

## A 40 Gb/s duty-cycle/polarization division multiplexing system

### ABSTRACT

Ever increasing demand for higher bandwidth and capacity requests more efficient multiplexing techniques. To increase supportable subscribers in networks, hybrid fiber optic systems have been proposed lately. In this research work a combination of polarization division multiplexing (PDM) and duty-cycle division multiplexing (DCDM) system is proposed for long haul communication. In the proposed system each PDM channel carries 2-channel DCDM where each user is operating at data rate of 10 Gb/s which forms  $2 \times 2 \times 10$  Gb/s optical system. Results show that the bit error rate of  $10^{-9}$  for worst user is achieved at received power per chip of 21.12 dBm and optical signal to noise ratio of 22.08. Furthermore, system analysis demonstrates that the proposed system can tolerate the  $\pm 10$  ps/nm dispersion without any need for compensation.

**Keyword:** Optical communication; Hybrid modulation; Polarization division multiplexing; Duty-cycle division multiplexing