



CHAPTER 8

Configuring SDM Templates

This chapter describes how to configure the Switch Database Management (SDM) templates on the switch. Unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.



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 8-1](#)
- [Configuring the Switch SDM Template, page 8-4](#)
- [Displaying the SDM Templates, page 8-6](#)

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; for example, use the default template to balance resources, and use access template to obtain maximum ACL usage.

To allocate hardware 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:

- **Routing**—The routing template maximizes system resources for unicast routing, typically required for a router 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.
- **Access**—The access template maximizes system resources for access control lists (ACLs) to accommodate a large number of ACLs.

Table 8-1 lists the approximate numbers of each resource supported in each of the four templates.

Table 8-1 Approximate Number of Feature Resources 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	0.5 K	0	0.5 K	0
QoS classification ACEs	0.5 K	0.5 K	0.5 K	0.5 K
Security ACEs	2 K	1 K	1 K	1 K
VLANs	1 K	1 K	1 K	1 K

The first eight rows in the tables (unicast MAC addresses through security ACEs) represent approximate hardware boundaries set when a template is selected. If a section of a hardware resource is full, all processing overflow is sent to the CPU, seriously impacting switch performance. The last row is a guideline used to calculate hardware resource consumption related to the number of Layer 2 VLANs on the switch.

Dual IPv4 and IPv6 SDM Templates

You can select SDM templates to support IP Version 6 (IPv6). For more information about IPv6 and how to configure IPv6 unicast routing, see [Chapter 40, “Configuring IPv6 Unicast Routing.”](#)

This software release does not support IPv6 multicast routing and QoS.

The software supports IPv4 and IPv6 policy-based routing (PBR) only when the **dual-ipv4-and-ipv6 routing** template is configured.

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

- 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.
- 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.
- 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.

With the new indirect IPv4 and IPv6 routing template in Cisco IOS Release 12.2(58)SE, you can more IPv6 indirect routes for deployments that have little need for direct IPv6 host route connectivity. Compared to the existing dual IPv4 and IPv6 routing, the new template also provides more unicast MAC addresses and IPv4 and IPv6 direct routes. However, the indirect IPv4 and IPv6 routing template allows fewer IPv4 policy-based routing entries and IPv6 ACL, QoS, and policy-based routes.

You must reload the switch with the dual IPv4 and IPv6 templates for switches running IPv6.

Table 8-2 defines the approximate feature resources allocated by each dual IPv4 and IPv6 template. Template estimations are based on a switch with 8 routed interfaces and 1024 VLANs.

Table 8-2 *Approximate Feature Resources Allowed by Dual IPv4-IPv6 Templates*

Resource	Dual IPv4-and IPv6 Templates			Indirect IPv4 and IPv6 Routing
	Default	VLAN	Routing	
Unicast MAC addresses	2 K	8 K	1.5 K	2 K
IPv4 IGMP groups and multicast routes	1 K	1 K (IGMP) 0 (multicast)	1 K	1 K
Total IPv4 unicast routes:	3 K	0	2.7 K	4 K
• Directly connected IPv4 hosts	2 K	0	1.5 K	2 K
• Indirect IPv4 routes	1 K	0	1.2 K	2 K
IPv4 policy-based routing ACEs	0	0	0.25 K	0.125 K
IPv4 or MAC QoS ACEs (total)	0.5 K	0.5 K	0.5 K	0.5 K
IPv4 or MAC security ACEs (total)	1 K	1 K	0.5 K	0.625 K
IPv6 multicast groups	1 K	1 K	1 K	1 K
Directly connected IPv6 addresses	2 K	0	1.5 K	2 K
Indirect IPv6 unicast routes	1 K	0 1.25 K	1.25 K	3 K
IPv6 policy-based routing ACEs	0	0	0.25 K	0.125 K
IPv6 QoS ACEs	0.5 K	0.5 K	0.5 K	0.125 K
IPv6 security ACEs	0.5 K	0.5 K	0.5 K	0.125 K

SDM Templates and Switch Stacks

All stack members must use the same SDM desktop template that is stored on the stack master. When a new switch is added to a stack, the SDM configuration that is stored on the stack master overrides the template configured on an individual switch. For more information about stacking, see [Chapter 7, “Managing Switch Stacks.”](#)

