



# 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: <ul style="list-style-type: none"> <li>• <a href="#">show controllers npu resources</a></li> </ul>
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: <ul style="list-style-type: none"> <li>• <a href="#">show controllers npu resources</a></li> </ul>
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: <ul style="list-style-type: none"> <li>• <a href="#">oor hw</a></li> <li>• <a href="#">show controllers npu resources</a></li> </ul>

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# Graceful Handling of Out of Resource Situations Overview

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

When a router reaches the OOB 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 OOB state. After the router is out of the OOB 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 OOB situations.

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

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

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

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

The default values for OOB 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 OOB 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	<ul style="list-style-type: none"> <li>• lpmcam</li> <li>• centalem</li> <li>• stage1lbgroun</li> <li>• stage1lbmember</li> <li>• stage2lbgroun</li> <li>• stage2lbmember</li> </ul>

Traffic Type	NPU Resource
MPLS	<ul style="list-style-type: none"> <li>• egresslargeencap</li> <li>• centralem</li> </ul>
GRE	<ul style="list-style-type: none"> <li>• egresslargeencap</li> <li>• sipidxtbl</li> <li>• myipv4tbl</li> <li>• tunneltermination</li> </ul>
SR-TE	<ul style="list-style-type: none"> <li>• counterbank</li> <li>• egresslargeencap</li> <li>• egresssmallencap</li> <li>• stage1lbgroup</li> <li>• stage1lbmember</li> <li>• stage2lbgroup</li> <li>• stage2lbmember</li> </ul>

### 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

```




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**Note** The IP BGP ECMP over BVI uses *stage2lbgrou*p 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 stage2lbgrou**p location <location>

For example,

```
Router# show controllers npu resources stage2lbgrou
```

p location location all

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

For example,

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

 location location all

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