

# 在Cisco 7500系列上采用分布式QoS的帧中继流量整形

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## 简介

本文阐明了在具有通用接口处理器(VIP)的Cisco 7500系列路由器上和其他平台上将流量整形应用于帧中继接口之间的区别。其他平台包括Cisco 7200、3600和2600系列路由器。

## 先决条件

### 要求

本文档没有任何特定的要求。

### 使用的组件

本文档不限于特定的软件和硬件版本。

### 规则

有关文件规则的更多信息请参见“Cisco技术提示规则”。

## 背景信息

自Cisco IOS®软件版本12.1(5)T起，服务质量(QoS)策略必须在VIP的分布式模式下运行；不再支持基于路由交换处理器(RSP)的QoS。因此，您必须使用模块化QoS命令行界面(MQC)的shape命令和其他命令，以便在Cisco 7500系列的VIP上为帧中继接口实施分布式流量整形(DTS)。DTS将通用流量整形(GTS)和帧中继流量整形（帧中继TS）相结合。有关配置[示例](#)，请[参阅](#)配置分布式流量整形

。

下表说明了如何配置帧中继TS，具体取决于平台：

	7500 系列	7200、3600、2600和其他非VIP平台
支持的整形机制	DTS	帧中继TS
配置命令	shape命令	主接口上的帧中继流量整形；map-class配置命令以指定整形参数
需要dCEF <sup>1</sup>	是(使用show cef linecard命令验证。)	无

<sup>1</sup> dCEF =分布式思科快速转发

**注意：**在Cisco 7500系列上，由于帧中继TS仅在非分布式模式下执行RSP，因此现在无法通过frame-relay traffic-shaping命令配置帧中继TS。使用dCEF和帧中继TS时，CEF“punt”邻接关系会导致RSP快速交换所有数据包，这对于最大转发性能而言是次优的。

## 配置步骤

使用以下步骤在基于VIP的帧中继接口上配置DTS:

1. 使用以下命令启用dCEF:

```
router(config)# ip cef distributed
```

2. 确保已为分布式交换启用帧中继接口。

```
router(config-if)# interface serial 8/0/0
router(config-if)# ip route-cache distributed
```

```
router# show ip interface serial 8/0/0
Serial8/0/0 is up, line protocol is up
Internet address is 24.0.0.2/24
Broadcast address is 255.255.255.255
!--- Output suppressed. ICMP redirects are always sent ICMP unreachable are always sent
ICMP mask replies are never sent IP fast switching is enabled IP fast switching on the same
interface is disabled IP Flow switching is disabled IP CEF switching is enabled IP
Distributed switching is enabled
IP Fast switching turbo vector
IP CEF switching with tag imposition turbo vector
IP multicast fast switching is enabled
IP multicast distributed fast switching is disabled
IP route-cache flags are Fast, Distributed, CEF
Router Discovery is disabled
IP output packet accounting is disabled
```

3. 创建服务策略并将其应用于映射类。您可以实施以下策略之一：**单级策略** — 将整形参数应用于虚电路(VC)**流量分层策略** — 应用具有“父”级整形和“子”级排队的两级策略有关详细信息，[请参阅将流量策略作为QoS策略 \( 分层流量策略 \)](#) 示例。**注意：**虽然Cisco IOS软件版本12.1(2)T在Cisco 7500系列以外的平台上引入了对低延迟队列(LLQ)的支持，但VIP上的Cisco IOS软件版本12.1(5)T中引入了分布式LLQ(dLLQ)。分布式版本增强了此功能的性能。您可以

为每个数据链路连接标识符(DLCI)配置唯一的服务策略。您不需要使用映射类。您可以直接将 **service-policy** 命令应用到子接口或DLCI。但是，在映射类内配置dLLQ。

4. 使用以下命令验证服务策略的正确操作：**show policy-map interfaceshow interface shapeshow vip full-qos**

## FRF.12 与 DTS

Cisco IOS软件版本12.1(5)T引入了分布式版本的帧中继分段FRF.12。将分布式FRF.12应用到帧中继接口时，必须定义映射类并在映射类下应用服务策略。如果尝试配置映射类并将服务策略直接应用到接口，则路由器会在启用日志记录控制台的情况下报告**此错误消息**：

```
Frame Relay fragmentation works with dTS only.  
Please remove traffic-shaping from the interface serial 1/0/0
```

