



High Priority Traffic Jitter Improvement for Cisco 12000 Series Router, Cisco 12000 SIP-400, Shared Port Adapters

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Feature History

Release	Modification
12.0(32)S	This feature was introduced on the Cisco 12000 series router, Cisco 12000 SIP-400, Shared Port Adapters (SPAs).

This feature module provides information on High Priority Traffic Jitter Improvement in the following sections:

- [High Priority Traffic Jitter Improvement Feature Overview](#)
- [Supported Platforms](#)
- [Supported Standards, MIBs, and RFCs](#)
- [Prerequisites](#)
- [Configuration Tasks](#)
- [Command Reference](#)
- [Glossary](#)

High Priority Traffic Jitter Improvement Feature Overview

The High Priority Traffic Jitter Improvement feature reduces latency variation (jitter) on the Cisco 12000 SIP-400, Shared Port Adapters (SPAs) by separating back pressure signaling from the SPAs towards the queuing ASIC for high and low priority traffic. This mechanism ensures that high priority traffic will not be delayed by congesting low priority traffic. The independent back pressure signaling is effected by separating out the high priority and low priority traffic into independent ports on the queuing ASIC—one for each.



Note

We recommend that you police high priority traffic and define small queue-limit to ensure minimal latency variation (jitter).

Latency Variation (Jitter) Calculation

The High Priority Traffic Jitter Improvement feature limits worst case latency variation (jitter) to the sum of all of the following calculations:

- Fragment line delay: $\langle \text{fragment size} \rangle * 8 / \langle \text{channel linerate} \rangle$
- HDLC controller back pressure threshold for high priority traffic delay: $128 * 8 / \langle \text{channel linerate} \rangle$
- Engine queuing delay: $\langle \text{L2 frame size} \rangle * \langle \text{queue-limit in packets} \rangle * 8 / \langle \text{(sub) interface rate} \rangle$
- Egress queuing ASIC port scheduling delay: 4 ms
- Egress queuing ASIC token refill delay: 0.5 ms

The following example shows the worst case calculation for:

- 128 fragment size
- 128 kbps channel line-rate
- Flat service policy (Frame Relay subinterface rate is equal to the channel line-rate)
- High Priority frame size 72 bytes L2
- Queue-limit one packet

Fragment line delay: $128 * 8 / 128000 = 8 \text{ ms}$

HDLC controller back pressure threshold for HP traffic delay: $128 * 8 / 128000 = 8 \text{ ms}$

Engine queuing delay: $72 * 1 * 8 / 128000 = 4.5 \text{ ms}$

Egress queuing ASIC port scheduling delay: 4 ms

Egress queuing ASIC token refill delay: 0.5 ms

Max jitter: $8 \text{ ms} + 8 \text{ ms} + 4.5 \text{ ms} + 4 \text{ ms} + 0.5 \text{ ms} = 25 \text{ ms}$



Note

For channel line-rates above 128 kbps, the worst case latency variation (jitter) could, theoretically, amount to the sum of all five factors in the latency variation calculation; however, testing shows that only the first factor—fragmentation delay—is significant.

Benefits

The High Priority Traffic Jitter Improvement feature reduces latency and latency variation (jitter) for high priority traffic.

Cisco IOS Modular Quality of Service CLI configuration is backward compatible.

Restrictions

Scalability

For the L3nCnD QoS model, each Frame Relay subinterface configured with the High Priority Traffic Jitter Improvement feature requires 2 ports, which reduces by half the number of Frame Relay subinterfaces available when all Frame Relay subinterfaces are configured.

Related Features and Technologies

Cisco IOS Quality of Service (QoS) solutions for Cisco 12000 series routers

Related Documents

For information on configuring multicast traffic, refer to *Cisco 12000 Series Router Configuration Guide for Cisco IOS Release 12.0S*.

Also refer to the installation and configuration guide for a specific Cisco 12000 series router.

