

Analysis of return-to-zero-on-off-keying over absolute polar duty cycle division multiplexing in dispersive transmission medium

ABSTRACT

We propose and investigate a technique to reduce the spectral width as well as increase the tolerance to chromatic dispersion (CD) using improved return-to-zero (RZ) on-off-keying (OOK) over absolute polar duty cycle division multiplexing (AP-DCDM) technique. The proposed channel multiplexing and demultiplexing are performed electrically using only one modulator for n number of users, which is very economical. It is demonstrated that the spectral width occupied by 30 Gb/s RZ-OOK without AP-DCDM measured at -20 dB from the peak power is around 105 GHz whereas, this value can be reduced to around 64 GHz for 30 Gb/s RZ-OOK over AP-DCDM. This amount of saving in the spectral width is a significant achievement, which leads to better tolerance to CD. Its tolerance to CD is in the range of plusmn109 and plusmn155 ps/nm, for the worst and the best users, respectively. These values are higher than that of 30 Gb/s conventional RZ-OOK, which is around plusmn86.5 ps/nm. At 120 Gb/s RZ-OOK over AP-DCDM (the worst user) has pre-amplified receiver sensitivity and optical signal to noise ratio (OSNR) of -22.5 dBm and 28.57 dB, respectively.

Keyword: Channel multiplexing; Optical signal processing; Signal receivers; Signal to noise ratio