

# High Capacity Optical Networks

## Project Leader

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## Objective

High capacity networks are indispensable for next generation networks. Wavelength Division Multiplexing (WDM) and optical pass routing are key technologies for such networks. The realization of these networks presents a number of problems, such as fiber nonlinearity, ultra high speed electronics and optical pass routing. In this research, we will investigate techniques to compensate for fiber-nonlinear degradation and optical frequency conversion techniques for all optical networks.

## Project Outline

### (1) Fiber nonlinear degradation compensation

Fiber nonlinearity impairments in WDM systems are becoming more and more detrimental, since fiber input power is increasing and optical amplifiers accumulate the impairments. We investigate fiber-nonlinearity impairment compensation techniques using digital coherent detection and signal processing[1]. In this research, we will apply our proposed scheme to WDM transmission systems and validate the performance of the compensation scheme

### (2) Optical frequency conversion

The optical frequency conversion using optical (single-sideband) SSB modulator and Arrayed Waveguide Grating (AWG) has several merits, including signal format independence and accurate frequency change (2). We will apply the proposed scheme to several modulation/demodulation schemes and convert optical signal frequencies using optical label signals.

## References

- (1) Jing Liang and K. Iwashita, "A Novel Compensation Method for FWM Impairments based on Cancellation by Estimated Components in Digital Coherent Detection," *IEEE Photonics Technology Letters*, Vol.23, No.19, pp.1394-1396, Oct. 2011
- (2) H. Mima and K. Iwashita, "A Novel wavelength Converter Based in Optical Single-Sideband Modulator and Arrayed Waveguide Grating," *The 17<sup>th</sup> OptoElectronics and Communications Conference(OECC 2012)*, P1-10, 2012

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