APPLICATION NOTE

QoS (Quality of Service)
RFL eXmux 3500® IP Access Multiplexer

The RFL eXmux 3500 is a hardened IP Access Multiplexer engineered for mission critical infrastructures that seamlessly transport voice, serial, video and Ethernet data communications over Ethernet/IP or MPLS networks. The eXmux 3500 is a Layer 2 device with an integrated managed Ethernet switch which allows the eXmux 3500 to be used either in a private network with other eXmux 3500's or as part of a larger Ethernet/IP/MPLS network. Both fiber (using SFPs) and RJ-45 connections are available for the eXmux 3500; uplink speeds of up to a Gigabit are possible.

This application note should allow us to illustrate the eXmux-3500 IP access multiplexer basic QoS (Quality of Service) functionality in prioritizing and handling of important traffic.

Quality of Service

Without enabling special handling, a network provides a "best effort" service to all applications. This means that there are no assurances regarding the Quality of Service (QoS) for any particular application because all packets are treated equally at each switch or router. However, certain applications require deterministic response e.g. VoIP, SCADA, Current Differential Relay from the network to assure proper operation.

To assure that the response is continuously flowing without service interruptions or delay in communications is avoided, we need to provide a certain QoS that guarantees the packets with highest priority forwarded first in an event of network congestion (bandwidth bottleneck). However, although QoS feature can provide priority, in the absence of network congestion eliminates the need for QoS mechanisms as in a simple term "No Congestion, No QoS".

Numerous mechanisms exist to help assure reliable and timely network communication. The eXmux 3500 managed switch supports two common means of prioritizing messages: IP (ToS/DSCP) and 802.1p (Pbit).. The switch provides four priority queues for expediting outbound data. The 256 IP priorities and the 7 IEEE priorities are mapped into these ports in a way that optimizes throughput of high priority data.

When choosing how to handle priority data, the switch can use *strict* or *fair* scheduling. This choice affects all queues on all ports.

Strict Scheduler: With strict scheduling, all data in the highest priority queue will be sent before any lower priority data, then all data from the second highest priority, and so on. This assures that high-priority data always gets through as quickly as possible.

In Figure 1, in the eXmux 3500 managed switch, the untagged packet ingressing the Data (LAN Port 1) and RFL 9300 Current Differential Relay (TDM over IP Ethernet Port 10) switchports are tagged with lowest and highest priority Pbit, respectively. Thus, in the egress switchport (WAN Port 5) the Relay's tagged packet are forwarded more often than the Data tagged packet and most often the Data tagged packet is discarded.

