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).

<table>
<thead>
<tr>
<th>Fiber Mode</th>
<th>Wavelength</th>
<th>IEEE Standard</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multimode LED</td>
<td>1310 nm</td>
<td>1000BASE-SX</td>
<td>550 m (0.34 mi)</td>
</tr>
</tbody>
</table>

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.