

Do Both Router Ends of an ATM PVC Need to Use the Same Traffic Shaping Values?

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Introduction

In typical hub and spoke wide-area network topologies, the traffic flow volume is asymmetrical, in which more traffic flows down to the remote site than comes from the remote site. Such configurations may benefit from provisioning an asymmetrical permanent virtual circuit (PVC), which uses different peak cell rate (PCR) and sustained cell rate (SCR) traffic shaping values at the two router ends of a nonreal-time variable bit rate (nrt-VBR) PVC.

The purpose of this document is to provide a sample configuration for an asymmetrical PVC. Note that, if not properly implemented in the ATM switch network, the slower end of the PVC may experience cyclic redundancy check (CRC) errors, which may affect performance.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

This document is not restricted to specific software and hardware versions.

Conventions

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

Are PVCs Unidirectional?

An ATM virtual connection consists of two unidirectional sublinks. While the connection allocates the same virtual path identifier (VPI)/virtual channel identifier (VCI) in both directions, it can allocate different bandwidth amounts in each direction. Such a connection is referred to as asymmetrical.

Configuration

This sample configuration on the LS1010 ATM switch uses two routers with unique PCR=SCR values:

- Central site 5 MB PCR=SCR, connected to LS1010 port 0/0/0
- Remote site 3.5 MB PCR=SCR, connected to LS1010 port 1/0/0

```
LS1010 Configuration
atm connection-traffic-table-row index 63999 vbr-nrt pcr 3500 scr0 3500 mbs 200
atm connection-traffic-table-row index 64000 vbr-nrt pcr 7000 scr0 7000 mbs 200
!
interface ATM1/0/0
 no atm auto-configuration
 no atm ilmi-keepalive
 atm pvc 5 100 rx-cttr 63999 tx-cttr 64000 interface ATM0/0/0 5 100
```

show Commands and Configuration Notes

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 connection-traffic-table** Cisco campus ATM switches store traffic parameters for each connection in a separate table of connection traffic table row (CTTR) values. You first configure traffic parameter values and assign an index number to the row in the CTTR table. Issue the following command to view these CTTR rows:

```
ls1010-2#show atm connection-traffic-table
Row      Service-category  pcr      scr/mcr      mbs      cdvt
1        ubr               7113539  none         none     none
2        cbr               424      none         none     none
3        vbr-rt           424      424          50       none
4        vbr-nrt          424      424          50       none
5        abr               424      0            none     none
6        ubr               424      none         none     none
63997   cbr               1741     none         none     none
63998   vbr-rt           5000     2500-0       none     none
63999   vbr-nrt          3500     3500-0       200     none
64000   vbr-nrt          7000     7000-0       200     none
2147483645* ubr              0        none         none     none
2147483646* ubr               1        none         none     none
2147483647* ubr             7113539  none         none     none
```

- The **atm pvc** command accepts **tx-cttr** and a **rx-cttr** parameters for each leg of the VC. So what direction is the transmit and what direction is the receive? The view is switch-fabric centric. In other words, rx is into the switch fabric from the interface, and tx is out of the switch fabric to the interface.
- There are multiple ways to achieve the same traffic-shaping result. In other words, these commands are equivalent:

```
interface atm 1/0/0

atm pvc 5 100 rx-cttr 63999 tx-cttr 64000 interface atm 0/0/0 5 100
atm pvc 5 100 interface atm 0/0/0 5 100 rx-cttr 64000 tx-cttr 63999
atm pvc 5 100 rx-cttr 63999 interface atm 0/0/0 5 100 rx-cttr 64000
```

- Issue the **show atm vc interface x/y/z vpi vci** command to confirm the asymmetrical parameters of the connection.

```
0/0/0 - rx is 7MB
0/0/0 - tx is 3.5MB 1/0/0 - tx is 7MB
```

