting both IPv4 and IPv6). Using the dual stack templates results in less TCAM capacity allowed for each resource. Do not use them if you plan to forward only IPv4 traffic.

The dual IPv4 and IPv6 default template supports Layer 2, multicast, routing, QoS, and ACLs for IPv4; and Layer 2 for IPv6 on the switch.

These SDM templates support IPv4 and IPv6 environments:

- The dual IPv4 and IPv6 default template supports Layer 2, multicast, routing, QoS, and ACLs for IPv4; and Layer 2, routing, and ACLs for IPv6 on the switch.
- The dual IPv4 and IPv6 routing template supports Layer 2, multicast, routing (including policy-based routing), QoS, and ACLs for IPv4; and Layer 2, routing, and ACLs for IPv6 on the switch.
- The dual IPv4 and IPv6 VLAN template supports basic Layer 2, multicast, QoS, and ACLs for IPv4, and basic Layer 2 and ACLs for IPv6 on the switch.

[Table 7-2](#) defines the approximate feature resources allocated by each new template. Template estimations are based on a switch with 8 routed interfaces and approximately 1000 VLANs.

Table 7-2 *Approximate Feature Resources Allowed by Dual IPv4-IPv6 Templates*

Resource	IPv4-and-IPv6 Default	IPv4-and-IPv6 Routing	IPv4-and-IPv6 VLAN
Unicast MAC addresses	2 K	1.5 K	8 K
IPv4 IGMP groups and multicast routes	1 K	1K	1 K
Total IPv4 unicast routes:	3 K	2.75 K	0
• Directly connected IPv4 hosts	2 K	1.5 K	0
• Indirect IPv4 routes	1 K	1.25 K	0
IPv6 multicast groups	1.125 K	1.125 K	1.125 K
Total IPv6 unicast routes:	3 K	2.75 K	0
• Directly connected IPv6 addresses	2 K	1.5 K	0
• Indirect IPv6 unicast routes	1 K	1.25 K	0
IPv4 policy-based routing ACEs ¹	0	0.25 K	0
IPv4 or MAC QoS ACEs (total)	0.75 K	0.75 K	0.75 K
IPv4 or MAC security ACEs (total)	1 K	0.5 K	1K
IPv6 policy-based routing ACEs ¹	0	0.25 K	0
IPv6 QoS ACEs ¹	0.5 K	0.5 K	0.5 K
IPv6 security ACEs ²	0.5 K	0.5 K	0.5 K

1. Not supported in the IP base image that runs on the switch.

2. The switch supports only input IPv6 router ACLs for management traffic.

**Note**

Although these features are visible in the template in the CLI, the switch does not support IPv4 or IPv6 policy-based routing or IPv6 QoS ACLs.

Configuring the Switch SDM Template

These sections contain this configuration information:

- [Default SDM Template, page 7-3](#)
- [SDM Template Configuration Guidelines, page 7-4](#)
- [Setting the SDM Template, page 7-4](#)

Default SDM Template

The default template is the default.

SDM Template Configuration Guidelines

Follow these guidelines when selecting and configuring SDM templates:

- When you select and configure SDM templates, you must reload the switch for the configuration to take effect.
- Use the **sdm prefer vlan** global configuration command only on switches intended for Layer 2 switching with no routing. When you use the VLAN template, no system resources are reserved for routing entries, and any routing is done through software. This overloads the CPU and severely degrades routing performance.
- Do not use the routing template if you do not have routing enabled on your switch. The **sdm prefer routing** global configuration command prevents other features from using the memory allocated to unicast routing in the routing template.
- If you try to configure IPv6 without first selecting a dual IPv4 and IPv6 template, a warning message is generated.
- Using the dual stack templates results in less TCAM capacity allowed for each resource, so do not use if you plan to forward only IPv4 traffic.
- Although these features are visible in the template in the CLI, the switch does not support IPv4 or IPv6 policy-based routing or IPv6 Qos ACLs.

Setting the SDM Template

Beginning in privileged EXEC mode, follow these steps to use the SDM template to maximize feature usage:

	Command	Purpose
Step 1	<code>configure terminal</code>	Enter global configuration mode.
Step 2	<code>sdm prefer {access default dual-ipv4-and-ipv6 {default routing vlan} routing vlan}</code>	<p>Specify the SDM template to be used on the switch:</p> <p>The keywords have these meanings:</p> <ul style="list-style-type: none"> • access—Maximizes system resources for ACLs. • default—Gives balance to all functions. • dual-ipv4-and-ipv6—Select a template that supports both IPv4 and IPv6 routing. <ul style="list-style-type: none"> – default—Balance IPv4 and IPv6 Layer 2 and Layer 3 functionality. – routing—Provide maximum usage for IPv4 and IPv6 routing, including IPv4 policy-based routing. – vlan—Provide maximum usage for IPv4 and IPv6 VLANs. • routing—Maximizes routing on the switch. • vlan—Maximizes VLAN configuration on the switch with no routing supported in hardware. <p>The default template balances the use of system resources.</p>
Step 3	<code>end</code>	Return to privileged EXEC mode.

