

# Abstract

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## **Enhanced Spectral Amplitude Coding OCDMA System Utilizing a Single Photodiode Detection**

In this paper, the performance of a spectral amplitude coding-optical code division multiple access (SAC-OCDMA) system is investigated utilizing a single photodiode (SPD) detection technique. The proposed system uses enhanced double weight (EDW) codes as signature codes with three simultaneous users to overcome both phase-induced intensity noise (PIIN) and multiple access interference (MAI). In addition, a dispersion compensating fiber (DCF) is used in order to decrease the group velocity dispersion (GVD) caused in the single mode fiber. An erbium-doped fiber amplifier (EDFA) is used to overcome the attenuation. The use of both DCF and EDFA leads to an appreciable enhancement in the system performance. The system performance is evaluated through its bit error rate (BER), Q-factor, and received power. A comparison between the EDW codes and modified double weight (MDW) codes on the SAC-OCDMA system is demonstrated. Simulation is carried out through Optisystem ver. 7. The simulation results show that: (a) using an avalanche photodiode (APD) over PIN photodiode allows data transmission over longer distances (b) the use of DCF improves the system BER (c) using MDW codes gives better BER than using EDW codes.