APPLICATION NOTE

eXmux 3500 over Direct Fiber Backbone 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 optical fiber (using SFPs) and electrical (using RJ-45) connections are available for the eXmux 3500 with uplink speeds of up to a Gigabit are possible.

The purpose of this application note is to show the eXmux-3500 IP Access Multiplexer interoperability with Gigabit Ethernet over Fiber standard as backbone in Regional Area Network and Metro Area Network which is a typical area of jurisdiction for utility companies in delivering converge legacy TDM and IP services.

Gigabit Ethernet over Fiber

The IEEE 802.3.z standard a.k.a. 1000BASE-X which is commonly refer to Gigabit Ethernet over Fiber transmission operating over single or multimode fiber of different wavelengths. The 802.3z standards have various flavors that include 1000BASE-CX, 1000BASE-LX, and 1000BASE-SX network implementations.

With the Gigabit Ethernet over Fiber advantage of more distance up to 100 kms and Bandwidth, converge legacy TDM e.g. Aynch, Synch, T1/E1 and native IP e.g. IP Security Camera, VoIP, Internet services in a LAN can now be extended in different areas e.g. Substations-To-Substations, Remote Offices employing the same time-tested Ethernet communications protocol.

Gigabit Ethernet over Fiber technology promises to revolutionize Internet and telecommunications networks. The technology boasts a time tested networking communications standard, Ethernet, and it allows speeds upwards of 1000 times more than current broadband technologies.

Now, it is also used by end-user enterprises to expand Ethernet local area networks (LAN), especially since the adoption of IEEE standards for Gigabit Ethernet and 10 Gigabit Ethernet over single-mode fiber. Running Ethernet networks between geographically separated buildings is a practice known as "WAN elimination". This will provide added security in preventing data traffic to traverse in the unsecured network as the "Internet".

eXmux 3500 Gigabit Ethernet

The eXmux 3500 is a Layer-2 switching access multiplexer designed to provide Direct Fiber connections with optical Gigabit Ethernet uplink ports in various network e.g. Ring, Point-to-Point, Star, Linear topologies. The eXmux 3500 support various distances and wavelengths in accordance to IEEE 802.3z (1000Base-X) standards (see Table 1).

Fiber Mode	Wavelength	IEEE Standard	Distance
Multimode LED	1310 nm	1000BASE-SX	550 m (0.34 mi)

Single mode Laser	1310 nm	1000BASE-LX10	10 Km (6.21 mi)
Single mode Laser	1310 nm	1000BASE-ZX	40 Km (24.8 mi)
Single mode Laser	1550 nm	1000BASE-ZX	80Km (49.7 mi)

The eXmux 3500 Layer 2 switching device that employs the robust, time-tested and ubiquitous pure Ethernet protocol and supports bridging features per IEEE e.g. 801.1ad, 802.1q, 802.1d/w/s, 802.1p could be implemented as Access or Transport, as depicted in Figure 1 below, switching device to deliver an End-to-End TDM & IP services in a Direct Fiber infrastructure.

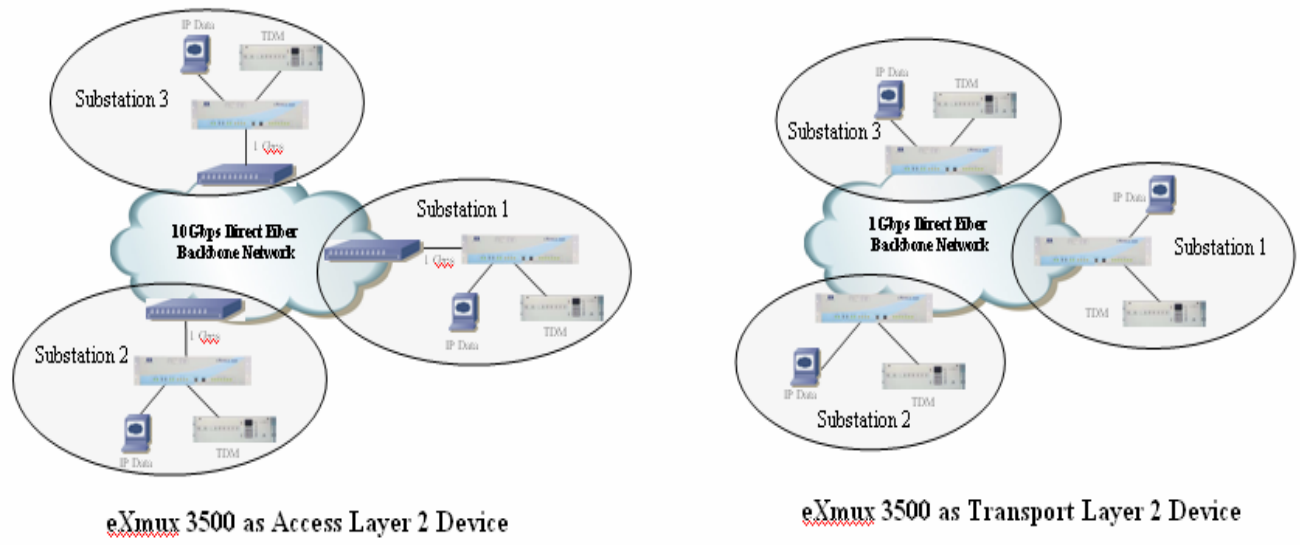

Figure 1

Contact RFL Electronics at 973-334-3100 for any inquiries and further assistance.