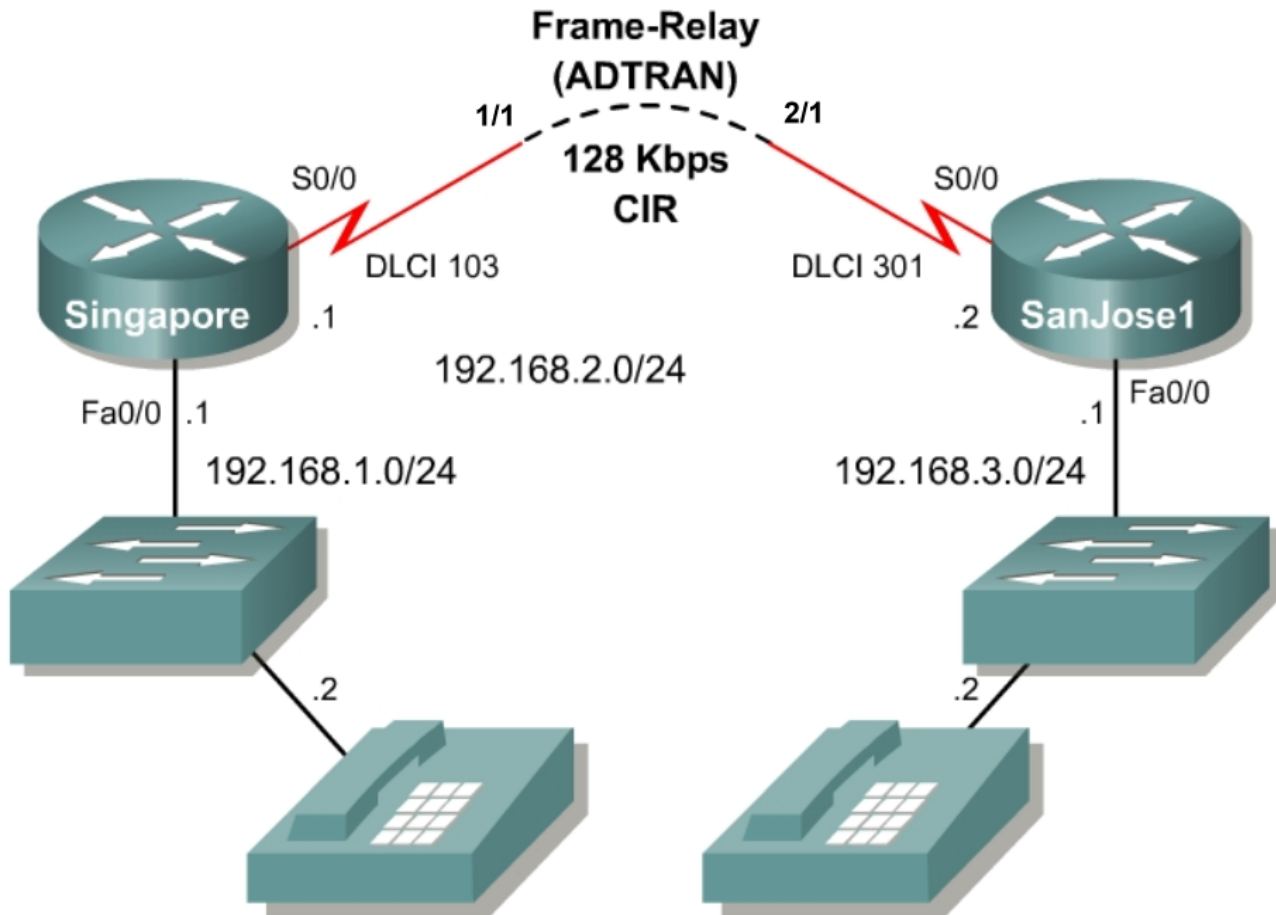


## Lab 8.1.10.10 Quality of Service Dynamic Frame Relay Traffic Shaping



### Objective

Failing to perform traffic shaping before injecting traffic into a Frame Relay permanent virtual connection (PVC) is likely to lead to dropped frames. These dropped frames will occur as the traffic rate will exceed the guarantees provided by the service provider. In this lab, Dynamic Frame Relay traffic shaping (FRTS) is used to shape traffic exiting a Frame Relay interface. This is done so that the traffic flow responds to backward explicit congestion notification (BECN) received from the Frame Relay switch.

