

Configuring the ATM1 Queue Length

ATM1 PICs contain a transmit buffer pool of 16,382 buffers, which are shared by all the PVCs that you configure on the PIC. Even multiple-port ATM PICs have a single buffer pool shared by all the ports.

By default, the ATM1 PIC allows PVCs to consume all the buffers they require. If the sustained traffic rate for a PVC exceeds its shaped rate, buffers are consumed. Eventually, all buffers on the PIC are consumed, and the other PVCs are underserved. This results in head-of-line blocking.

For each PVC, you prevent this situation by configuring the queue length of the PVC. The queue length is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are dropped.

To limit the queue size of a PVC, include the **queue-length** statement:

```
queue-length number;
```

For a list of hierarchy levels at which you can include this statement, see [queue-length](#).

The length can be from 1 through 16,383 packets. The default is 16,383 packets. You should include the **queue-length** statement in the configuration of all the PVCs that you configure on an ATM1 PIC. The **queue-length** statement performs two functions:

- It prevents head-of-line blocking because it limits the number of packets and therefore buffers that can be consumed by each configured PVC.
- It sets the maximum lifetime that can be sustained by packets over the PVC when traffic has oversubscribed the configured shaping contract.

The total value of all the queue lengths must not exceed the total number of packets that can be held in the buffer space available on the PIC. The total number of packets the buffers can hold depends on the size of the physical interface MTU, including all encapsulation overhead. You can use the following formula to calculate the total number of packets the buffer space can hold:

$$16,382 / (\text{Round Up} (\text{MTU} / 480))$$

For example, assuming default MTU settings for all ATM1 interfaces on a PIC, the total number of packets that can be held is:

$$16,382 / (\text{Round Up} (4482 / 480)) = 1638 \text{ packets}$$

Thus, you can configure up to 1638 for the combined queue length of all the PVCs on an ATM1 PIC that uses default MTU settings for all interfaces.

If you set a queue length to a very low value, small bursts in packets transiting the PVC might not be buffered.

The maximum lifetime that packets can sustain while transiting a PVC depends on the shaping rate you configure for the PVC, the setting for the **queue-length** statement,

and the physical interface MTU. You can use the following formula to calculate the maximum lifetime that packets can sustain while transiting a PVC:

$$(\text{PVC queue-length in packets} \times \text{MTU}) / (\text{PVC shaping in bps} / 8)$$

For example, if you configure a PVC on an ATM1 interface with the default MTU, a CBR shaping rate of 3,840,000 bps (10,000 cps), and a queue length of 25 packets. The maximum lifetime is:

$$(25 \times 4482) / (3,840,000 / 8) = 233 \text{ ms}$$

This is the worst-case lifetime assuming all packets in the queue are MTU sized, and the traffic using the PVC is oversubscribing its configured shaping contract.

In general, we recommend that you use a maximum lifetime under 500 ms.

If you add or change the queue-length setting on the VC, the logical interface associated with the VC is deleted and re-added.