



## VLAN (Virtual Local Area Network) 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 introduces the concepts and implementation of VLAN technology on the eXmux 3500 IP access multiplexer.

### VLAN (Virtual Local Area Network)

Virtual LAN (VLAN) technology a.k.a IEEE 802.1Q, Extended-LAN, VLAN Tagging, which is defined under the IEEE 802.1Q specifications, is a networking standard/technology allowing multiple bridge networks to transparently share the same physical network link without leakage of information between networks.

This has allowed enterprise to extend the reach of their corporate networks across the WAN. VLAN provides flexibility and easier administration by logically segmenting/segregation of network based on different types of services e.g. voice, video, data or group function requirements e.g. Engineering, Accounting, Manufacturing, Sales/Marketing, Critical Server, etc. and keeping unicast, multicast and broadcast traffic flows only on segment that serve the VLAN to which the traffic belongs while maintaining connectivity across all devices on the network. Thus, utilizing the network bandwidth efficiently and having a level of data security by keeping the data exchanged only between devices that is member of a particular VLAN within the network.

### VLAN in eXmux 3500

eXmux 3500 employs VLAN mode traffic segregation that is done based on membership in a group of ports (port-based VLAN) or on IEEE 802.1Q tags which include a VLAN ID (tag-based VLAN). The application suggests the used of the later to achieve better bandwidth utilization and providing security.

#### VLAN Modes

**Disabled** – No VLAN processing is done. VLAN ID's and Port-based VLANs are ignored.

**Port-Based** – Only port-based VLAN's are used to switch frames. VLAN ID's are ignored.

**Standard** – All switching is done by VLAN ID and Port-based VLAN's are ignored. The source ports of a frame need not to be part of forwarding decision.

**Secure** – All switching is done by VLAN ID, however if the source port of a frame is not a member of the target VLAN, then the frame is dropped.

Note: Standard mode is recommended when implementing VLAN and is mostly acceptable to all switches.

#### VLAN Port Type Settings

**Network** – All frames exiting (egress) this port will be tagged. If no tag was present when the frames entered (ingress), the source port's PVID\* will be used. Typically, a Network port will be a member of many or all tag-based LAN on switch and is used to forward VLAN traffic to another switch then distributes it to other network segments based on the tags. A network port can only send packets for VLAN's in which it is a member.

Typical application for the port in Network mode is interconnection with other vendor's routers and switches that can negotiates IEEE dot1q trunking protocol.

\* **PVID:** This is the port's default VLAN ID. It is applied to frames which arrive at the port without a VLAN tag or with a priority-only VLAN tag (one which contains the special VLAN ID 0). Set the desired PVID to make sure your untagged packets for the port get forwarded to other ports in the desired VLAN.

**Core** – Trunk port, all frames exiting this port will be double-tagged and will only accept tagged frames entering this port. This is a typical port setting for trunking purpose if traversing to other distribution/aggregator switch and going into WAN. This can be useful for Internet Service Providers (ISP) allowing them to use VLAN internally while mixing traffic from clients that are already VLAN-tagged.

Typical application for the port in Core mode is interconnection with other vendor's routers and switches that can negotiates IEEE dot1q trunking protocol.

**Edge** – Access port, removes tag for all outgoing frames and frames entering the port will be tagged with PVID where the port belongs to. A port can be a member of a VLAN as untagged only once.

Typically, this is the port setting for edge devices e.g. PC, Servers, IP Phone, IP Camera, Unmanaged Switch that doesn't do frame tagging.

**Transparent** – frames entering and exiting this port will be kept unchanged.

Typical application is for substation that needs unmanaged ethernet communications, eXmux TDM over IP engines, ethernet port extensions acting as a hub/repeater.

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