Wavelength Division Transmission for 1.31 μm and 1.55 μm Bands Simultaneously

Advantages
• Provides a significant increase in capabilities while utilizing existing optical fiber networks, doubling the capacity of current fiber optic systems
• Full dispersion compensation in both wavelength bands
• Reduced four-wave mixing in both wavelength bands

Invention
The design of a wavelength division multiplexed system for fully dispersion compensated operation in both 1.55 μm and 1.31 μm wavelength bands by use of constant-intensity modulation formats, semiconductor optical amplifiers, and selective compensation protocols.

Background
Fiber optic communications is the underpinning of the information revolution we enjoy today, and at the heart of this exciting technology are two fundamental questions – what wavelengths of light should be used and how much information can we channel? The question of wavelength features two factors that guide physicists: dispersion and attenuation. Dispersion is the wavelength (color) varying propagation speed of light in a waveguide which results in pulse broadening. Attenuation is the umbrella term for loss, and includes absorption and scatter; both of which results in decreasing the signal's strength. Unfortunately, the wavelength for which these two factors are at their very minimum is not the same. This dilemma has led to the development of technologies to compensate for one of the two degrading elements. Industry has accepted 1.55 μm and 1.31 μm as standards since these represent the minimum attenuation and dispersion, respectively. First, the choice between these wavelengths must be based upon the distance over which the information is to be sent. Next, the question of information capacity falls to our ability to produce and resolve wavelength comb packets within each of these operational wavelength bands.

Researchers at UCF have set out to double the capacity of the existing infrastructure by using bands around both these wavelengths at the same time. The result of this work is the invention presented herein: a system that allows the transmission of information in both wavelength bands over the same single mode fiber, thus minimizing dispersion and attenuation and maximizing signal strength and capacity.

Application
This technology can be easily integrated into existing and new optical fiber systems, and has the potential to significantly expand the information capacity of the world wide fiber communications infrastructures. The invention would be of particular interest to telecommunications companies to increase the capabilities of their existing fiber optic lines.

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