You can use the **show switch** privileged EXEC command to see if any stack members are in SDM mismatch mode. This example shows the output from the **show switch** privileged EXEC command when an SDM mismatch exists:

```
Switch# show switch
```

Switch#	Role	Mac Address	Priority	Current State
*2	Master	000a.fdfd.0100	5	Ready
4	Member	0003.fd63.9c00	5	SDM Mismatch

This is an example of a syslog message notifying the stack master that a stack member is in SDM mismatch mode:

```
2d23h:%STACKMGR-6-SWITCH_ADDED_SDM:Switch 2 has been ADDED to the stack (SDM_MISMATCH)
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:System (#2) is incompatible with the SDM
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:template currently running on the stack and
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:will not function unless the stack is
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:downgraded. Issuing the following commands
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:will downgrade the stack to use a smaller
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:compatible desktop SDM template:
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:      "sdm prefer vlan desktop"
```

```
2d23h:%SDM-6-MISMATCH_ADVISE:      "reload"
```

Configuring the Switch SDM Template

These sections contain this configuration information:

- [Default SDM Template, page 8-4](#)
- [SDM Template Configuration Guidelines, page 8-4](#)
- [Setting the SDM Template, page 8-5](#)

Default SDM Template

The default template is the default Switch Database Management (SDM) desktop template.

SDM Template Configuration Guidelines

Follow these guidelines when selecting and configuring 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. To prevent other features from using the memory allocated to unicast routing in the routing template, use the **sdm prefer routing** global configuration command.
- If you try to configure IPv6 without first selecting a *dual* IPv4 and IPv6 template, a warning message appears.
- Using the dual stack template results in less hardware capacity allowed for each resource, so do not use it if you plan to forward only IPv4 traffic.
- Use the indirect-ipv4-and-ipv6-routing template to provide more space for IPv4 and IPv6 summary or indirect routes by providing less space for IPv4 policy-based routing entries and IPv6 ACL, QoS, and policy-based routes.

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	configure terminal	Enter global configuration mode.
Step 2	sdm prefer {access default dual-ipv4-and-ipv6 {default routing vlan} indirect-ipv4-and-ipv6-routing routing vlan}	<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—Maximize system resources for ACLs. • default—Give 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. • indirect-ipv4-and-ipv6-routing—Maximize IPv4 and IPv6 entries for indirect routes. • routing—Maximize routing on the switch. • vlan—Maximize VLAN configuration on the switch with no routing supported in hardware. <p>Use the no sdm prefer command to reset the switch to the default desktop template. The default template balances the use of system resources.</p>
Step 3	end	Return to privileged EXEC mode.
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 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 igmp groups + multicast routes: 1K
number of unicast routes:                 11K
number of directly connected hosts:       3K
number of indirect routes:                8K
number of qos aces:                       0.5K
number of 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:

```
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.

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

This is an example of output from the **show sdm prefer** command that displays 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 igmp groups + multicast routes: 1K
number of unicast routes:                 8K
number of directly connected hosts:       6K
number of indirect routes:                2K
number of policy based routing aces:      0
number of qos aces:                       0.5K
number of 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 igmp groups + multicast routes: 1K
number of unicast routes:                11K
    number of directly connected hosts:    3K
    number of indirect routes:             8K
number of policy based routing aces:      0.5K
number of qos aces:                      0.5K
number of security aces:                  1K
```

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

```
Switch# show sdm prefer dual-ipv4-and-ipv6 routing
The current template is "desktop IPv4 and IPv6 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:          1.5K
number of IPv4 IGMP groups + multicast routes: 1K
number of IPv4 unicast routes:            2.75K
    number of directly-connected IPv4 hosts: 1.5K
    number of indirect IPv4 routes:         1.25K
number of IPv6 multicast groups:          1K
number of directly-connected IPv6 addresses: 1.5K
number of indirect IPv6 unicast routes:    1.25K
number of IPv4 policy based routing aces:  0.25K
number of IPv4/MAC qos aces:               0.5K
number of IPv4/MAC security aces:          0.5K
number of IPv6 policy based routing aces:  0.25K
number of IPv6 qos aces:                   0.5K
number of IPv6 security aces:              0.5K
```