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Application Note: Isolation of Monitored Optical Network Interface and Electrical Control Interface in Interceptor

To preclude any compromise of sensitive data, Interceptor is designed for maximum isolation between the optical network ports and the electrical control ports. The following is a description of this design methodology.

Architecture of Interceptor

Designed with security in mind, Interceptor is partitioned as shown below, with separate sections for the monitored optical signal and the Ethernet (RJ-45) and Serial (RS-232) control ports. Shown are block diagram and annotated picture.





Power Supply

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System Control/Alarm Reporting/Network Interface

Lasers/Detectors/Low Freq Rx/A-D

Optical Section

This section contains the CW (continuous wave, or non-modulated) laser transmitters, the low frequency receivers, the proprietary optical components, and the electronics required to control them. Isolation from the secure data occurs here in multiple ways:

1. The optical design separates the data from the out-of-band monitor wavelength as follows:

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- a. In Interceptor "dark" units, there is no data present on the fiber as the unit is used exclusively for monitoring unused fibers within the protected cable.
- b. In Interceptor+Plus units, wavelength division multiplexers (WDMs) are used to route protected data only to the Remote port, and only the separate out-of-band monitor wavelength to the Interceptor internal receiver. This out-of-band isolation is tightly monitored and controlled during manufacture; as part of our ISO9001 QC procedure, Interceptor units are 100% tested for insertion loss and isolation of both data and monitor wavelengths.
- The optical receiver is bandwidth limited to below 1 kHz. By utilizing sub-data bandwidth for the monitoring wavelength, Interceptor is incapable of reading any data from network traffic that might be present (see section 1 above). The monitor wavelength, exclusively, is analyzed for trends characteristic of physical perturbations.
- 3. The low frequency monitor signal alone is communicated across the interface to the electronic section, by virtue of the limited bandwidth, electrically isolating the optical data from the control RJ-45 and RS-232.

Interface Section

This section supplies the communication between the electronic and optical sections. This allows the processor to enable optical ports, perform maintenance and safety monitoring, and receive low frequency signal from the optical receiver for perturbation and intrusion analysis.

Electronic Section

This section contains the Ethernet and Serial interfaces, power switch, status lights, reset buttons, processor board, and the electronics needed to interface between them. Communication with the Ethernet and Serial interfaces are limited to this section, and no network connectivity exists between these electrical interfaces and the optical network ports in the optical section. Analysis of the low frequency signal from optical receivers occurs in this section.

Designed For Security

As shown, great lengths were taken to separate the control and data paths in Interceptor, thereby assuring isolation and security of data in a protected network. For a summary of software security features, please see NIS Application Note: "Interceptor Version 2.3 Software Security Features".