

VBR, UBR and ABR Soft PVCs in Shaped Tunnels

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Introduction

This document provides a sample configuration for passing variable bit rate (VBR), available bit rate (ABR) and unspecified bit rate (UBR) traffic across a WAN link using shaped virtual path (VP) tunnels on a LightStream 1010 or Catalyst 8500 ATM switch.

Note: VP tunnels must be in the constant bit rate (CBR) category in order to be shaped. Shaped VP tunnels cannot simultaneously transport virtual circuits (VCs) of multiple categories. In this example, there are three VP tunnels, one for each ATM service category (VBR, UBR, and ABR).

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

Shaped VP tunnels in the CBR service category are supported on the following hardware platforms:

- LightStream 1010 with feature card per flow queuing (FC-PFQ).
- Catalyst 8510-MSRs.
- Catalyst 8540-MSRs.

Note: All VCs within CBR VP tunnels must be of the same service category.

Software support for shaped VP tunnels is as follows:

- Cisco IOS® Software Release 11.2(8.0.1) FWA4 introduced support for shaped VP tunnels.
- Cisco IOS Software 11.1 and WA3 release trains do not support shaped VP tunnels.
- For Cisco IOS software releases after 11.3(0.8) TWA4, shaped VP tunnels are supported for non-CBR service category VCs within a shaped tunnel.
- For earlier Cisco IOS software releases that do support shaped VP tunnels, VCs within shaped CBR tunnels must be in the CBR service category.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only).

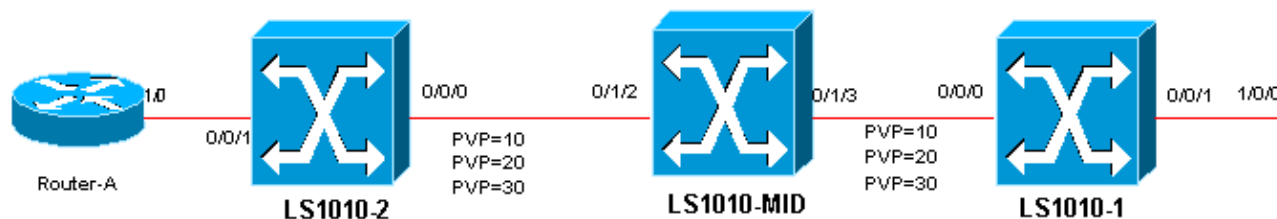
VP Tunnel Restrictions

- LightStream 1010s with FC–PFQ and Catalyst 8510–MSRs support a maximum of $2 \times 64 = 128$ shaped VP tunnels: 64 shaped VP tunnels on x/0/y numbered ports and 64 on x/1/y numbered ports.
- Catalyst 8540–MSRs support a maximum of $8 \times 64 = 512$ shaped VP tunnels. You can define a maximum of 64 shaped VP tunnels on each of the following interface groups: (0/0/x, 1/0/x), (0/1/x, 1/1/x), (2/0/x, 3/0/x), (2/1/x,3/1/x), (9/0/x, 10/0/x), (9/1/x, 10/1/x), (11/0/x, 12/0/x), and (11/1/x, 12/1/x).
- The bandwidth of the shaped VP tunnel is shared by the active VCs inside the tunnel in a strict round–robin fashion.
- Shaped VP tunnels do not support merged VCs for tag switching.
- UBR+ and ABR VCs with non–zero minimum cell rates (MCRs) are not allowed on a shaped VP tunnel interface.
- A maximum of 128 VCs can travel along a shaped VP tunnel interface.

Network Diagram

In this configuration, the LS1010–MID switch serves as the WAN link.

