

## **A divided spectrum balanced detection technique for intensity noise reduction in SAC OCDMA systems**

### **Abstract**

In this paper we propose a simple divided spectrum balanced detection (DSBD) for spectral amplitude coding (SAC) optical code division multiple access (OCDMA) systems. SAC OCDMA systems are limited by phase induced intensity noise (PIIN), which is a signal dependent source of noise. Our proposed technique reduces the PIIN by dividing the spectrum of the signal into two or more, and detecting each spectrum by a different photodiode. The DSBD scheme reduces the detected optical power at photodetection, thus resulting in a higher mitigation of the PIIN. Theoretical results show that DSBD demonstrate noticeable improvement over traditional balanced detection technique, for example an up to 33% increase in the number of active users can be achieved, and at least  $1 \times 10^{-3}$  b/s/Hz increase in the spectral efficiency is obtained. However, the DSBD is more complex and append more constraints on system components.

### **Keywords**

Balanced detection; Divided spectrum balanced detection (DSBD); OCDMA; Optical code division multiple access; Phase induced intensity noise (PIIN); Spectral amplitude coding (SAC)