

## Improving BER Using RD Code for Spectral Amplitude Coding Optical CDMA Network

### Abstract:

A new code for spectral-amplitude coding optical code-division multiple-access system is proposed called random diagonal (RD) code. This code is constructed using code segment and data segment. One of the important properties of this code is that the cross correlation at data segment is always zero, which means that phase intensity induced noise (PIIN) is reduced. For the performance analysis, the effects of phase-induced intensity noise, shot noise, and thermal noise are considered simultaneously. Bit-error rate (BER) performance is compared with Hadamard and modified frequency hopping (MFH) codes. It is shown that the system using this new code matrices not only suppress PIIN, but also allows larger number of active users compare with other codes. Simulation results shown that using point to point transmission with three encoded channels, RD code has better BER performance than other codes, also its found that at 0 dbm PIIN noise are  $10^{-10}$  and  $10^{-11}$  for RD and MFH respectively.