Supported Platforms

The High Priority Traffic Jitter Improvement feature is supported on the following Cisco 12000 series router, Integrated Services Engine (ISE), Shared Port Adapters (SPAs) running Cisco IOS Release 12.0(32)S:

- 2-port channelized T3 SPA
- 4-port channelized T3 serial SPA

1CnD and nCnD QoS models are supported.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Supported Standards, MIBs, and RFCs

Standards

No new or modified standards are supported, and support for existing standards has not been modified.

MIBs

No new or modified MIBs are supported, and support for existing MIBs has not been modified.

RFCs

No new or modified RFCs are supported, and support for existing RFCs has not been modified.

Prerequisites

No prerequisites are required for this feature.

Configuration Tasks

See the following sections for configuration tasks for the High Priority Traffic Jitter Improvement feature.

- [Configuring High Priority Traffic Jitter Improvement](#)
- [Monitoring High Priority Traffic Jitter Improvement](#)

Configuring High Priority Traffic Jitter Improvement

This configuration procedure shows how to configure the High Priority Traffic Jitter Improvement feature for a Frame Relay subinterface on a 128 kbps channel line-rate, using a flat service policy.

In Step 2 :

- **police cir 64000** is 50 percent of channel line-rate
- **queue-limit 1** is approximately 10ms for a 72B Layer 2 frame on a priority channel policed to 64kbps.

Step 1 Identify high priority traffic:

```
Router#
Router#config t
Router (config)#class-map match-any voice-ip
Router (config-cmap)#match ip dscp 63
Router (config-cmap)#match ip precedence 7
Router (config-cmap)#exit
Router (config)#
```

Step 2 Mark high priority traffic

```
Router (config)#policy-map Low-Latency
```



Note

We recommend that you police high priority traffic and define small queue-limit to ensure minimal latency variation (jitter).

```
Router (config-pmap)#class voice-ip
Router (config-pmap-c)#priority
Router (config-pmap-c)#police cir 64000
Router (config-pmap-c)#queue-limit 1
Router (config-pmap-c)#exit
Router (config-pmap)#exit
Router (config)#
```

Step 3 Specify the fragmentation policy:

```
Router (config)#map-class frame-relay LFI
Router (config-cmap)#frame-relay fragment 128
Router (config-cmap)#exit
Router (config)#
```

Step 4 Create Frame Relay interface:

```
Router (config)#interface Serial12/0.1/1:0
Router (config-if)#no ip address
Router (config-if)#encapsulation frame-relay
Router (config-if)#exit
Router (config)#
```

Step 5 Create Frame Relay subinterface, enable fragmentation, and attach service policy

```
Router (config)#interface Serial12/0.1/1:0.1
Router (config-if)#ip address 2.1.1.1 255.255.255.0
Router (config-if)#frame-relay interface-dlci 16
Router (config-fr-dlci)#class LFI
Router (config-subif)#service-policy output Low-Latency
Router (config-subif)#exit
```

Monitoring High Priority Traffic Jitter Improvement

Use the following show commands to monitor and troubleshoot High Priority Traffic Jitter Improvement.

Command	Purpose
Router# show policy interface	Displays detailed policy mapping information.
Router# show class-map	Displays class-map information.
Router# show policy-map	Displays policy-map information.

Command Reference

No new or modified CLI commands were introduced for the High Priority Traffic Jitter Improvement feature in Cisco IOS Release 12.0(32)S.

Glossary

ISE	Integrated Services Engine
LFI	Link Fragmentation Interleave. Reassembly procedure based on FRF.12
QoS	Quality of Service. Measure of performance for a transmission system that reflects its transmission quality and service availability.
RED	Random Early Detection
SPA	Shared port adapter. A SPA is a modular, platform-independent port adapter that inserts into a subslot of a compatible SIP carrier card to provide network connectivity and increased interface port density. The SPA provides the interface between the network and the SIP.
WRED	Weighted Random Early Detection. Queueing method that ensures that high-precedence traffic has lower loss rates than other traffic during times of congestion.

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