This document uses this network setup:



Configurations

Router A
<pre>interface ATM1/0 no ip address no ip route-cache cef logging event subif-link-status load-interval 30 no atm ilmi-keepalive</pre>

```

!
interface ATM1/0.1 point-to-point
 ip address 10.10.10.2 255.255.255.0
 pvc 11/800
  vbr-nrt 7000 4000
!
!
interface ATM1/0.2 point-to-point
 ip address 20.20.20.2 255.255.255.0
 PVC 30/900
 ubr 7000
!
interface ATM1/0.3 point-to-point
 ip address 30.30.30.2 255.255.255.0
 PVC 40/1000
abr 7000 4000

```

LS1010-2

```

ATM connection-traffic-table-row index 50 cbr pcr 7200
ATM connection-traffic-table-row index 60 vbr-nrt pcr 7000 scr0 4000 mbs 100
ATM connection-traffic-table-row index 90 ubr pcr 7200
ATM connection-traffic-table-row index 95 abr pcr 7000 mcr 0
ATM address 47.0091.8100.0000.0040.0b0a.1b81.0040.0b0a.1b81.00
ATM router pnni
 no aesa embedded-number left-justified
 node 1 level 56 lowest
 redistribute ATM-static
!
!
!
interface ATM0/0/0
 no ip address
 no ip directed-broadcast
 no ATM auto-configuration
 no ATM ilmi-keepalive
 ATM nni
 ATM pvp 10 shaped rx-cttr 50 tx-cttr 50
 ATM pvp 20 shaped rx-cttr 50 tx-cttr 50
 ATM pvp 30 shaped rx-cttr 50 tx-cttr 50
 no ATM signaling enable
!
interface ATM0/0/0.10 point-to-point
 no ip directed-broadcast
 no ATM ilmi-keepalive
 ATM cac service-category cbr deny
 ATM cac service-category vbr-nrt permit
!
interface ATM0/0/0.20 point-to-point
 no ip directed-broadcast
 no ATM ilmi-keepalive
 ATM cac service-category cbr deny
 ATM cac service-category ubr permit
!
interface ATM0/0/0.30 point-to-point
 no ip directed-broadcast
 no ATM ilmi-keepalive
 ATM cac service-category cbr deny
 ATM cac service-category abr permit
interface ATM0/0/1
 no ip address
 no ip directed-broadcast
 no ATM ilmi-keepalive
 ATM soft-vc 11 800 dest-address 47.0091.8100.0000.0060.5c72.2b01.4000.0c80.0010
 .00 11 800 rx-cttr 60 tx-cttr 60

```

```
ATM soft-vc 30 900 dest-address 47.0091.8100.0000.0060.5c72.2b01.4000.0c80.0010
.00 30 900 rx-cttr 90 tx-cttr 90
ATM soft-vc 40 1000 dest-address 47.0091.8100.0000.0060.5c72.2b01.4000.0c80.001
0.00 40 1000 rx-cttr 95 tx-cttr 95
```

LS1010-MID

```
ATM connection-traffic-table-row index 50 cbr pcr 8000
ATM address 47.0091.8100.0000.0005.5e8f.3601.0005.5e8f.3601.00
ATM router pnni
  no aesa embedded-number left-justified
  node 1 level 56 lowest
  redistribute ATM-static
!
!
interface ATM0/1/2
  no ip address
  load-interval 30
  no ATM ilmi-keepalive
!
interface ATM0/1/3
  no ip address
  load-interval 30
  no ATM ilmi-keepalive
ATM pvp 10 rx-cttr 50 tx-cttr 50 interface ATM0/1/2 10
ATM pvp 20 rx-cttr 50 tx-cttr 50 interface ATM0/1/2 20
ATM pvp 30 rx-cttr 50 tx-cttr 50 interface ATM0/1/2 30
```

LS1010-1

```
ATM connection-traffic-table-row index 50 cbr pcr 7200
ATM connection-traffic-table-row index 60 vbr-nrt pcr 7000 scr0 4000 mbs 100
ATM connection-traffic-table-row index 90 ubr pcr 7200
ATM connection-traffic-table-row index 95 abr pcr 7000 mcr 0
ATM address 47.0091.8100.0000.0060.5c72.2b01.0060.5c72.2b01.00
ATM router pnni
  no aesa embedded-number left-justified
  node 1 level 56 lowest
  redistribute ATM-static
!
!
!
interface ATM0/0/0
  no ip address
  no ip directed-broadcast
  no ATM auto-configuration
  no ATM ilmi-keepalive
  ATM uni type public side user version 3.1
  ATM pvp 10 shaped rx-cttr 50 tx-cttr 50
  ATM pvp 20 shaped rx-cttr 50 tx-cttr 50
  ATM pvp 30 shaped rx-cttr 50 tx-cttr 50
  no ATM signaling enable
!
interface ATM0/0/0.10 point-to-point
  no ip directed-broadcast
  no ATM ilmi-keepalive
  ATM cac service-category cbr deny
  ATM cac service-category vbr-nrt permit
!
interface ATM0/0/0.20 point-to-point
  no ip directed-broadcast
  no ATM ilmi-keepalive
  ATM cac service-category cbr deny
  ATM cac service-category ubr permit
!
```

```

interface ATM0/0/0.30 point-to-point
  no ip directed-broadcast
  no ATM ilmi-keepalive
  ATM cac service-category cbr deny
  ATM cac service-category abr permit
!
interface ATM0/0/1
  no ip address
  no ip directed-broadcast
  no ATM ilmi-keepalive

