CHARACTERISTICS ANALYSIS OF STIMULATED RAMAN SCATTERING EFFECTS ON BIDIRECTIONAL WDM-PON

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ABSTRACT

In this paper, the nonlinear effect of Stimulated Raman Scattering (SRS) been studied on next generation network WDM-PON which can deliver huge bandwidth to customer premises. The simulation been done using OptiSystem software, the results has been shown for multiple input powers, it is observed that the power penalty becomes higher at higher input power, higher number of channels and higher bit rates used for transmission.

Key words: WDM-PON, SRS, BER, Q Factor, Nonlinear Effects, Bidirectional.

INTRODUCTION

Non-linear properties of fiber start to show as the number of data channel, transmission length, data rate & power level increase. Mainly non-linearity occurs in fiber because refractive index dependence on power going through fibre. This can be shown by equation (1)

$$n = no + n2\ (P/Aeff)\ [1] \qquad (1)$$

Here, no is core refractive index, n2 is non linear refractive index coefficient, P is optical power in watt and Aeff is fiber core's effective area [1]. Practically, any change in refractive index with optical power is small but this becomes effective when the length of fiber is hundreds of kilometer.

Nonlinear effects including stimulated Raman scattering (SRS), stimulated Brillouin scattering, four wave mixing, self and cross-phase modulation [1-2]. Among all these effects, stimulated Raman scattering (SRS) is one of the major limitations of system performance. The Raman scattering effect is the inelastic scattering [3] of a photon with an optical photon, which can start from a finite response time of the third order nonlinear polarization [4] of the material.