

# **A new code design for spectral amplitude coding optical CDMA systems using fiber bragg-grating**

## **Abstract**

In this paper, we present the performance of a new code called Dynamic Cyclic Shift (DCS) code for Spectral Amplitude Coding (SAC) optical Code Division Multiple Access (CDMA) networks, using Fiber Bragg-Grating (FBG). FBG consists of a fiber segment whose index of reflection varies periodically along its length. One of the important properties of the DCS code is that the cross-correlation  $\leq 1$  between the code words, which means that the Phase Induced Intensity Noise (PIIN) is reduced. We find that the performance of the DCS code is better than Random Diagonal (RD) and Modified Frequency Hopping (MFH). It is observed through simulation and theoretical results that the bit-error rate (BER) of the DCS code is significantly better than other codes. Proof-of-principle simulations of encoding with six channels, and 10 Gb/s data transmission is successfully demonstrated together with FBG Encoder/Decoder scheme.