Technological breakthrough in Silicon Photonics: Intel Silicon-based Optical Modulator Could Run Faster Than 1GHz

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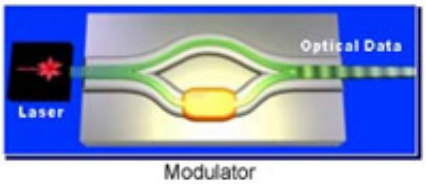

Modulator

Intel researchers have developed a silicon-based optical modulator operating at 1GHz -- an increase of over 50 times the previous research record of about 20MHz. Fabricated in an Intel Fab using Intel's existing high-volume manufacturing processes, the device incorporates a transistor-like structure to encode data onto a wavelength of light.

Intel's breakthrough modulator takes an incoming light beam and splits it into two beams. The beams are then "phase shifted" relative to each other to change the amplitude of the resulting, recombined beam. The result is the ability to change light from bright to dark and thus encode data.

Fast modulation has been one of the critical technical barriers to making photonic — also known as fiber-optic or opto-electronic — devices out of silicon. Intel simulations show that its silicon optical modulator could

run much faster than 1GHz, making it possible to extend Moore's Law into the development of silicon photonic devices.

Intel is focusing on ways to "siliconize" photonics and bring the benefits of Intel's volume manufacturing expertise to optical communications. Intel's goal is to make integrated, inexpensive photonic devices out of silicon instead of the exotic materials used today.

By demonstrating how optical modulators can be made out of silicon using Intel's standard manufacturing processes in an existing fab, Intel researchers have removed a significant cost barrier in photonics. The next step is integrating entire photonic devices on a chip with digital intelligence. This should pave the way to produce photonics products based on silicon.

Intel expects to achieve even greater bandwidth in silicon photonic devices by multiplexing many data streams onto multiple wavelengths of light onto one optical fiber. This approach could bring silicon photonics into an age where enormous amounts of data can be exchanged at high speeds on a single fiber.

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