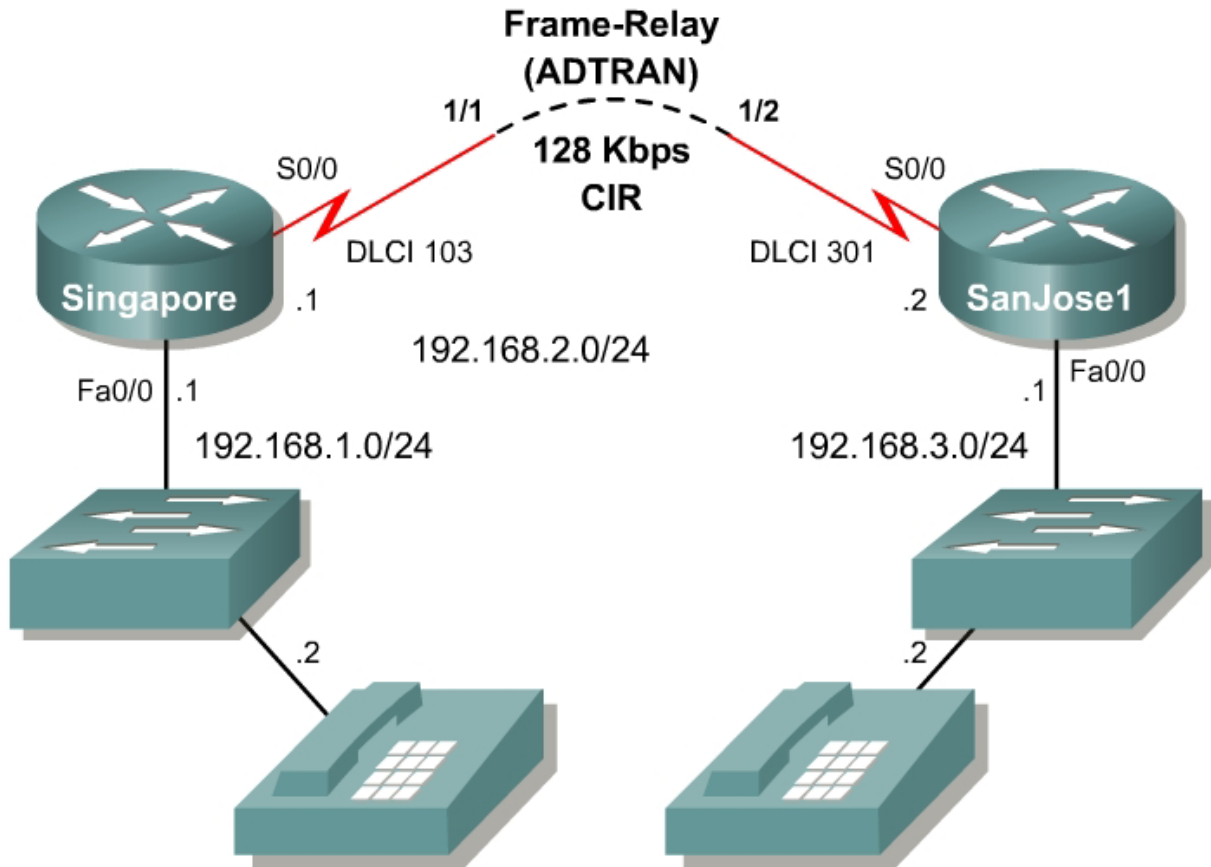


Lab 8.9.9 QoS Manually Configured Frame Relay Traffic Shaping



Objective

Failing to perform traffic shaping before injecting traffic into a Frame Relay permanent virtual circuit (PVC) is likely to lead to drop frames, since the traffic rate will exceed the guarantees provided by the service provider. In this lab, Frame Relay traffic shaping (FRTS) is used to shape traffic exiting a Frame Relay interface. This is done so that the traffic matches the committed information rate (CIR), committed burst (Bc), and excess burst (Be) provided by the ISP.

Scenario

A Frame Relay link was recently added between the Singapore and SanJose1 offices. The Frame Relay service provider will guarantee a CIR of 128 kbps and a Bc of 256 kbps. Configure the routers so that these rates are not exceeded.

Step 1

Build and configure the network according to the diagram. Configure Enhanced Interior Gateway Routing Protocol (EIGRP) with an autonomous system (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 the factory-default configuration.

