Parts of a Transmission Link

Fiber optic transmission uses the same basic elements as copper-based transmission systems: A transmitter, a receiver, and a medium by which the signal is passed from one to the other, in this case, optical fiber. Figure 1 illustrates these elements. The transmitter uses an electrical interface to encode the use information through AM, FM or digital modulation. A laser diode or an LED do the encoding to allow an optical output of 850 nm,1310 nm, or 1550 nm (typically).

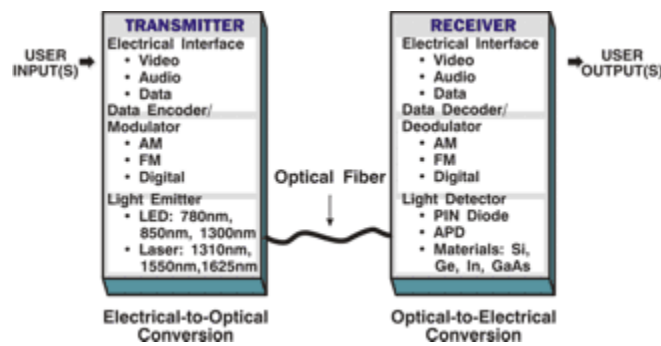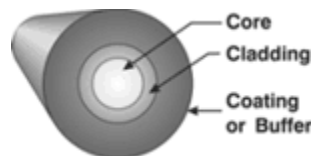**Figure 1 - Elements of a Fiber Optic Link**

Figure 2 - Cross-section of an Optical Fiber

The optical fiber connects the transmitter and the receiver. This fiber may be either single-mode or multimode. The fiber consists of three main regions, as illustrated in Figure 2. The core, the center of the fiber, actually carries the light. The cladding surround the core in a glass with a different refractive index than the core, allowing the light to be confined in the fiber core. A coating or buffer, typically plastic, provides strength and protection to the optical fiber. The receiver uses either a PIN photodiode or an APD to receive the optical signal and convert it back into an electrical signal. A

data demodulator converts the data back into its original electrical form. These elements comprise the simplest link, but other elements may also appear in a fiber optic transmission system. For example, the addition of WDM components allows two separate signals to be joined into a composite signal for transmission, and then can be separated into their original signals at the receive end. Other wavelength-division multiplexing techniques allow up to eight signals (CWDM) or more (DWDM) to be combined onto a single fiber. These are discussed in separate articles as linked in this paragraph. Long distance fiber optic transmission leads to further system complexity. Many long-haul transmission systems require signal regenerators, signal repeaters, or optical amplifiers such as EDFAs in order to maintain signal quality. System drop/repeat/add requirements, such as those in multichannel broadcast networks, further add to the fiber optic system, incorporating add-drop multiplexers, couplers/splitters, signal fanouts, dispersion management equipment, remote monitoring interfaces, and error-correction components. See the linked articles for additional information on these components.