Optical interposer for 10-Tbps interconnection

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Abstract – One of the solutions toward 10-Tbps is optical interconnection. Figure 2 shows our proposed optical interposer for realizing 10-Tbps bandwidth. The optical interposer consists of silicon photonics integrated circuits, polymer waveguides, LSI, optical connector, and printed circuit board. For reducing the loss of the high-speed electrical signal, the distance between silicon photonics integrated circuits and LSI was minimized by embedding the silicon photonics integrated circuits into the printed circuit board. Furthermore, for easily connecting between silicon waveguide and SMF, the polymer waveguides and polymer mirrors are used.

For realizing 10Tbps, three transceiver chips as shown in Fig. 2 are required, which consist of 112 Gbps per a wavelength and 16-wavelengths WDM. Then, we have been developing 112 Gbps PAM4 modulator and receiver, and 16 WDM coupler. We will introduce the detail of these devices in our presentation.

This paper is based on results obtained from a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO).
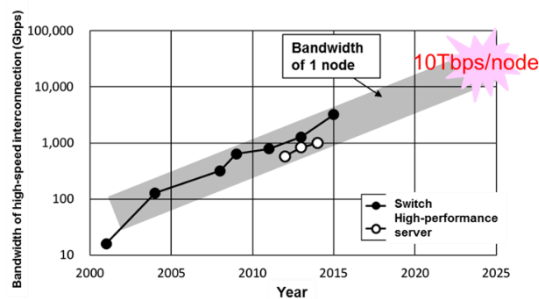
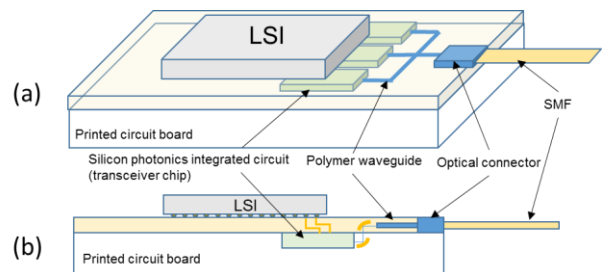Fig. 1 Trend of interconnection bandwidth in high-performance LSI

Fig. 2 Optical interposer for 10-Tbps bandwidth
(a) Three-dimensional view
(b) Cross-sectional view

Bio – Takahiro Nakamura is currently a Chief Manager for the Photonics and Electronics Technology Research Association on a temporary basis and a project professor in the University of Tokyo. He is a member of the Institute of Electronics, Information and Communication Engineers of Japan. He received the B.E., M.E., and D.E. degrees in electrical engineering from Osaka University in 1986, 1988, and 2005, respectively. He joined NEC Corporation, Kawasaki, Japan in 1988, where he engaged in research and development on laser diodes and silicon photonics.