本节中的配置和配置验证命令已在运行Cisco IOS软件版本12.2(5)T的Cisco 7500系列路由器 (在RSP 8上) 上进行测试。

**注意：**有关[选择分段值的详细信息](#)，请参阅具有[服务质量\(分段、流量整形、LLQ/IP RTP优先级\)](#)的帧中继VoIP。

### DTS和FRF.12的示例配置

```
interface Ethernet4/1/3  
 ip address 10.122.3.206 255.255.255.0  
!  
interface Serial5/0/0:0  
 no ip address  
 encapsulation frame-relay  
 load-interval 30  
 no fair-queue  
!--- Do not configure frame-relay traffic-shaping.  
!  
interface Serial5/0/0:0.1 point-to-point  
 ip address 10.1.1.2 255.255.255.0  
 frame-relay interface-dlci 16  
 class test  
 frame-relay ip rtp header-compression  
!  
map-class frame-relay test  
 no frame-relay adaptive-shaping  
 service-policy output llq-shape  
 frame-relay fragment 120  
!--- Apply the frame-relay fragment command to the !---  
Frame Relay map class.  
  
 access-list 101 permit udp any range 16384 32767 any  
 range 16384 32767
```

```
MS-7507-8A# show ip rtp head  
RTP/UDP/IP header compression statistics:  
DLCI 16 Link/Destination info: point-to-point dlci  
Interface Serial5/0/0:0:  
Distributed fast switched:  
4 seconds since line card sent last stats update  
Rcvd: 105475 total, 105472 compressed, 0 errors  
0 dropped, 0 buffer copies, 0 buffer failures  
Sent: 99451 total, 99447 compressed,
```

3776208 bytes saved, 2187963 bytes sent  
2.72 efficiency improvement factor  
Connect: 256 rx slots, 256 tx slots,  
0 long searches, 3 misses 0 collisions, 0 negative cache hits  
99% hit ratio, five minute miss rate 0 misses/sec, 0 max

MS-7507-8A# **show policy-map**

Policy Map llq-shape  
Class class-default  
  shape peak 256000 1024 1024  
  service-policy llq  
Policy Map llq  
Class voip  
  priority percent 50

MS-7507-8A# **show policy-map interface s 5/0/0:0.1**

Serial5/0/0:0.1: DLCI 16 -  
Service-policy output: llq-shape  
  queue stats for all priority classes:  
  queue size 0, queue limit 32  
  packets output 147008, packet drops 0  
  tail/random drops 0, no buffer drops 0, other drops 0  
Class-map: class-default (match-any)  
  148237 packets, 10393582 bytes  
  30 second offered rate 24000 bps, drop rate 0 bps  
Match: any  
  queue size 0, queue limit 64  
  packets output 149563, packet drops 0  
  tail/random drops 0, no buffer drops 0, other drops 0  
Shape: cir 256000, Bc 1024, Be 1024  
  lower bound cir 0, adapt to fecn 0  
  output bytes 6972057, shape rate 10000 bps  
Service-policy : llq  
  Class-map: voip (match-all)  
  146701 packets, 10325334 bytes  
  30 second offered rate 24000 bps, drop rate 0 bps  
  Match: access-group 101  
  Priority: 50% (128 kbps), burst bytes 3200, b/w  
  exceed drops: 0  
  Class-map: class-default (match-any)  
  1536 packets, 68248 bytes  
  30 second offered rate 0 bps, drop rate 0 bps  
  Match: any  
  queue size 0, queue limit 32  
  packets output 2555, packet drops 0  
  tail/random drops 0, no buffer drops 0, other drops 0

MS-7507-8A# **show frame pvc 16**

PVC Statistics for interface Serial5/0/0:0 (Frame Relay DTE)  
DLCI = 16, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial5/0/0:0.1  
input pkts 3036327   output pkts 199453  
in bytes 198958363  
out bytes 17271661   dropped pkts 0   in FECN pkts 0  
in BECN pkts 0       out FECN pkts 0   out BECN pkts 0  
in DE pkts 0         out DE pkts 0  
out bcast pkts 1071   out bcast bytes 371448  
5 minute input rate 0 bits/sec, 0 packets/sec  
5 minute output rate 35000 bits/sec, 50 packets/sec  
pvc create time 17:51:42, last time pvc status changed 17:50:53  
fragment type end-to-end fragment size 120

