

Electronic and Photonic Processing in Advanced Photonic Long-Haul Transmission

Le Nguyen Binh

Department of Electrical and Computer Systems Engineering, Monash University, Clayton, Victoria 3168 Australia.

le.nguyen.binh@eng.monash.edu.au

The advancement of electronic integrated circuit technology and photonics in the last decade have allowed the design and demonstration of ultra-high bit-rate transmission over advanced optical fiber transmission line employing in-line optical amplification as well as electronic compensation and equalisation of linear and nonlinear distortion effects. The research and development of novel modulation techniques to achieve effective signal bandwidth and energy distribution per bit for extending the transmission reach are also attracting intensive interests. This paper presents: (i) A brief overview of optical fiber communications employing advanced modulation and novel formats, especially the amplitude and phase shift keying (ii) Distortion and dispersion effects due to linear and nonlinear effects and experimental demonstration of electronic and photonic compensation methodologies (iii) Practical demonstration of the transmission of multiple channels at 40 Gb/s over several fiber spans of dispersion managed optical fibers (iv) Demonstration of 40 Gb/s over 10 Gb/s wavelength multiplexed optically amplified long haul transmission for capacity upgrading.