```

Router B

```

interface ATM1/0/0
  no ip address
  no ip route-cache distributed
  no ip mroute-cache
  load-interval 30
  no ATM ilmi-keepalive
!
interface ATM1/0/0.1 point-to-point
  ip address 10.10.10.1 255.255.255.0
  no ip mroute-cache
  PVC 11/800
  vbr-nrt 7000 4000
!
interface ATM1/0/0.2 point-to-point
  ip address 20.20.20.1 255.255.255.0
  no ip mroute-cache
  PVC 30/900
 ubr 7000
!
interface ATM1/0/0.3 point-to-point
  ip address 30.30.30.1 255.255.255.0
  PVC 40/1000
  abr 7000 4000

```

Verify

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show atm resources** Confirms that hierarchical scheduling is enabled.
- **show atm interface resource atm 0/0/0** Displays allocated resources by all connections on physical interface atm $x/y/z$. It also shows the total available resources on this interface.
- **show atm vc interface atm 0/0/1** Displays all VCs going through the VP tunnel with virtual path identifier (VPI)= n .
- **show atm interface resource atm 0/1/3** Displays the allocated resources by all connections on physical interface atm $x/y/z$. It also shows the total available resources on this interface.
- **show atm vp interface atm 0/1/3 10** Displays specific information on the VP tunnel with VPI= n , as illustrated in the sample output below. Be sure to verify that:
 - ◆ The *STATUS* field indicates the correct type of tunnel.
 - ◆ The Rx and Tx service category are configured properly and match the category of VP purchased from the service provider.
 - ◆ The correct traffic parameters, such as Peak Cell Rate (PCR), sustained cell rate (SCR), minimum cell rate (MCR), cell delay variation tolerance (CDVT) and maximum burst size (MBS).

- **show atm pnni neighbor** Lists the neighboring ATM switches with which the local switch has formed Private Network-to-Network Interface (PNNI) adjacencies. In this configuration, the neighbor is LS1010-1 since the middle switch acts as the WAN or telco connection and signaling is not running in the main interface.
- **ping 10.10.10.1** Verifies connectivity.

LS1010-2#**show atm resources**

```
Resource configuration:
Over-subscription-factor 8 Sustained-cell-rate-margin-factor 1%
Abr-mode: relative-rate
Service Category to Threshold Group mapping:
  cbr 1 vbr-rt 2 vbr-nrt 3 abr 4 ubr 5
Threshold Groups:
Group Max      Max Q  Min Q  Q thresholds  Cell  Name
      cells   limit limit  Mark Discard  count
      instal instal instal
-----
 1   65535   63    63    25 %  87 %    0   cbr-default-tg
 2   65535  127   127    25 %  87 %    0  vbr-rt-default-tg
 3   65535  511    31    25 %  87 %    0  vbr-nrt-default-tg
 4   65535  511    31    25 %  87 %    0  abr-default-tg
 5   65535  511    31    25 %  87 %    0  ubr-default-tg
 6   65535 1023  1023    25 %  87 %    0  well-known-vc-tg
```

