



Configuring SDM Templates

This chapter describes how to configure the Switch Database Management (SDM) templates on the Catalyst 3750 switch. Unless otherwise noted, the term *switch* refers to a standalone switch and 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 8-5](#)
- [Displaying the SDM Templates, page 8-7](#)

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 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:

- **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.
- **Access**—The access template maximizes system resources for access control lists (ACLs) to accommodate a large number of ACLs.

There are two versions of each template: a desktop template and an aggregator template. The Catalyst 3750-12S switch can use the larger TCAM size available in the aggregator templates or can use the standard desktop templates. All other Catalyst 3750 switches support only the desktop templates. If you do not enter the **desktop** keyword on an aggregator switch, the aggregator templates are selected.

Table 8-1 lists the approximate numbers of each resource supported in each of the three templates for a desktop or an aggregator switch.

Table 8-1 Approximate Number of Feature Resources Allowed by Each Template

Resource	Desktop Templates				Aggregator Templates			
	Access	Default	Routing	VLAN	Access	Default	Routing	VLAN
Unicast MAC addresses	4 K	6 K	3 K	12 K	6 K	6 K	6 K	12 K
IGMP groups and multicast routes	1 K	1 K	1 K	1 K	1 K	1 K	1 K	1 K
Unicast routes	6 K	8 K	11 K	0	12 K	12 K	20 K	0
• Directly connected hosts	4 K	6 K	3 K	0	6 K	6 K	6 K	0
• Indirect routes	2 K	2 K	8 K	0	6 K	6 K	14 K	0
Policy-based routing ACEs	512	0	512	0	512	0	512	0
QoS classification ACEs	512	512	512	512	896	896	512	896
Security ACEs	2 K	1 K	1 K	1 K	4 K	1 K	1 K	1 K
Layer 2 VLANs	1 K	1 K	1 K	1 K	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

If the switch stack is running the advanced IP services image, you can select SDM templates to support IP Version 6 (IPv6). For more information about IPv6 and how to configure IPv6 routing, see [Chapter 36, “Configuring IPv6 Unicast Routing.”](#)

This software release does not support IPv6 multicast routing and QoS. This release does support IPv6 Multicast Listener Discovery (MLD) snooping.

This software release does not support Policy-Based Routing (PBR) when forwarding IPv6 traffic. The software supports IPv4 PBR only when the **dual-ipv4-and-ipv6 routing** template is configured.



Note

Though visible in the command-line help strings for all switches, the **dual-ipv4-and-ipv6** option is only supported in the advanced IP services image.

The dual desktop and aggregator 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 TCAM 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:

- Desktop 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 desktop switches (all Catalyst 3750 switches except Catalyst 3750-12S).

- Desktop 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 desktop switches (all Catalyst 3750 switches except Catalyst 3750-12S).
- Desktop 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 desktop switches.
- Aggregator dual IPv4 and IPv6 default template—supports Layer 2, multicast, routing, QoS, and ACLs for IPv4, and Layer 2 and routing for IPv6 on Catalyst 3750-12S aggregator switches.
- Aggregator 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 Catalyst 3750-12S aggregator switches.
- Aggregator 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 Catalyst 3750-12S switches.

**Note**

An IPv4 route requires only one TCAM entry. Because of the hardware compression scheme used for IPv6, an IPv6 route can take more than one TCAM entry, reducing the number of entries forwarded in hardware. For example, for IPv6 directly connected IP addresses, the desktop template might allow less than two thousand entries.

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

Resource	Desktop Default	Desktop Routing	Desktop VLAN	Aggregator Default	Aggregator Routing	Aggregator VLAN
Unicast MAC addresses	2 K	1536	8 K	2 K	2K	8 K
IPv4 IGMP groups and multicast routes	1 K	1K	1 K	1 K	1K	0
Total IPv4 unicast routes:	3 K	2816	0	3 K	8K	0
• Directly connected IPv4 hosts	2 K	1536	0	2 K	2K	0
• Indirect IPv4 routes	1 K	1280	0	1 K	6K	1 K
IPv6 multicast groups	1 K	1152	1 K	1 K	2176	1 K
Total IPv6 unicast routes:	3 K	2816	0	3 K	8K	0
• Directly connected IPv6 addresses	2 K	1536	0	2 K	2K	0
• Indirect IPv6 unicast routes	1 K	1280	0	1 K	6K	0
IPv4 policy-based routing ACEs	0	256	0	0	512	0
IPv4 or MAC QoS ACEs (total)	512	512	512	876	896	876
IPv4 or MAC security ACEs (total)	1 K	512	1K	512	1K	1 K
IPv6 policy-based routing ACEs ¹	0	255	0	0	510	0
IPv6 QoS ACEs	510	510	510	876	510	876
IPv6 security ACEs	510	510	510	876	510	876

