

Introduction to Multiplexing in Fiber Optics

Halifax Operation

The bandwidth properties of optical fiber are well known and make it the media of choice for high-speed data and video applications. However, various forms of multiplexing are required to take advantage of this bandwidth. Time division and wavelength division multiplexing are the two most commonly used.

As fiber is best suited to digital transmission, many low-rate digital signals can be time division multiplexed (TDM) using electronic parallel-to-serial converters like the Agilent G-Link or the Cypress Hotlink. Several low rate signals are combined into a single high-speed channel for transmission and then reconstructed or broken out at the receiving end. Although high-speed TDM devices are available for aggregate data rates of 10-40 Gbps for telecommunications applications, affordable components, e.g. TDM ICs, fiber optic transceivers and test equipment, are currently limited to 2.5 Gbps. TDM can also be done in several stages, e.g. programmable logic devices (PLDs) can be used to combine many low-rate signals. Over-sampling using a common clock is required when the signals are asynchronous. Wavelength division multiplexing (WDM) is used to transmit more than one high-speed digital data stream on a single optical fiber. Different wavelengths of light, i.e. different colors, propagate in a single fiber without interfering as shown below. The devices that do .2994 024aghs of u3d ig u.1(o u3d i)o Tc.31e2 T11994 024ca5s6-25.2o7./ue2 oin 0245.2

