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OSNR monitoring in optical fiber communication systems

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Abstract

Optical signal to noise ratio (OSNR) is a critical parameter that determines the performance of optical transmission system. For future smart optical networks, real-time monitoring for OSNR becomes more necessary for the system management. In this paper, we review our OSNR monitoring techniques based on RF power measurement, which is simple and cost-effective. After the optical signal and noise is detected by the square law detection, the relationship between optical signal and noise is transformed into the relationship between electrical signal and noise. We can remove signal in both electrical domain and optical domain. In electrical domain, we remove signal by balanced subtraction between correlated signals, leaving uncorrelated beat noise. In optical domain, optical signal can be removed by our proposed notch filter. After signal is removed in large scales, the rest part will be noise dominant, which can be used to estimate noise power. When the fiber link induced chromatic dispersion (CD) and polarization-mode dispersion (PMD) accompany optical signal, the high frequency components of received RF signal will be affected by the residual CD and PMD, which introduces OSNR monitoring error. We propose using low bandwidth photo detector in the monitoring scheme, which can not only reduce the cost, but also minimize the effects of CD and PMD.

Biography

Changyuan Yu has been an asst. professor at Dept. of Electrical and Computer Engineering, National Univ. of Singapore since 12/2005. He is also a joint senior scientist with A*STAR Institute for Infocomm Research. He received his Ph.D. in Electrical Engineering from the Univ. of Southern California, USA in 2005. He was a visiting researcher at NEC Labs America in 2005. His research focuses on optical fiber communication and sensor systems. Dr. Yu has authored/co-authored 5 book chapters and over 180 research papers, and served as a technical program committee co-chair/member for a few International conferences.