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Inventor(s)

LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (City, State or Foreign Country)
Tew	Claude	E.	8215 San Leandro Dr., Dallas, TX 75218

TITLE OF INVENTION:
MICROMIRROR WAVELENGTH EQUALIZER

CORRESPONDENCE ADDRESS:
Charles A. Brill
Texas Instruments Incorporated
P.O. Box 655474, MS 3999
Dallas, Texas 75265

PHONE: (972) 917-4379
FAX: (972) 917-4418

Was this invention made under a Government contract? ___X___ No _____ Yes

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Respectfully submitted,

Charles A. Brill
Reg. No. 37,786

Date: Nov. 30, 2000

PROVISIONAL APPLICATION ONLY

MICROMIRROR WAVELENGTH EQUALIZER

FIELD OF THE INVENTION

This invention relates to the field of optical systems, particularly to fiber optic communication systems.

BACKGROUND OF THE INVENTION

Modulated light beams carry information in fiber optic communication systems. A single fiber carries several light beams, and therefore several separate information streams. Each light beam in the fiber has a unique wavelength. When necessary, the light beams are separated by wavelength and routed to their particular destination. Through the course of the network, various wavelengths come from different sources and along different paths. This typically results in the different wavelengths having different amplitudes.

When the various amplitudes have different wavelengths, optical amplification is difficult. An unequalized signal passing through an optical amplifier remains unequalized. The disparity between the various signals can become even worse upon amplification. EFDA are the amplifier of choice because they have gain across the entire spectrum of interest. When amplified by an EFDA, the stronger signals in the unequalized source are spontaneously matched/amplified, robbing from the weaker signals.

When unequalized signals pass through cascaded amplifiers, the equalization problem cascades as well. The worst case result is that the weaker signals become weaker and weaker until the information in the weak signals is not recoverable. What is needed it a method of equalizing the signal strength between the various wavelengths in an optical fiber.

SUMMARY OF THE INVENTION

Objects and advantages will be obvious, and will in part appear hereinafter and will be accomplished by the present invention which provides a method and system for wavelength equalization. One embodiment of the claimed invention provides a wavelength equalizer. The wavelength equalizer comprises an input waveguide, an output waveguide, a wavelength separation device, and a micromirror array. The wavelength separation device divides the input beam of light into sub-beams. A first sub-array of the micromirrors in the micromirror array are operable between a first and second position. The first position directing light in the sub-beam to the output waveguide, and the second position excluding the light in the sub-beam from the output waveguide.

According to another embodiment of the wavelength equalizer, a method of equalizing a plurality of components of an optical input signal is provided. The method comprises: separating the components, directing each component to a sub-array of a micromirror array, positioning micromirrors in each sub-array such that micromirrors in a first position direct incident light to an output waveguide and micromirrors in a second position do not, and combining the sub-beams into an output beam of light.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a small portion of a micromirror array of the prior art.

FIGURE 2 is an exploded perspective view of a single micromirror element from the micromirror array of Figure 1.

FIGURE 3 is a schematic view of one embodiment of a wavelength equalizer according to the present invention.

FIGURE 4 is a schematic view of one embodiment of a wavelength equalizer according to the present invention using a detector to sense the strength of the input signals.

FIGURE 5 is a schematic view of another embodiment of a wavelength equalizer according to the present invention that operates without the use of a fixed mirror.

FIGURE 6 is a schematic view of another embodiment of a wavelength equalizer according to the present invention similar to the embodiment of Figure 5, using both a detector and a light trap.

FIGURE 7 is a schematic view of another embodiment of a wavelength equalizer according to the present invention that does not require a circulator or other light separation device.

FIGURE 8 is a schematic view of another embodiment of a wavelength equalizer according to the present invention using a retro-reflector and two groups of mirror elements and having an output power monitor.

FIGURE 9 is a schematic view of another embodiment of a wavelength equalizer according to the present invention using a retro-reflector and two groups of mirror elements and having an output power monitor.

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