### Scenario

A Frame Relay link has been added between the offices in Singapore and San Jose. The Frame Relay service provider will guarantee a committed information rate (CIR) of 128 kbps and a committed burst rate (Bc) of 256 kbps. As a user, it is important to take advantage of the ability of

Frame Relay to burst above the CIR. Use Dynamic traffic shaping to minimize any traffic loss during periods when the Frame Relay provider network may be congested.

## Step 1

Build and configure the network according to the diagram. Before beginning a lab, the configurations on all the routers should be cleared and then reloaded or power cycled to reset their default configurations. Delete the **vlan.dat** and startup configuration files on the switches before reloading them.

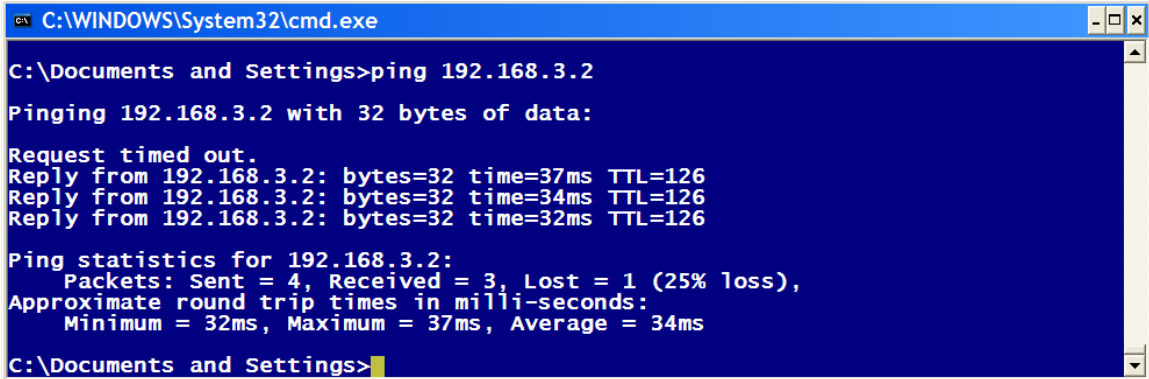
Configure the hostnames and the FastEthernet interfaces on the routers. Configure the Enhanced Interior Gateway Routing Protocol (EIGRP) with an AS of 100 as the routing protocol. The configuration of FRTS will occur on the routers so the access-layer switches can be left in their factory-default configuration.

The Frame Relay should be configured using the subinterfaces as follows:

```
Singapore(config)#interface serial 0/0
Singapore(config-if)#encapsulation frame-relay
Singapore(config-if)#interface serial 0/0.103 point-to-point
Singapore(config-subif)#frame-relay interface-dlci 103
Singapore(config-subif)#ip address 192.168.2.1 255.255.255.0

SanJose1(config)#interface serial 0/0
SanJose1(config-if)#encapsulation frame-relay
SanJose1(config-if)#interface serial 0/0.301 point-to-point
SanJose1(config-subif)#frame-relay interface-dlci 301
SanJose1(config-subif)#ip address 192.168.2.2 255.255.255.0
```

Verify the configuration by pinging between the hosts and troubleshoot as necessary.



```
C:\WINDOWS\System32\cmd.exe

C:\Documents and Settings>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Request timed out.
Reply from 192.168.3.2: bytes=32 time=37ms TTL=126
Reply from 192.168.3.2: bytes=32 time=34ms TTL=126
Reply from 192.168.3.2: bytes=32 time=32ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 32ms, Maximum = 37ms, Average = 34ms

C:\Documents and Settings>
```

```
Router(config)#hostname Singapore
Singapore(config)#interface fastethernet 0/0
Singapore(config-if)#ip address 192.168.1.1 255.255.255.0
Singapore(config-if)#no shutdown
Singapore(config-if)#interface serial 0/0
Singapore(config-if)#no shutdown
Singapore(config-if)#encapsulation frame-relay
Singapore(config-if)#interface serial 0/0.103 point-to-point
Singapore(config-subif)#frame-relay interface-dlci 103
Singapore(config-fr-dlci)#ip address 192.168.2.1 255.255.255.0
Singapore(config-if)#
Singapore(config-if)#router eigrp 100
Singapore(config-router)#network 192.168.1.0
Singapore(config-router)#network 192.168.2.0
```

```

Router(config)#hostname SanJose1
SanJose1(config)#interface fastethernet 0/0
SanJose1(config-if)#ip address 192.168.3.1 255.255.255.0
SanJose1(config-if)#no shutdown
SanJose1(config-if)#interface serial 0/0
SanJose1(config-if)#no shutdown
SanJose1(config-if)#encapsulation frame-relay
SanJose1(config-if)#interface serial 0/0.301 point-to-point
SanJose1(config-subif)#ip address 192.168.2.2 255.255.255.0
SanJose1(config-subif)#frame-relay interface-dlci 301
SanJose1(config-fr-dlci)#router eigrp 100
SanJose1(config-router)#network 192.168.3.0
SanJose1(config-router)#network 192.168.2.0

