

# Performance enhancement of multiple access 3D-OCDMA networks using a pascal triangle codes

## Abstract

In this paper, a novel Three Dimensional Pascal's Triangle Zero Cross Correlation (3D-PTZCC) code is proposed for non coherent Spectral Amplitude Coding Optical Code Division Multiple Access systems with a spectral/time/spatial combination and direct detection at the level of the receiver. The proposed code is based on (1D-PTZCC) and (2D-PTZCC) codes using Pascal's Triangle rule. Its structure can minimise the receiver complexity of 3D-Perfect/Multi Diagonal (3D-PD/MD) and 3D-Perfect Difference (3D-PD) codes. The simulation results prove that systems using the proposed code can support a high data rate, high signal power and large number of simultaneous users with less power consuming. The code can save the received power by around  $-5.5$  dBm and  $-3.7$  dBm and the system capacity can be enhanced by 4.7 and 3.85 times compared to the systems using (3D-PD/MD) and (3D-PD) codes.

## Keywords

Data rate; OCDMA systems; Pascal's triangle zero cross correlation (PTZCC) code; Received power; The signal to noise ratio (SNR)