LS1010-2#**show atm interface resource atm 0/0/0**

```
Resource Management configuration:
Service Classes:
  Service Category map: c1 cbr, c2 vbr-rt, c3 vbr-nrt, c4 abr, c5 ubr
  Scheduling: RS c1 WRR c2, WRR c3, WRR c4, WRR c5
  WRR Weight: 8 c2, 1 c3, 1 c4, 1 c5
Pacing: disabled 0 Kbps rate configured, 0 Kbps rate installed
Service Categories supported: cbr,vbr-rt,vbr-nrt,abr,ubr
Link Distance: 0 kilometers
Controlled Link sharing:
  Max aggregate guaranteed services: none RX, none TX
  Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
                 none abr RX, none abr TX, none ubr RX, none ubr TX
  Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
                 none abr RX, none abr TX, none ubr RX, none ubr TX
Best effort connection limit: disabled 0 max connections
Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
  Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
  Sustained-cell-rate: none vbr RX, none vbr TX
  Minimum-cell-rate RX: none abr, none ubr
  Minimum-cell-rate TX: none abr, none ubr
  CDVT RX: none cbr, none vbr, none abr, none ubr
  CDVT TX: none cbr, none vbr, none abr, none ubr
  MBS: none vbr RX, none vbr TX
Resource Management state:
Available bit rates (in Kbps):
  133342 cbr RX, 133342 cbr TX, 133342 vbr RX, 133342 vbr TX,
  133342 abr RX, 133342 abr TX, 133342 ubr RX, 133342 ubr TX
Allocated bit rates:
  14400 cbr RX, 14400 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Best effort connections: 0 pvcs, 0 svcs
```

LS1010-2#**show atm interface resource atm 0/0/0.10**

```
Resource Management configuration:
Service Categories supported: vbr-nrt
Link Distance: 0 kilometers
Best effort connection limit: disabled 0 max connections
```

```

Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none vbr,
  Peak-cell-rate TX: none vbr,
  Sustained-cell-rate: none vbr RX, none vbr TX
  Minimum-cell-rate RX:
  Minimum-cell-rate TX:
  CDVT RX: none vbr,
  CDVT TX: none vbr,
  MBS: none vbr RX, none vbr TX
Resource Management state:
Available bit rates (in Kbps):
  0 cbr RX, 0 cbr TX, 2810 vbr RX, 2810 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Allocated bit rates:
  0 cbr RX, 0 cbr TX, 4029 vbr RX, 4029 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX

```

LS1010-2#show atm interface resource atm 0/0/0.20

```

Resource Management configuration:
Service Categories supported: ubr
Link Distance: 0 kilometers
Best effort connection limit: disabled 0 max connections
Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none ubr
  Peak-cell-rate TX: none ubr
  Minimum-cell-rate RX: none ubr
  Minimum-cell-rate TX: none ubr
  CDVT RX: none ubr
  CDVT TX: none ubr
Resource Management state:
Available bit rates (in Kbps):
  0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Allocated bit rates:
  0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX

```

LS1010-2#show atm interface resource atm 0/0/0.30

```

Resource Management configuration:
overbooking : disabled
Service Categories supported: abr
Link Distance: 0 kilometers
Best effort connection limit: disabled 0 max connections
Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none abr,
  Peak-cell-rate TX: none abr,
  Minimum-cell-rate RX: none abr,
  Minimum-cell-rate TX: none abr,
  CDVT RX: none abr,
  CDVT TX: none abr,
Resource Management state:
Available bit rates (in Kbps):
  0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Allocated bit rates:
  0 cbr RX, 0 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX

```

LS1010-2#show atm vc interface atm 0/0/1

Interface	VPI	VCI	Type	X-Interface	X-VPI	X-VCI	Encap	Status
ATM0/0/1	0	5	PVC	ATM2/0/0	0	40	QSAAL	UP
ATM0/0/1	0	16	PVC	ATM2/0/0	0	36	ILMI	UP
ATM0/0/1	11	800	SoftVC	ATM0/0/0.10	10	36		UP
ATM0/0/1	30	900	SoftVC	ATM0/0/0.20	20	36		UP