The Frame-Relay should be configured using sub-interfaces 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-fr-dlci)#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-fr-dlci)#ip address 192.168.2.2 255.255.255.0
```

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

Step 2

On each router, configure a map-class to define the shape of the traffic. The CIR should be 128 kbps and any Bc can be used, as long as it is not greater than the Bc specified by the service provider. A smaller Bc will produce a smoother traffic flow, since jitter will be reduced. For voice traffic it is recommended that the Bc be kept to 1% of the CIR. In this example, some jitter is acceptable in return for the higher performance that a larger Bc allows. The Bc will be set at 12800 bps. The application requires that traffic loss must be minimized so Be over the CIR will not be allowed. This should prevent the ISP marking any frames as discard eligible (DE) and prevent the frames from potentially being dropped.

Use the command **map-class frame-relay** *map-name* to create a map-class. Then use the question mark to examine the available options:

```
Singapore(config)#map-class frame-relay myclass

SanJose1(config)#map-class frame-relay myclass
```

Configure the Frame-Relay parameters as follows:

```
Singapore(config-map-class)#frame-relay cir 128000
Singapore(config-map-class)#frame-relay bc 12800
Singapore(config-map-class)#frame-relay be 0
Singapore(config-map-class)#frame-relay fair-queue

SanJose1(config-map-class)#frame-relay cir 128000
SanJose1(config-map-class)#frame-relay bc 12800
SanJose1(config-map-class)#frame-relay be 0
SanJose1(config-map-class)#frame-relay fair-queue
```

Step 3

In order to activate FRTS, apply the **frame-relay traffic-shaping** commands to the Frame Relay (S0/0) interface:

```
Singapore(config)#interface serial 0/0
Singapore(config-if)#frame-relay traffic-shaping

SanJose1(config)#interface serial 0/0
SanJose1(config-if)#frame-relay traffic-shaping
```

Once FRTS is activated on the interface, the traffic shape or map-class must be specified for each PVC using the frame relay class statement on the sub-interface:

```
Singapore(config-if)#interface serial 0/0.103
Singapore(config-subif)#frame-relay class myclass

SanJose1(config-if)#interface serial 0/0.301 point-to-point
SanJose1(config-subif)#frame-relay class myclass
```

Step 4

In order to test the traffic shaping, set up file sharing on the Singapore host and copy a large file to the SanJose1 host. After a couple of minutes of copying use the **show interface serial 0/0** command to determine the average traffic rate:

```
Singapore#show interface serial 0/0
Serial0/0 is up, line protocol is up
  Hardware is PowerQUICC Serial
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 15/255, rxload 1/255
  Encapsulation FRAME-RELAY, loopback not set
  Keepalive set (10 sec)
  LMI enq sent 612, LMI stat recvd 612, LMI upd recvd 0, DTE LMI up
  LMI enq recvd 0, LMI stat sent 0, LMI upd sent 0
  LMI DLCI 0 LMI type is ANSI Annex D frame relay DTE
  Broadcast queue 0/64, broadcasts sent/dropped 1438/0, interface
  broadcasts 133
6
  Last input 00:00:04, output 00:00:00, output hang never
  Last clearing of "show interface" counters 01:41:58
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 2000 bits/sec, 6 packets/sec
  5 minute output rate 91000 bits/sec, 12 packets/sec
    5185 packets input, 308426 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    6353 packets output, 5078253 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
```

Step 5

Try making the CIR much smaller, 10 kbps, and confirm that FRTS is in fact shaping the traffic.

Configuration

Singapore

```
hostname Singapore

interface FastEthernet0/0
 ip address 192.168.1.1 255.255.255.0
!
interface Serial0/0
 encapsulation frame-relay
 frame-relay traffic-shaping
!
interface Serial0/0.103 point-to-point
 ip address 192.168.2.1 255.255.255.0
 frame-relay class myclass
 frame-relay interface-dlci 103
!
router eigrp 100
 network 192.168.1.0
 network 192.168.2.0
!
map-class frame-relay myclass
 no frame-relay adaptive-shaping
 frame-relay cir 128000
 frame-relay bc 12800
 frame-relay be 0
 frame-relay fair-queue
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```

SanJose1 Configuration

```
hostname SanJose1

interface FastEthernet0/0
 ip address 192.168.3.1 255.255.255.0
!
interface Serial0/0
 encapsulation frame-relay
 frame-relay traffic-shaping
!
interface Serial0/0.301 point-to-point
 ip address 192.168.2.2 255.255.255.0
 frame-relay class myclass
 frame-relay interface-dlci 301
!
router eigrp 100
 network 192.168.2.0
 network 192.168.3.0
!
map-class frame-relay myclass
 no frame-relay adaptive-shaping
 frame-relay cir 128000
 frame-relay bc 12800
 frame-relay be 0
 frame-relay fair-queue
!
line con 0
line aux 0
line vty 0 4
 login
!
end
```