MS-7507-8A# **show interface shape**

Serial5/0/0:0 nobuffer drop 0  
Serial5/0/0:0.1(class 0):

cir 256000, Bc 1024, Be 1024  
lower bound cir 0, adapt to fecn 0  
packets output 152104, bytes output 6985505  
queue limit 64, queue size 0, drops 0  
last clear = 16:58:59 ago, shape rate = 10000 bps

MS-7507-8A# **show ip rtp head**

RTP/UDP/IP header compression statistics:  
DLCI 16 Link/Destination info: point-to-point dlci  
Interface Serial5/0/0:0:  
Distributed fast switched:  
4 seconds since line card sent last stats update  
Rcvd: 105475 total, 105472 compressed, 0 errors  
0 dropped, 0 buffer copies, 0 buffer failures  
Sent: 99451 total, 99447 compressed,  
3776208 bytes saved, 2187963 bytes sent  
2.72 efficiency improvement factor  
Connect: 256 rx slots, 256 tx slots,  
0 long searches, 3 misses 0 collisions, 0 negative cache hits  
99% hit ratio, five minute miss rate 0 misses/sec, 0 max

MS-7507-8A# **show policy-map**

Policy Map llq-shape  
Class class-default  
shape peak 256000 1024 1024  
service-policy llq  
Policy Map llq  
Class voip  
priority percent 50

MS-7507-8A# **show policy-map interface s 5/0/0:0.1**

Serial5/0/0:0.1: DLCI 16 -  
Service-policy output: llq-shape  
queue stats for all priority classes:  
queue size 0, queue limit 32  
packets output 147008, packet drops 0  
tail/random drops 0, no buffer drops 0, other drops 0  
Class-map: class-default (match-any)  
148237 packets, 10393582 bytes  
30 second offered rate 24000 bps, drop rate 0 bps  
Match: any  
queue size 0, queue limit 64  
packets output 149563, packet drops 0  
tail/random drops 0, no buffer drops 0, other drops 0  
Shape: cir 256000, Bc 1024, Be 1024  
lower bound cir 0, adapt to fecn 0  
output bytes 6972057, shape rate 10000 bps  
Service-policy : llq  
Class-map: voip (match-all)  
146701 packets, 10325334 bytes  
30 second offered rate 24000 bps, drop rate 0 bps  
Match: access-group 101  
Priority: 50% (128 kbps), burst bytes 3200, b/w  
exceed drops: 0  
Class-map: class-default (match-any)  
1536 packets, 68248 bytes  
30 second offered rate 0 bps, drop rate 0 bps  
Match: any  
queue size 0, queue limit 32  
  
packets output 2555, packet drops 0  
tail/random drops 0, no buffer drops 0, other drops 0

MS-7507-8A# **show frame pvc 16**

```
PVC Statistics for interface Serial5/0/0:0 (Frame Relay DTE)
DLCI = 16, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial5/0/0:0.1
input pkts 3036327    output pkts 199453
in bytes 198958363
out bytes 17271661    dropped pkts 0    in FECN pkts 0
in BECN pkts 0        out FECN pkts 0    out BECN pkts 0
in DE pkts 0          out DE pkts 0
out bcast pkts 1071  out bcast bytes 371448
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 35000 bits/sec, 50 packets/sec
pvc create time 17:51:42, last time pvc status changed 17:50:53
fragment type end-to-end fragment size 120
```

```
MS-7507-8A# show interface shape
Serial5/0/0:0 nobuffer drop 0
Serial5/0/0:0.1(class 0):
cir 256000, Bc 1024, Be 1024
lower bound cir 0, adapt to fecn 0
packets output 152104, bytes output 6985505
queue limit 64, queue size 0, drops 0
last clear = 16:58:59 ago, shape rate = 10000 bps
```

## 已知问题

如果仍使用Cisco IOS软件版本12.1E，则配置了帧中继封装的VIP接口可能会因总线错误而崩溃。如果在接口传递流量时应用服务策略，则会发生此崩溃。解决方法是在更新服务策略之前停止所有后台流量。或者，您可以升级到Cisco IOS软件版本12.2或更高版本。

有关详细信息，请参阅[思科工具和资源页](#)。

## 相关信息

- [QoS 技术支持](#)
- [技术支持和文档 - Cisco Systems](#)