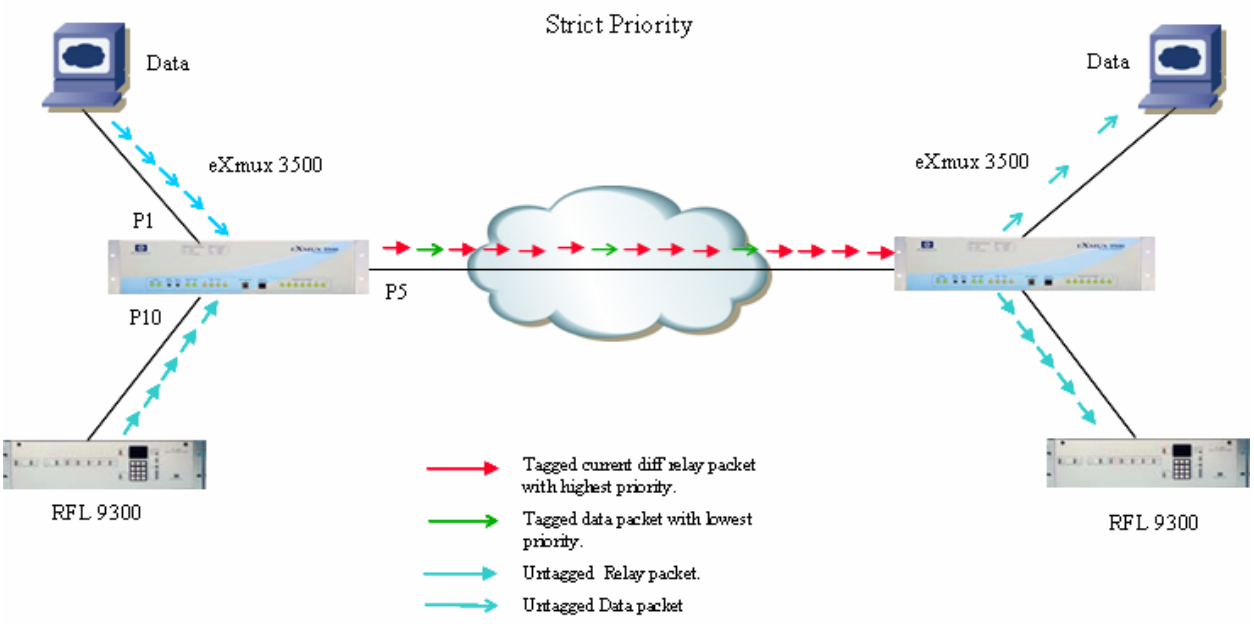

Figure 1.

Fair Scheduler: With fair scheduling, a round-robin algorithm is used, weighted so that more high-priority than low-priority data gets through Specifically, the switch will send eight frames from the urgent queue, then four from the expedited queue, two from the normal queue, and one from the background queue, then start over with the urgent queue. This assures that the lower priority queues will not be starved.

In Figure 2, in the eXmux 3500 managed switch, the untagged packet ingressing the Data (LAN Port 1) and RFL 9300 Current Differential Relay (TDM over IP Ethernet Port 10) switchports are tagged with normal and expedited priority Pbit, respectively. Thus, in the egress switchport (WAN Port 5) the Relay's tagged packet are forwarded in accordance with the set fair-queue and followed with Data tagged packet.

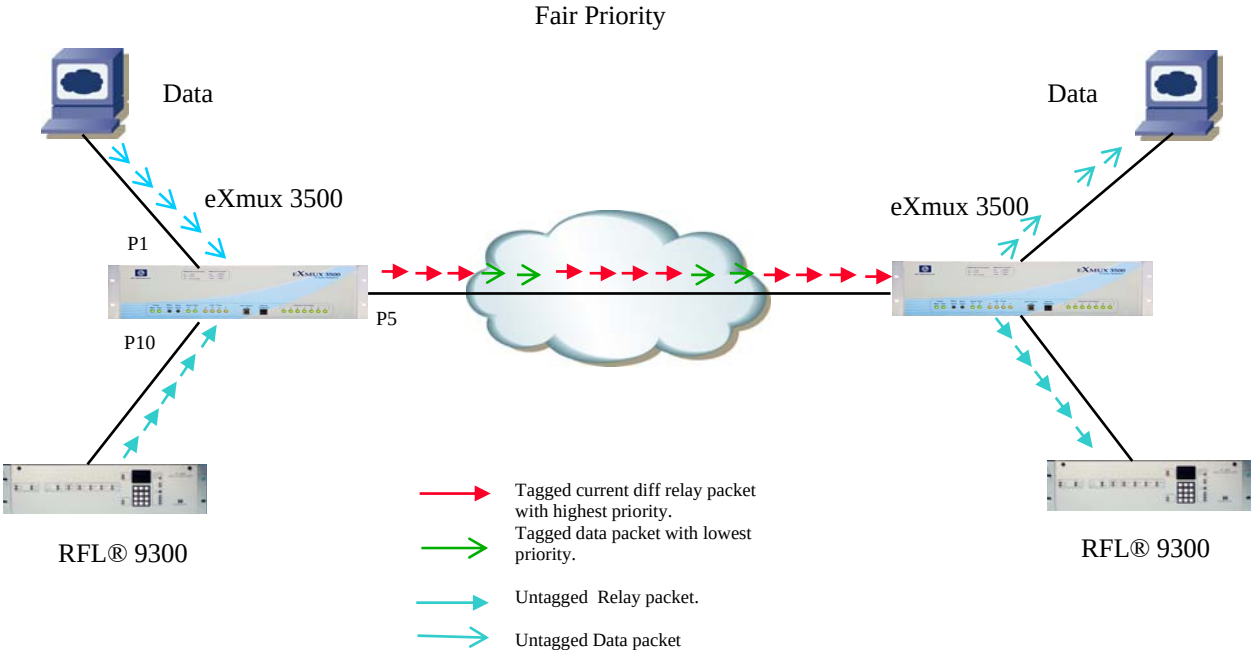

Figure 2.

Please refer to the eXmux 3500 User Manual for the detailed configurations guide. Contact RFL at 973- 334-3100 for further assistance.