**Wavelength Division Multiplexing**

In recent years, the problem of bandwidth crisis for computer data communication has increased as amount of data in backbone network is increasing exponentially because of increasing use of text, audio, still and motion video data over long distance. One of the solutions to the problem is by using optical network with multiplexing of data. It consists of optical fibers carrying flashes of light from a laser. It improves the speed of information transfer by increasing the number of laser light flashes per second (by increasing the bit-rate). The laser light flashes on and off in a pattern that represents the information being sent. We can think of this as being similar to Morse code, where certain series of dots and dashes form information. The quicker the lasers can flash on and off, quicker is the information that is transferred. The speed of transfer is known as “bit-rate” and is usually talked about in terms of bits per second -- bps or bit/s (effectively the number of flashes possible per second). Modern networks can transmit 10 Gbps (10 Gigabits per second, which is 10 billion flashes per second) from one single laser. To put this into context, we can send text of more than 1000 books in just one second.

Bandwidth in communications is similar to closet space in your home-you can never have enough. To make matters worse, Internet traffic is making the demand for communication capacity grow faster than the wardrobe of a teenager with a no-limit credit card. Bandwidth-hogging megabytes of animated graphics are replacing compact e-mail messages. Data, video and voice signals crowd transmission systems that had ample space just a few years ago is looking for space anywhere it may come from. The communications industry needs room to breathe. Here optical multiplexing helps that provides low loss and high bandwidth. The optical multiplexing concept is not new, it dates back at least to 1958, to an IEEE paper by R.T. Denton and T. S. Kinsel. About 20 years later, first practical components for multiplexing were proposed for different laboratories, mainly in the U.S., Japan, and Europe. Research on gratings started in 1965. Engineering of ruling engines, introduction and development of holographic gratings was started in 1967 at Jobin Yvon. In those days, the main application was spectroscopy, and there was no idea of the possible applications to optical telecommunications. Soon, researchers developed new grating optics coupler in 1974, but this component was only used for optical spectroscopy research and did not find application in optical telecommunications. In those days, optical telecommunications had more urgent problems to be solved. In 1980, when the technology began to mature, we introduced the Stimax configuration. Since that time, they refined the configuration and grating to achieve lower losses, lower polarization effect, smaller near-end crosstalk allowing full bi-directionality with many channels, routing capability, more channels (the feasibility of devices with several hundred channels is now being demonstrated), smaller spacing (down 0.4 nm now). In order to get more channels at smaller wavelength spacing, you need higher dispersion gratings i.e. more grooves per millimeter. Unfortunately, this generally means gratings with more crosstalk and a larger polarization rate. Since then WDM has been applied in various kinds of fields ranging from telecommunication to internet. WDM technology has been applied to international undersea fiber optic cable networks in order to provide enhancements such as increased network capacity and greater networkflexibility. WDM is technology that transfers data of different types through optical fiber and it is received on the basis of the wavelength at the receiver side. The data is first serialized and then sent to the receiver side.