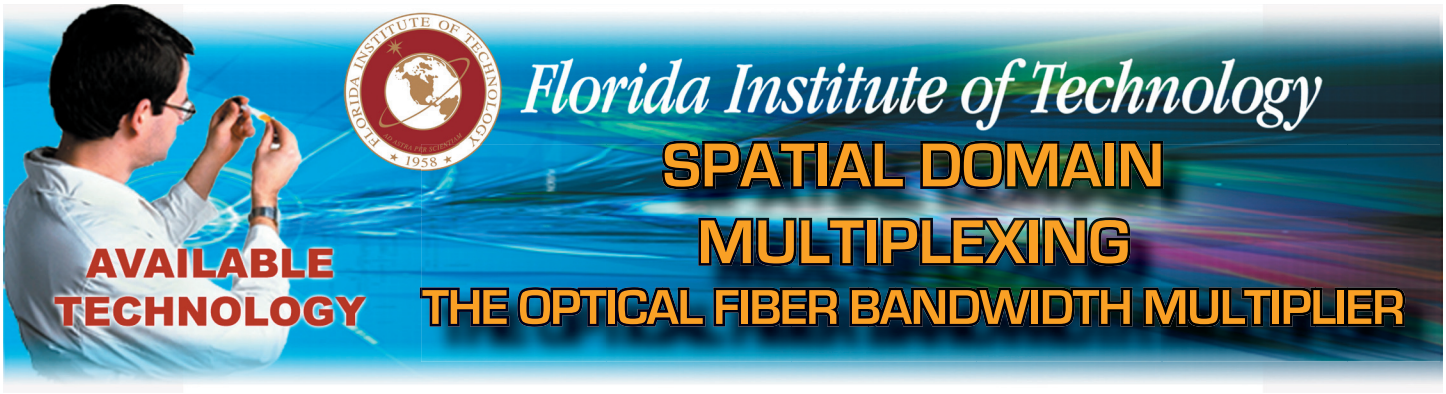

Summary

A novel and revolutionary spatial domain multiplexing technique for optical fibers has been developed. This technique provides a method to launch, transport and detect two or more optical channels operating at exactly the same wavelength inside an optical fiber. Hence the bandwidth of existing and new optical fiber systems can be doubled, tripled or increased by multiple folds. It adds a new dimension to existing multiplexing techniques and complements time division multiplexing (TDM) as well as wavelength/dense wavelength division-multiplexing (WDM/DWDM) techniques.

The Technology

Target Industry Overview

The optical communications technology encountered an unprecedented growth during the dot com era that outpaced the performance of digital semiconductor systems. Despite tremendous commercial success, research investment in this field has mostly been short term. Groundbreaking research is necessary to sustain the growth in information transfer capacity. There has been a continuous push toward denser wavelength division multiplexing with some success, as incremental advances over existing technologies are reported on a regular basis. The current market situation and its effect on communications sector has lead to stagnation, especially in industry-sponsored R&D. To make the situation worse, development in existing technologies, including DWDM is maturing to the point of diminishing returns.

Therefore, the goal of increasing total capacity in optical communications and networking requires new concepts for basic transmission media. Quantum growth in transmission data rates can only be addressed by implementing new modulation techniques, such as spatial multiplexing.

Commercial Applications

This technique can increase the data carrying capacity of optical fibers by orders of magnitude. Even the bandwidth of existing multimode fibers can be doubled with minimal effort. Additionally, this technique can provide enhanced data assurance and can be used for encryption purposes to secure communications links without sacrificing bandwidth. This technique can also be used for optical switching and routing applications. In addition to the communications industry, this breakthrough has applications in perimeter security and securing mobile assets. Besides the commercial aspects, it can also be used as a global sensing scheme for missile defense and many other DoD applications.

Stage of Technology Development and Commercialization

Successfully transmitted and received two spatially modulated channels on a standard communications grade silica fiber that was subjected to tight bends and mechanical and fusion splices. Current efforts are focused on characterization of two channels on standard multimode fibers and development of field deployable units.

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