

Hybrid Subcarrier Multiplexed Spectral-Amplitude-Coding Optical CDMA System Performance for Point-to-Point Optical Transmissions

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ABSTRACT

A hybrid subcarrier multiplexed spectral-amplitude-coding optical code-division-multiple-access (SCM SAC-OCDMA) system is presented. This hybrid system is proposed for the purpose of combining the advantages of both techniques. The SCM technique is used because of its ability to enhance the channel data rate of OCDMA system. SAC-OCDMA is employed because of its ability to eliminate the multiple-access interference (MAI) when code sequences with fixed in-phase cross correlation are used. The system utilizes modified double-weight (MDW) code which is of a double-weight (DW) code family variation that has variable weight of greater than two. The performance of the hybrid system using MDW code to support point-to-point transmission, is shown through experimentally-simulated results of signal-to-noise ratio (SNR) and eye patterns for data rate of 155Mbps with various numbers of channels.

Key words: Hybrid SCM SAC-OCDMA, Multiple access interference, Modified double weight code, Subcarrier multiplexed

INTRODUCTION

In SCM system, the information signals are modulated onto different electrical carriers at radio or microwave frequencies and combined. The resulting signals are then used to modulate the intensity an optical carrier. At the receiver end, the optical signal is converted back to an electrical current by a photodetector. The particular signals can then be demultiplexed and demodulated, using conventional methods. The attractive feature of SCM is the independence of the different channels. This allows for great flexibility in the choice of modulation schemes. In addition to being flexible, the current SCM technology is also cost-effective as it provides a way to take advantage of the multi-gigahertz bandwidth of the fiber optics, using well-established microwave techniques for which components are commercially