```

## Step 2

On each router specify the maximum rate that should be used over the Frame Relay link using the **traffic-shape rate** command. In this example set the maximum rate to the committed burst speed of 256 kbps. Use the interface **traffic-shape adaptive** command to allow the interface to recognize BECNs and adjust its output rate accordingly.

```

Singapore(config-if)#interface serial 0/0.103 point-to-point
Singapore(config-subif)#traffic-shape rate 256000
Singapore(config-subif)#traffic-shape adaptive 128000

SanJose1(config-if)#interface serial 0/0.301 point-to-point
SanJose1(config-subif)#traffic-shape rate 256000
SanJose1(config-subif)#traffic-shape adaptive 128000

```

Note that the **traffic-shape adaptive** command takes a parameter that defines the traffic rate to be used when BECNs are received. Normally this value is set to the CIR of the virtual circuit. The actual data rate will fall between these two values.

## Step 3

Adaptive traffic shaping configuration can be verified using the **show traffic-shape** command:

```

Singapore#show traffic-shape serial 0/0.103

Interface  Se0/0.103
Access Target  Byte  Sustain  Excess  Interval  Increment Adapt
VC   List   Rate   Limit  bits/int bits/int  (ms)      (bytes)  Active
-    -      256000 1984   7936    7936     31        992      BECN
Singapore#

```

Congratulations, Frame Relay has been configured to automatically adapt its transmission rate to the congestion in the Frame Relay switch.

```

SanJose1#show traffic-shape serial 0/0.301

Interface  Se0/0.301
Access Target  Byte  Sustain  Excess  Interval  Increment Adapt
VC   List   Rate   Limit  bits/int bits/int  (ms)      (bytes)  Active
-    -      256000 1984   7936    7936     31        992      BECN

```

### ADDITIONAL EXERCISE

=====

Copy a file from the Singapore host to the SanJose host and use the **show traffic-shape statistics** command.

Singapore#show traffic-shape statistics

| I/F       | Access List | Queue Depth | Packets | Bytes  | Packets Delayed | Bytes Delayed | Shaping Active |
|-----------|-------------|-------------|---------|--------|-----------------|---------------|----------------|
| Se0/0.103 |             | 0           | 627     | 674007 | 306             | 409188        | no             |

Singapore#show traffic-shape statistics

| I/F       | Access List | Queue Depth | Packets | Bytes  | Packets Delayed | Bytes Delayed | Shaping Active |
|-----------|-------------|-------------|---------|--------|-----------------|---------------|----------------|
| Se0/0.103 |             | 2           | 668     | 730823 | 332             | 444884        | yes            |

Singapore#show traffic-shape statistics

| I/F       | Access List | Queue Depth | Packets | Bytes  | Packets Delayed | Bytes Delayed | Shaping Active |
|-----------|-------------|-------------|---------|--------|-----------------|---------------|----------------|
| Se0/0.103 |             | 0           | 706     | 783999 | 358             | 480012        | no             |

Singapore#show traffic-shape statistics

| I/F       | Access List | Queue Depth | Packets | Bytes  | Packets Delayed | Bytes Delayed | Shaping Active |
|-----------|-------------|-------------|---------|--------|-----------------|---------------|----------------|
| Se0/0.103 |             | 2           | 753     | 849271 | 388             | 521156        | yes            |

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|             |   |
|-------------|---|
| <b>Note</b> | Shaping will only be active periodically when TCPs window size allows it to exceed the specified bandwidth. |
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