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(54) **WIRELESS OPTICAL COMMUNICATIONS
WITHOUT ELECTRONICS**

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(58) **Field of Search** 385/31, 16, 17, 385/39, 24, 50, 124; 359/118, 144, 172, 152, 119, 113, 174, 125, 124; 372/6, 23, 92, 102

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(57) **ABSTRACT**

A system for exchanging optical signals between two separate locations. Each location is provided with a transceiver that includes a transmitter and a receiver. Both the transmitter and the receiver are based on a transceiver unit, used as a transmitter unit in the transmitter and as a receiver unit in the receiver. The transceiver unit includes a multimode optical waveguide and imaging optics that collimates the light emerging from the waveguide in the transmitter implementation of the unit and that focuses incoming light onto the waveguide in the receiver implementation of the unit. The waveguide is terminated by a FC/APC to suppress reflections at the waveguide/air interface. In each transceiver, the units are mounted in clusters, with their optical axes all parallel. Transmitter units of a transmitter cluster are optically coupled via a splitter to a common input waveguide, possibly via one or more optical amplifiers. Receiver units of a receiver cluster are optically coupled via a combiner to a common output waveguide. Alternatively, the receiver includes an airlink receiver to convert incoming optical signals to electronic signals and a converter unit to convert the electronic signals back to optical signals. The common waveguides in turn are optically coupled to network interface units at each location. Transceivers are aimed at each other to exchange optical signals between the two locations.

12 Claims, 6 Drawing Sheets

