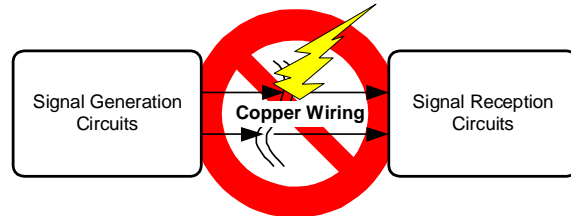




Application Note AP38

Apogee Labs Helps to Maintain Data Security Use Optical Interfaces

Maintaining signal isolation between equipment that process sensitive data has and continues to be a challenge. Making sure that sensitive data does not invade areas where it can become compromised requires careful planning and, quite often, considerable expense. To accomplish a clean line of separation and isolation between **red** equipment, containing secure information and **black** equipment, containing unsecured information, requires at least three measures to be taken. The two classes of equipment must be physically separated to minimize electrical coupling of signals. Shielding must be employed in equipment housings and interconnections. And, signal filters are used so as to reduce compromising emanations.



Interconnections between red and black equipment, that employ copper wire, require cable shielding and signal filters. Implementing this can become costly, clumsy and bulky. Today, with the advent of photo-electric laser isolators and fiber-optic transmission media, the problem becomes more manageable. Photo-electric interfaces and fiber-optic cables now fit into common system budget constraints. These devices are much less bulky and do not require shielding to eliminate radiated emissions.

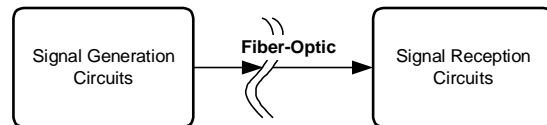


Figure 1
Typical Optical Data-Link Interface for the Model 430 series

Optical data-link products from Apogee Labs are a cost effective solution to developing and maintaining a secure data interconnect structure. Devices are available as stand-alone interfaces in the model 2073 series and in the model 430 Multiplexer / Demultiplexer product lines. These devices are an ideal solution for securing data since they provide optically isolated interface data link connections for electrical signals. Signal converters in the model 2073 series are available (Figure 2) with electrical interfaces such as: RS-422, ECL and TTL. In the model 430 product line (Figure 1 and Figure 3) an extremely broad range of electrical interfaces and functions are available which include: RS-422, ECL, TTL, RS-232, Analog and Ethernet. Signal processing functions include A/D, Voice, Video and others. Apogee Labs offers optical interfaces for data-link rates up to and including 622.08M bps (OC-12). The most commonly used optical link is OC-3, which operates at 155.52M bps.

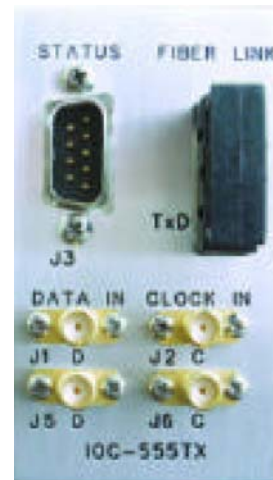


Figure 2
Typical Opto-Electronic Interface in the Model 2073 series

Using an optical data link offers many advantages. The optical signal may be conveyed over a relatively long distance of fiber-optic cable without the need for repeaters. A typical distance over which data may be transmitted using single-mode fiber extends from tens to hundreds of kilometers. Short distances to only a foot or two are also supported by using multi-mode fiber and optical attenuators. **Fiber-optic interconnections are simple** and eliminate



APOGEE LABS, INC

emanations, which are present in copper cables. **Optical isolation provides a secure data-link**, devoid of electromagnetic radiation that might interfere with other system functions or be “sniffed”. The information transport link may be implemented on a **dedicated point-to-point fiber** connection or when the full protocol is used and data security is less of an issue, **public networks** may be included. Naturally, some level of data security may be included on public networks by incorporating encryption. By using conventional fiber-optic techniques expensive hardware is eliminated from a system interconnect. Traditional hardware and radio data links require data coherent clock reconstruction at the receive site. This function is performed by an expensive bit synchronizer or modem. In optical systems the expensive bit synchronizer is replaced by an optical receiver. **Synchronous coherent data clocks are produced directly by the optical receiver.**

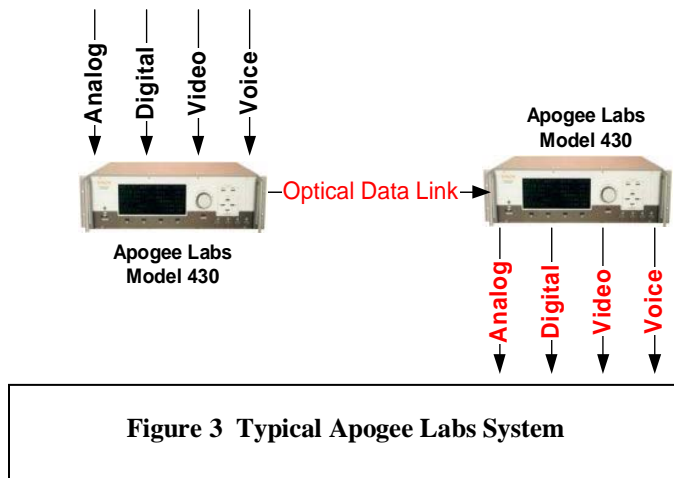


Figure 3 Typical Apogee Labs System

In summary:

- Optical interfaces placed between **red** and **black** electronic subsystems provide **isolation**.
- Optical interfaces support **long distance interconnections** of systems with minimum concern for noise and other external signal contaminants.
- Electronic “**snooping**”, which is possible on copper and radio data links, is **virtually eliminated**.
- **Expensive system components** such as bit synchronizers are **eliminated** when using optical interfacing.
- World-wide optical communications **standards** permit the use of public networks to complete a data link.
- Apogee Labs Offers Support.