1. IPv6 policy-based routing is not supported.

SDM Templates and Switch Stacks

All stack members use the same SDM desktop or aggregator template that is stored on the stack master. When a new switch is added to a stack, as with the switch configuration and VLAN database files, 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 5, “Managing Switch Stacks.”](#)



Note

To select a dual stack template for IPv6 routing to work across the stack, all switches in the stack must be running the advanced IP services image.

If the stack master is a desktop switch and a Catalyst 3750-12S running the aggregator template is added as a stack member, the stack operates with the desktop template selected on the stack master. This could result in configuration losses on the Catalyst 3750-12S if the number of TCAM entries on it exceeds desktop template sizes.

If the stack master is a Catalyst 3750-12S switch using an aggregator template and a new stack member is not a Catalyst 3750-12S, the stack member is not able to support the template that is running on the stack master. The switch attempting to join the stack goes into SDM mismatch mode, the stack master does not attempt to change the SDM template, and the switch cannot be a functioning member of the stack.

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
-----  -
*2      Master    000a.fdfd.0100   5          Ready
4       Member    0003.fd63.9c00   5          SDM Mismatch
```

If the stack master is a Catalyst 3750-12S, changing the template can create these results:

- If you change the template from an aggregator template to a desktop template and reload the switch, the entire stack operates with the selected desktop template. This could cause configuration losses if the number of TCAM entries exceeds the desktop template sizes.
- If you change the template from a desktop template to an aggregator template and reload the switch, any desktop switches that were part of the stack go into the SDM mismatch mode. When this occurs, a syslog message is sent to the stack master indicating that a stack member has gone into the SDM mismatch mode and suggesting the steps to take to bring the switch out of the mismatch mode.

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 8-5](#)
- [SDM Template Configuration Guidelines, page 8-5](#)
- [Setting the SDM Template, page 8-6](#)

Default SDM Template

The default template for desktop switches is the default desktop template; the default template for the Catalyst 3750-12S is the default aggregator 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 [desktop]** 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 [desktop]** 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.

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} [desktop]</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. Visible on Catalyst 3750-12S switches to use with the desktop keyword to set the switch to the default desktop template. (Use the no sdm prefer command to set a desktop switch to the default desktop template or to set an aggregator switch to the default aggregator template.) • dual-ipv4-and-ipv6—Select a template that supports both IPv4 and IPv6 routing. (This option is visible on all switches but supported only when the stack switch is running the advanced IP services image.) <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. • desktop—Supported only on Catalyst 3750-12S switches. Sets the switch to the default, routing, or VLAN desktop template. <p>The default templates balance the use of system resources.</p>
Step 3	<code>end</code>	Return to privileged EXEC mode.
Step 4	<code>reload</code>	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: 512
number of security aces: 1K

```

On next reload, template will be "aggregate routing" 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 (the desktop routing template for a desktop switch or the aggregator routing template for a Catalyst 3750-12S).

```

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

```

This example shows how to configure the desktop routing template on a Catalyst 3750-12S switch:

```

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

```

This example shows how to configure the IPv4-and-IPv6 default template on a desktop 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 [desktop]]** privileged EXEC command to display the resource numbers supported by the specified template.



Note

The **desktop** keyword is available only on Catalyst 3750-12S aggregator switches.

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 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: 512
number of security aces: 1K

```

This is an example of output from the **show sdm prefer routing** command entered on an aggregator switch:

```
Switch# show sdm prefer routing
"aggregate 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:          6K
number of igmp groups + multicast routes: 1K
number of unicast routes:                20K
  number of directly connected hosts:     6K
  number of indirect routes:              14K
number of policy based routing aces:      512
number of qos aces:                       512
number of security aces:                  1K
```

This is an example of output from the **show sdm prefer routing** command entered on a desktop switch:

```
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:      512
number of qos aces:                       512
number of security aces:                  1K
```

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

```
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:         1K
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:             512
number of IPv4/MAC security aces:        1K
number of IPv6 policy based routing aces: 0
number of IPv6 qos aces:                  510
number of IPv6 security aces:            510
```