



Uenohara Lab.

Research on Optical Signal Processing Techniques for Photonic Networks and Related Photonic Integration Device

Photonics Integration System Research Core, FIRST

<http://vcSEL-www.pi.titech.ac.jp>

- Photonic integrated devices for high-speed, high-efficient optical signal processing
- Linear, nonlinear compensation for optical transmission signals
- Wavelength conversion, Optical switching, edge/cloud computing platform

In recent optical fiber communication system: high-spectral efficient multi-level, multi-carrier modulation format, and linear and nonlinear compensation, seamless connection of wired with wireless signals with edge-convergence have been required to achieve large capacity and flexible networks with 400Gbps/ch and > 10Pbps/fiber.

To meet these requirements, optical signal compensation with intensity/phase processing, and neural network have been investigated. In addition, all-optical signal processing with comb-generated pump with SSB modulation and four-wave-mixing for defragmentation, optical OFDM subcarrier add/drop function, and optical switching for low latency edge/cloud computing platform.

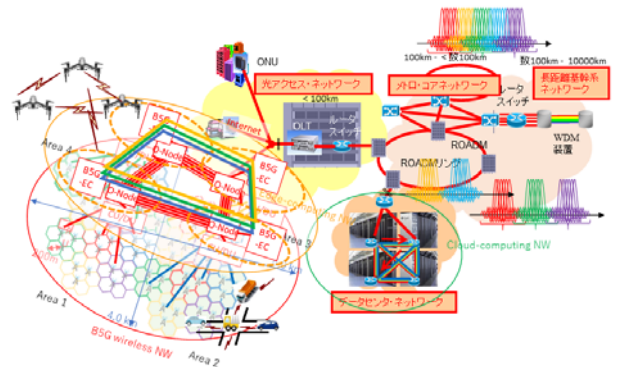
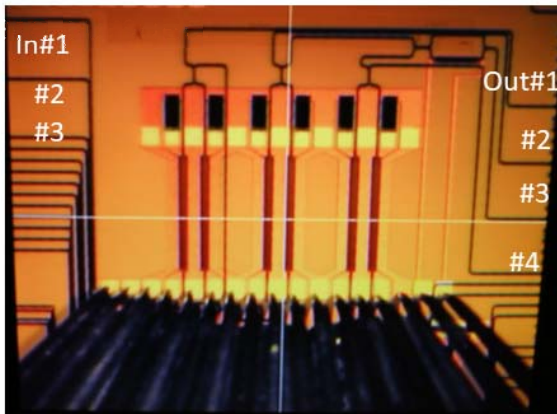
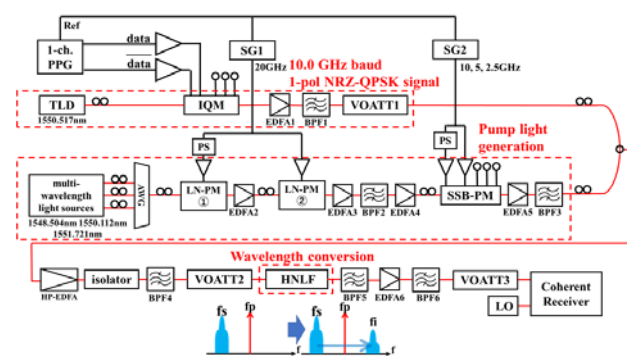
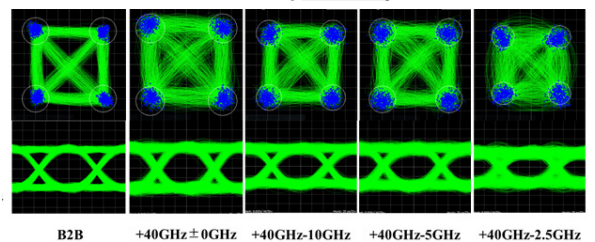


Image of optical network development



Si photonics optical switching circuit with WDM-DEMUX/MUX filters for edge/cloud computing platform

- High-integration with silicon photonics technology
- High functionality by integration of optical switches with optical filters



All-optical wavelength conversion with FWM in nonlinear medium for wavelength defragmentation

- High frequency resolution of wavelength assignment with 2-stage optical comb generated pump (upper: Experimental setup, lower: constellation)