1/0/0 - rx is 3.5 MB

ls1010-2#show atm vc interface atm 0/0/0 5 100

```
Interface: ATM0/0/0, Type: oc3suni
VPI = 5 VCI = 100
Status: DOWN
Time-since-last-status-change: 1d14h
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: disabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 2
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM1/0/0, Type: ds3suni_Quad
Cross-connect-VPI = 5
Cross-connect-VCI = 100
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Threshold Group: 3, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
Rx Clp0:0, 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: 64000
Rx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Rx pcr-clp01: 7000
Rx scr-clp0 : 7000
Rx mcr-clp01: none
Rx cdvt: 1024 (from default for interface)
Rx mbs: 200
Tx connection-traffic-table-index: 63999
Tx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Tx pcr-clp01: 3500
Tx scr-clp0 : 3500
Tx mcr-clp01: none
Tx cdvt: none
Tx mbs: 200
```

ls1010-2#show atm vc interface atm 1/0/0 5 100

```
Interface: ATM1/0/0, Type: ds3suni_Quad
VPI = 5 VCI = 100
Status: DOWN
Time-since-last-status-change: 1d14h
Connection-type: PVC
Cast-type: point-to-point
Packet-discard-option: disabled
Usage-Parameter-Control (UPC): pass
Wrr weight: 2
Number of OAM-configured connections: 0
OAM-configuration: disabled
OAM-states: Not-applicable
Cross-connect-interface: ATM0/0/0, Type: oc3suni
Cross-connect-VPI = 5
Cross-connect-VCI = 100
Cross-connect-UPC: pass
Cross-connect OAM-configuration: disabled
Cross-connect OAM-state: Not-applicable
Threshold Group: 3, Cells queued: 0
Rx cells: 0, Tx cells: 0
Tx Clp0:0, Tx Clp1: 0
```

```

Rx Clp0:0, 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: 63999
Rx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Rx pcr-clp01: 3500
Rx scr-clp0 : 3500
Rx mcr-clp01: none
Rx      cdvt: 1024 (from default for interface)
Rx      mbs: 200
Tx connection-traffic-table-index: 64000
Tx service-category: VBR-NRT (Non-Realtime Variable Bit Rate)
Tx pcr-clp01: 7000
Tx scr-clp0 : 7000
Tx mcr-clp01: none
Tx      cdvt: none
Tx      mbs: 200

```

- If not properly implemented, the slower receiving interface can experience input drops. Specifically, the PA-A3 allocates a subset of the total receive buffers to a VC based on its traffic shaping values. If a VC receives more packets than it expects due to an incorrectly implemented asymmetrical VC, these receive buffers fill. The router must drop subsequent packets and increments the InPktDrops counter in the **show atm vc** output. If your PVC logs InPktDrops, check the traffic-shaping configuration in the ATM switch network and at both router ends.
- The OC-3 and DS-3 network modules for the 2600 and 3600 series use a different architecture. These modules do not place a quota on the number of receive buffers allocated to a VC and thus should not report input drops if the VC is not configured properly in the ATM network.

Specifying Input and Output Values on a Router

An ATM router interface uses signaling protocols like Q.2931 to establish a switched virtual circuit (SVC). The signaling protocols start the SVC process by sending a SETUP message that includes multiple information elements (IEs). The purpose of IEs is to communicate the characteristics of the connection.

The traffic descriptor IE negotiates the traffic parameters of a connection, including forward and backward PCR, forward and backward SCR, and forward and backward maximum burst size (MBS). When configuring SVCs on an ATM router interface, the **vbr-nrt** command accepts input-pcr, input-scr, and input-mbs parameters. The full syntax of the command is:

```
vbr-nrt output-pcr output-scr output-mbs [input-pcr] [input-scr] [input-mbs]
```

In the following example, an output PCR and SCR of 5 MB is specified, as well as an input PCR and SCR of 2.5 MB.

```

7200-1.3(config-subif)#svc LESLIE nsap
47.00918100000000E04FACB401.00E04FACB401.00
7200-1.3(config-if-atm-vc)#vbr-nrt 5000 5000 94 ?
<1-45000> Input Peak Cell Rate(PCR) in Kbps
<cr>

7200-1.3(config-if-atm-vc)#vbr-nrt 5000 5000 94 2500 ?
<1-2500> Input Sustainable Cell Rate(SCR) in Kbps

7200-1.3(config-if-atm-vc)#vbr-nrt 5000 5000 94 2500 2500 ?
<1-65535> Input Maximum Burst Size(MBS) in Cells

```

When specifying traffic parameters for a PVC, note that the same **vbr-nrt** configuration statement does not offer the option of configuring these values since the VC is not performing any signaling.

```
7200-1.3(config)#interface atm 6/0.2  
7200-1.3(config-subif)#pvc 1/100
```

```
7200-1.3(config-if-atm-vc)#vbr-nrt 5000 5000 ?  
<1-65535> Maximum Burst Size(MBS) in Cells  
<cr>
```

```
7200-1.3(config-if-atm-vc)#vbr-nrt 5000 5000 94 ?  
<cr>
```

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