	Command	Purpose
Step 4	reload	Reload the operating system.

After the system reboots, you can use the **show sdm prefer** privileged EXEC command to verify the new template configuration. If you enter the **show sdm prefer** command before you enter the **reload** privileged EXEC command, the **show sdm prefer** command shows the template currently in use and the template that will become active after a reload.

This is an example of an output display when you have changed the template and have not reloaded the switch:

```
Switch# show sdm prefer
The current template is "desktop default" template.
The selected template optimizes the resources in
the switch to support this level of features for
8 routed interfaces and 1024 VLANs.

number of unicast mac addresses:           6K
number of IPv4 IGMP groups + multicast routes: 1K
number of IPv4 unicast routes:            8K
  number of directly-connected IPv4 hosts:  6K
  number of indirect IPv4 routes:          2K
number of IPv4 policy based routing aces:  0
number of IPv4/MAC qos aces:              0.75K
number of IPv4/MAC security aces:         1K

On next reload, template will be "desktop vlan" template.
```

To return to the default template, use the **no sdm prefer** global configuration command.

This example shows how to configure a switch with the routing template.

```
Switch(config)# sdm prefer routing
Switch(config)# end
Switch# reload
Proceed with reload? [confirm]
```

This example shows how to configure the IPv4-and-IPv6 default template on a switch:

```
Switch(config)# sdm prefer dual-ipv4-and-ipv6 default
Switch(config)# exit
Switch# reload
Proceed with reload? [confirm]
```

Displaying the SDM Templates

Use the **show sdm prefer** privileged EXEC command with no parameters to display the active template.

Use the **show sdm prefer [access | default | dual-ipv4-and-ipv6 {default | vlan} |routing | vlan]** privileged EXEC command to display the resource numbers supported by the specified template.

This is an example of output from the **show sdm prefer** command, displaying the template in use.

```
Switch# show sdm prefer
The current template is "desktop default" template.
The selected template optimizes the resources in
the switch to support this level of features for
8 routed interfaces and 1024 VLANs.

number of unicast mac addresses:          6K
number of IPv4 IGMP groups + multicast routes: 1K
number of IPv4 unicast routes:           8K
  number of directly-connected IPv4 hosts: 6K
  number of indirect IPv4 routes:        2K
number of IPv4 policy based routing aces: 0
number of IPv4/MAC qos aces:             0.75K
number of IPv4/MAC security aces:        1K
```

This is an example of output from the **show sdm prefer routing** command:

```
Switch# show sdm prefer routing
"desktop routing" template:
The selected template optimizes the resources in
the switch to support this level of features for
8 routed interfaces and 1024 VLANs.

number of unicast mac addresses:          3K
number of IPv4 IGMP groups + multicast routes: 1K
number of IPv4 unicast routes:           11K
  number of directly-connected IPv4 hosts: 3K
  number of indirect IPv4 routes:        8K
number of IPv4 policy based routing aces: 0.5K
number of IPv4/MAC qos aces:             0.75K
number of IPv4/MAC security aces:        1K
```

This is an example of output from the **show sdm prefer dual-ipv4-and-ipv6 default** command:

```
Switch# show sdm prefer dual-ipv4-and-ipv6 default
"desktop IPv4 and IPv6 default" template:
The selected template optimizes the resources in
the switch to support this level of features for
8 routed interfaces and 1024 VLANs.

number of unicast mac addresses:          2K
number of IPv4 IGMP groups + multicast routes: 1K
number of IPv4 unicast routes:           3K
  number of directly-connected IPv4 hosts: 2K
  number of indirect IPv4 routes:        1K
number of IPv6 multicast groups:         1.125k
number of directly-connected IPv6 addresses: 2K
number of indirect IPv6 unicast routes:   1K
number of IPv4 policy based routing aces: 0
number of IPv4/MAC qos aces:             0.75K
number of IPv4/MAC security aces:        1K
number of IPv6 policy based routing aces: 0
number of IPv6 qos aces:                 0.5K
number of IPv6 security aces:           0.5K
```