Graceful Handling of Out of Resource Situations

Table 1: Feature History Table

Feature Name	Release Information	Description
Extending Graceful Handling of Out of Resource (OOR) Situations for SR-TE traffic	Release 7.3.3	This release extends the graceful handling of dropped traffic in an out-of-resource situation to SR-TE traffic. Modified command: • show controllers npu resources
Extending Graceful Handling of Out of Resource (OOR) Situations for GRE and MPLS traffic	Release 7.3.2	This release extends the graceful handling of dropped traffic in an out-of-resource situation to GRE and MPLS-enabled traffic. Modified command: • show controllers npu resources
Graceful Handling of Out of Resource (OOR) Situations	Release 7.3.1	This feature enables you to resend any traffic that was dropped during an OOR situation. This enables better monitoring and management of failed traffic. Commands introduced and modified are: • oor hw • show controllers npu resources

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Graceful Handling of Out of Resource Situations Overview

OOR situations occur when the network is unable to handle the overload of traffic. It can lead to traffic loss. Graceful handling of OOR situations denotes the router recovers without any traffic loss of unaffected traffic. The recovery of unaffected traffic occurs when the OOR situation is cleared.

When a router reaches the OOR state, you release traffic with few prefixes to reduce the utilization of hardware and SDK resources. You can release traffic with the help of a traffic generator. With the reduced utilization of hardware and SDK resources, the router comes out of the OOR state. After the router is out of the OOR state, you can reinject the traffic that you had released. You can reinject the traffic with the help of traffic generator in a favorable way. You can control the monitoring and resending of failed traffic and gracefully handle OOR situations.

The **OOR State** in the output of the **show controllers npu resources** command changes when the router reaches an OOR situation due to heavy traffic or extreme utilization of hardware and SDK resources. The **OOR State** changes from **Green** to **Yellow**, and finally to **Red**. When the **OOR State** reaches **Red**, the Syslog in the router generates a notification and sends it to the end user.

The different **OOR State** signifies the following:

- **Green**: Favorable utilization of hardware and SDK resources
- **Yellow**: Router is advancing toward the OOR state
- **Red**: Router has reached the OOR state

You can configure the threshold value at which a router reaches the **OOR Red** or **Yellow** states by using the **oor hw** command.

The default values for OOR states are as follows:

- The **Yellow** state occurs when 80% of the router's hardware and SDK resources are utilized.
- The **Red** state occurs when 95% of the router's hardware and SDK resources are utilized.

For more information, see **oor hw** command in the chapter *Graceful Handling of OOR Situations Commands* of *System Monitoring Command Reference for Cisco 8000 Series Routers*.

You can use the **show controllers npu resources** command to view the status of utilization of hardware and Software Development Kit (SDK) resources:

Table 2: NPU Resources per Traffic Type

Traffic Type	NPU Resource
IPv4/IPv6	• lpmtcam • centralem • stage1lbgroup • stage1lbmember • stage2lbgroup • stage2lbmember

Traffic Type	NPU Resource
MPLS	• egresslargeencap • centralem
GRE	• egresslargeencap • sipidxtbl • myipv4tbl • tunneltermination
SR-TE	• counterbank • egresslargeencap • egresssmallencap • stage1lbgroup • stage1lbmember • stage2lbgroup • stage2lbmember

Restrictions

Graceful handling of OOR situations is only supported for IPv4, IPv6, MPLS, SR-TE, and GRE traffic.

Configuration

To configure OOR limits, use the **oor hw** command.

```
Router(config)#oor hw threshold red 96
Router(config)#oor hw threshold yellow 85
Router(config)#commit
```

Verification

To verify the OOR state of a router, use the **show logging | inc OOR** command.

```
Router# show logging | inc OOR
Wed Jan 6 23:36:34.138 EST
LC/0/0/CPU0:Jan 6 23:01:09.609 EST: npu_drvr[278]: %PLATFORM-OFA-4-OOR_YELLOW : NPU 1, Table
 nhgroup, Resource stage2_lb_group
LC/0/0/CPU0:Jan 6 23:01:29.655 EST: npu_drvr[278]: %PLATFORM-OFA-4-OOR_YELLOW : NPU 1, Table
 nhgroup, Resource stage2_lb_member
LC/0/0/CPU0:Jan 6 23:01:38.938 EST: npu_drvr[278]: %PLATFORM-OFA-1-OOR_RED : NPU 3, Table
nhgroup, Resource stage2_lb_group
```

To verify the NPU resource utilization for GRE traffic of a router, use the **show controllers npu resources** command.

```
Router# show controllers npu resources lpmtcam location 0/0/CPU0
Thu Dec 17 11:43:06.931 EST
HW Resource Information
```

```
    Name                            : lpm_tcam
    Asic Type                       : Pacific

NPU-0
OOR Summary
        Estimated Max Entries    : 100
        Red Threshold            : 95 % >>> shows the threshold for OOR Status Red
        Yellow Threshold         : 80 % >>> shows the threshold for OOR Status Yellow
        OOR State                : Red >>> shows that the OOR status is Red
        OOR State Change Time    : 2020.Dec.17 09:53:02 EST >>> shows the time at which OOR
 status changed to Red
```

Note The IP BGP ECMP over BVI uses *stage2lbgroup* and *stage2lbmember* NPU resources. You can use the following commands to monitor the total in-use values for resource utilization. The *nhgroup* value in the command outputs does not mean the hardware resource usage value. Please refer to the *Total In-Use* value to get the current hardware resource usage.

- **show controllers npu resources stage2lbgroup location** <*location*>

  For example,

  ```
  Router# show controllers npu resources stage2lbgroup location location all
  ```

- **show controllers npu resources stage2lbmember location** <*location*>

  For example,

  ```
  Router# show controllers npu resources stage2lbmember location location all
  ```