LS1010-MID#show atm interface resource atm 0/1/3

```
Resource Management configuration:
Service Classes:
  Service Category map: c2 cbr, c2 vbr-rt, c3 vbr-nrt, c4 abr, c5 ubr
  Scheduling: RS c1 WRR c2, WRR c3, WRR c4, WRR c5
  WRR Weight: 15 c2, 2 c3, 2 c4, 2 c5
CAC Configuration to account for Framing Overhead : Disabled
Pacing: disabled    0 Kbps rate configured, 0 Kbps rate installed
overbooking : disabled
Service Categories supported: cbr,vbr-rt,vbr-nrt,abr,ubr
Link Distance: 0 kilometers
Controlled Link sharing:
  Max aggregate guaranteed services: none RX, none TX
  Max bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
                 none abr RX, none abr TX, none ubr RX, none ubr TX
  Min bandwidth: none cbr RX, none cbr TX, none vbr RX, none vbr TX,
                 none abr RX, none abr TX, none ubr TX, none ubr TX
Best effort connection limit: disabled 0 max connections
Max traffic parameters by service (rate in Kbps, tolerance in cell-times):
  Peak-cell-rate RX: none cbr, none vbr, none abr, none ubr
  Peak-cell-rate TX: none cbr, none vbr, none abr, none ubr
  Sustained-cell-rate: none vbr RX, none vbr TX
  Minimum-cell-rate RX: none abr, none ubr
  Minimum-cell-rate TX: none abr, none ubr
  CDVT RX: none cbr, none vbr, none abr, none ubr
  CDVT TX: none cbr, none vbr, none abr, none ubr
  MBS: none vbr RX, none vbr TX
Resource Management state:
Available bit rates (in Kbps):
  131743 cbr RX, 131743 cbr TX, 131743 vbr RX, 131743 vbr TX,
  131743 abr RX, 131743 abr TX, 131743 ubr RX, 131743 ubr TX
Allocated bit rates:
  16000 cbr RX, 16000 cbr TX, 0 vbr RX, 0 vbr TX,
  0 abr RX, 0 abr TX, 0 ubr RX, 0 ubr TX
Best effort connections: 0 pvcs, 0 svcs
```

LS1010-MID#show atm vp interface atm 0/1/3 10

```
Interface: ATM0/1/3, Type: oc3suni
VPI = 10
Status: UP
Time-since-last-status-change: 5d00h
Connection-type: PVP
Cast-type: point-to-point
Usage-Parameter-Control (UPC): pass
Wrr weight: 2
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0/1/2, Type: oc3suni
Cross-connect-VPI = 10
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Threshold Group: 1, Cells queued: 0
Rx cells: 275955, TX cells: 468885
TX Clp0:468885, TX Clp1: 0
Rx Clp0:275955, Rx Clp1: 0
Rx Upc Violations:0, Rx cell drops:0
Rx Clp0 q full drops:0, Rx Clp1 qthresh drops:0
Rx connection-traffic-table-index: 50
Rx service-category: CBR (Constant Bit Rate)
Rx pcr-clp01: 8000
```

```
Rx scr-clp01: none
Rx mcr-clp01: none
Rx      cdvt: 1024 (from default for interface)
Rx      mbs: none
TX connection-traffic-table-index: 50
TX service-category: CBR (Constant Bit Rate)
TX pcr-clp01: 8000
TX scr-clp01: none
TX mcr-clp01: none
TX      cdvt: none
TX      mbs: none
```

LS1010-2#**show atm pnni neighbor**

Neighbors For Node (Index 1, Level 56)

```
Neighbor Name: LS1010-1, Node number: 9
Neighbor Node Id: 56:160:47.00918100000000605C722B01.00605C722B01.00
```

!--- LS1010-1 address

```
Neighboring Peer State: Full
Link Selection For CBR      : minimize blocking of future calls
Link Selection For VBR-RT  : minimize blocking of future calls
Link Selection For VBR-NRT : minimize blocking of future calls
Link Selection For ABR      : balance load
Link Selection For UBR      : balance load
Port                        Remote Port Id      Hello state
ATM0/0/0.30                 ATM0/0/0.30        2way_in
ATM0/0/0.20                 ATM0/0/0.20        2way_in
ATM0/0/0.10                 ATM0/0/0.10        2way_in (Flood Port)
```

Router-A#**ping 10.10.10.1**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

Router-A#**ping 20.20.20.1**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 20.20.20.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

Router-A#**ping 30.30.30.1**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 30.30.30.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Related Information

- [Troubleshooting VP Tunnel](#)
- [Configuring ATM Network Interface](#)
- [ATM Commands](#)
- [Technical Support – Cisco Systems](#)

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