

# Upstream Traffic Shaping Feature

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## Feature Overview

This feature allows the cable modem termination system (CMTS) to perform upstream rate shaping on the DOCSIS (Data-Over-Cable Service Interface Specifications) upstream channel.

## Benefits

With traffic shaping, the CMTS can buffer the grants for rate exceeded modems. This grant buffering at the CMTS avoids TCP-related timeouts and retransmits resulting in an improved TCP throughput performance for the rate-exceeded modems. Thus, shaping enables the CMTS to enforce the peak upstream rate for the modem without degrading overall TCP performance for the modem.

When users do not enable the shaping option for upstream rate limiting, the CMTS upstream-rate-policing code drops bandwidth requests from cable modems that are found to have exceeded their configured-peak-upstream rate (using different local drop policies). The effect of bandwidth requests (eventually upstream packets) being dropped causes degraded throughput performance of window-based protocols (like TCP) for these rate-exceeded modems because of the timeouts and retransmits that follow.

## Supported Platforms

uBR7200

## Supported MIBs and RFCs

None

## Configuration Tasks

Perform the following tasks to configure shaping on the upstream channel.

- Configuring Shaping
- Verifying Shaping

## Configuring Shaping

Step	Command	Purpose
1	Router(config)# <b>interface cable</b> <i>slot/port</i>	Enters the interface configuration mode for a cable interface.
2	Router(config-if)# <b>cable</b> <i>slot/port</i> <b>rate-limit</b> <b>token-bucket</b> <b>shaping</b>	Enables grant shaping on the upstream channel.
3	Router(config-if)# <b>^Z</b> Router#	Exits back to the EXEC mode, so that you can verify the steps.

## Verifying Shaping

Perform the following tasks to verify that shaping is enabled on the upstream channel:

**Step 1** Configure a low-peak upstream-rate limit for the cable modem in its qos profile. Either use the command line interface to modify the modem's qos profile, or edit the modem's tftp config file.

**Step 2** Use a regular rate-limiting algorithm on the upstream without rate shaping and see the drops of the excess bandwidth requests from this cable modem when it exceeds its peak upstream rate.

Use the `show interface cx/y sid` counters to see the bandwidth request drops. See that the upstream rate received by that modem is in fact less than its configured-peak rate due to the timeouts and backoffs produced by the drop in bandwidth requests. Enter the `show interface cx/y sid` command to see the input rate at CMTS in bps.

**Step 3** Enable grant shaping on the upstream channel by using the new **shaping** keyword extension to the token-bucket algorithm command line interface.

**Step 4** Make the cable modem exceed its peak upstream rate by generating lots of upstream traffic and see the effect of grant buffering (shaping) at the CMTS. If you use cable modem-to-CMTS pings, you will see a perceivable slowing down of the pings.

Let the pings run for a while (to let averages at CMTS settle); then, see the upstream rate received by this single modem. Use the `show interface cx/y` command and see the input rate in bps. This value should be close to the modem's peak-upstream rate. Also see the drop counts for the modem's Sid by using the `show interface sid counters` command and see that CMTS no longer drops the bandwidth requests from the cable modem.

The bandwidth request drop count (from previous non-shaping test) remains unchanged when upstream-rate shaping is used indicating that CMTS is actually shaping (buffering) the grants for the modem. See that the input rate at CMTS (from the single rate exceeded CM) stabilizes close to the configured-peak rate of 128 Kbps.





## Forcing the Cable Modem to Exceed the Peak Rate

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Sid	Inpackets	Inoctets	Outpackets	Outoctets	Ratelimit BWReqDrop	Ratelimit DSPktDrop
1	4780	6996880	4774	6987772	6244	0

Router# **show int c3/0 sid counters**

Sid	Inpackets	Inoctets	Outpackets	Outoctets	Ratelimit BWReqDrop	Ratelimit DSPktDrop
1	4866	7122488	4865	7120970	6244	0

## Command Reference

- `cable upstream rate-limit`

## cable upstream rate-limit

To set DOCSIS rate limiting for an upstream port on a cable modem card, use the **cable upstream rate-limit** interface configuration command. Use the **no** form of this command to disable DOCSIS rate limiting for an upstream port on a cable modem card:

```
cable upstream portnum rate-limit [token-bucket [shaping]]
no cable upstream portnum rate-limit
```

### Syntax Description

<i>portnum</i>	Specifies the upstream port.
<b>token-bucket</b>	(Optional) Applies the token bucket filter algorithm.
<b>shaping</b>	(Optional) Enables traffic shaping on the upstream channel.

### Default

The rate limit of the cable upstream port with grant shaping.

### Command Mode

Interface configuration

### Command History

Release	Modification
11.3(6)NA	This command was first introduced.
11.3(9)NA	The <b>shaping</b> keyword was added.

### Usage Guidelines

Use of the default value (the upstream port's rate limit) enforces strict DOCSIS-compliant rate limiting. The shaping option cannot be used without the token-bucket option.

### Example

The following example uses the token bucket filter algorithm and turns on grant shaping for upstream port 4:

```
Router(config-if)# cable upstream 4 rate-limit token-bucket shaping
```

### Related Commands

Command	Description
<b>cable downstream rate-limit</b>	Enables DOCSIS rate limiting on downstream traffic.

