



Configuring QoS TCAM Carving

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About QoS TCAM Carving

You can change the size of the access control list (ACL) ternary content addressable memory (TCAM) regions in the hardware. Both ingress and egress TCAM regions can be altered.

Ingress TCAM Region Features

Ingress TCAM regions are comprised of the following layout and sizes:

- Total TCAM size: 3.5K, 80 bit wide
- Total Counters: 3.5K
- Configurable width: 80 bit, 160 bit, 320 bit
- Configurable depth: 128, 256 or multiples of 256
- Max lookup: 10

For ingress TCAM, there are three logical QoS regions:

- `ing-12-qos`
- `ing-13-vlan-qos`
- `ing-12-13-qos`

For carving the above three regions, the following limitations apply:

- If you carve `ing-12-13-qos`, then `ing-12-qos` or `ing-13-vlan-qos` cannot be carved.
- If you carve `ing-12-qos` and `ing-13-vlan-qos`, each of these two logical regions matches to a separate physical TCAM region.

Table 1: Ingress TCAM Specifications

Feature	Width	Lookup	Default Carving
PACL MAC	160 bit	1	No
PACL IPv4	160 bit	1	No
PACL IPv6	320 bit	2	No
RACL IPv4	160 bit	1	Yes (size: 256)
RACL IPv4 UDF	320 bit	2	No
RACL IPv6	320 bit	2	No
VACL MAC	160 bit	1	No
VACL IPv4	160 bit	1	No
VACL IPv6	320 bit	2	No
L2 QoS	320 bit	2	No
L3-VLAN QoS	320 bit	2	Yes (size: 128)
L2-L3 QoS	320	2	No
SPAN	160 bit	1	Yes (size: 128)
SUP	320 bit	2	No
VPC Convergence	80 bit	1	No
Storm Control	80	1	Yes (size: 256)

Egress TCAM Region Features

Egress TCAM regions are comprised of the following layout and sizes:

- Total TCAM size: 1.5K, 80 bit wide
- Total Counters: 1.5K
- Configurable width: 80 bit, 160 bit, 320 bit
- Configurable depth: 128, 256 or multiples of 256
- Max lookup: 4

Table 2: Egress TCAM Specifications

Feature	Width	Lookup	Default Carving
RACL IPv4	160 bit	1	No
RACL IPv6	320 bit	2	No

Feature	Width	Lookup	Default Carving
VACL MAC	160 bit	1	No
VACL IPv4	160 bit	1	No
VACL IPv6	320 bit	2	No
L2 QoS	160 bit	2	No
L3 VLAN QoS	160 bit	2	No
PFC Counter	80 bit	1	Yes (size: 256)

You must save the configuration and reload the system for the region configuration to become effective.

Guidelines and Limitations for QoS TCAM Carving



Note For scale information, see the release-specific *Cisco Nexus 3400-S NX-OS Verified Scalability Guide*.

TCAM carving has the following guidelines and limitations:

- Egress QoS features are not supported. Therefore, egress QoS TCAM carving is blocked.
- **show** commands with the **internal** keyword are not supported.
- After TCAM carving, you must save the configuration and reload the switch.
- Use the **show hardware access-list tcam region** command to view the configured TCAM region size.
- TCAM templates are not supported.

Configuring QoS TCAM Carving

You can change the default QoS TCAM carving to accommodate your network requirements. The following sections contain examples of how to change the default QoS TCAM carving.

SUMMARY STEPS

1. **show hardware access-list tcam region**
2. **hardware access-list tcam region** {e-ipv6-racl | e-racl | eor-l2-qos | egr-l3-vlan | ifacl | ing-l2-qos | ing-l3-vlan-qos | ing-sup | ipv6-ifacl | ipv6-racl | ipv6-vacl | mac-ifacl | mac-vacl racl | span | vacl | vpc-convergence } *tcam-size*
3. **hardware access-list tcam region** {e-ipv6-racl | e-racl | eor-l2-qos | egr-l3-vlan | ifacl | ing-l2-qos | ing-l3-vlan-qos | ing-sup | ipv6-ifacl | ipv6-racl | ipv6-vacl | mac-ifacl | mac-vacl racl | span | vacl | vpc-convergence } *tcam-size*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>show hardware access-list tcam region</p> <p>Example:</p> <pre>switch# show hardware access-list tcam region IPV4 PAcl [ifacl] size = 0 IPV6 PAcl [ipv6-ifacl] size = 0 MAC PAcl [mac-ifacl] size = 0 IPV4 VAcl [vacl] size = 0 IPV6 VAcl [ipv6-vacl] size = 0 MAC VAcl [mac-vacl] size = 0 IPV4 RAcl [racl] size = 256 IPV6 RAcl [ipv6-racl] size = 0 Egress IPV4 RAcl [e-racl] size = 0 Egress IPV6 RAcl [e-ipv6-racl] size = 0 SPAN [span] size = 0 VPC Convergence/ES-Multi Home [vpc-convergence] size = 0 Ingress L2 QOS [ing-l2-qos] size = 0 Ingress L3/VLAN QOS [ing-l3-vlan-qos] size = 128 Ingress SUP [ing-sup] size = 256 Egress L2 QOS [egr-l2-qos] size = 0 Egress L3/VLAN QOS [egr-l3-vlan-qos] size = 0</pre>	View the current size of all TCAM regions. This shows the regions you can reduce so you can increase another region.
Step 2	<p>hardware access-list tcam region {e-ipv6-racl e-racl eor-l2-qos egr-l3-vlan ifacl ing-l2-qos ing-l3-vlan-qos ing-sup ipv6-ifacl ipv6-racl ipv6-vacl mac-ifacl mac-vacl racl span vacl vpc-convergence } tcam-size</p> <p>Example:</p> <pre>switch(config)# hardware access-list tcam region ipv6-racl 128 Warning: Please save config and reload the system for the configuration to take effect switch(config)#</pre>	To enable carving of another TCAM region, specify a region to free up resources. Also specify the reduced TCAM size for the region.
Step 3	<p>hardware access-list tcam region {e-ipv6-racl e-racl eor-l2-qos egr-l3-vlan ifacl ing-l2-qos ing-l3-vlan-qos ing-sup ipv6-ifacl ipv6-racl ipv6-vacl mac-ifacl mac-vacl racl span vacl vpc-convergence } tcam-size</p> <p>Example:</p>	To carve a TCAM region, specify the region and the TCAM size (the size you freed up in the previous step) for the region.

	Command or Action	Purpose
	<pre>switch(config)# hardware access-list tcam region vacl 128 Warning: Please save config and reload the system for the configuration to take effect switch(config)#</pre>	

Verifying QoS TCAM Carving

After you adjust the TCAM region sizes, enter the **show hardware access-list tcam region** command to display the TCAM sizes that will be applicable on the next reload of the device.



Note To keep all modules synchronized, you must reload all line card modules or enter the **copy running-config startup-config** command and the **reload** command to reload the device. Multiple TCAM region configurations require only a single reload. You can wait until you complete all of your TCAM region configurations before you reload the device.

If you exceed the 4K ingress limit for all TCAM regions when you configure a TCAM region, the following message appears:

```
ERROR: Aggregate TCAM region configuration exceeded the available Ingress TCAM space.
Please re-configure.
```

If TCAM for a particular feature is not configured and you try to apply a feature that requires TCAM carving, the following message appears:

```
ERROR: Module x returned status: TCAM region is not configured. Please configure TCAM
region and retry the command.
```

