# New optical transmitter enables better communication networks

January 29 2016

All the world's data – pictures, video, sounds, and text – has to traverse complex networks of optical fibers that crisscross cities, regions, and countries. To better handle the glut of information, a research team from NOKIA Bell Labs, have developed a new device that could become a crucial component of new flexible and optimized networks.

The device, a bandwidth variable transmitter (BVT), converts electronic signals to optical signals – but with a bandwidth that can change depending on need. And, it works without service interruptions, an advantage known as being "hitless."

"It's really the first transmitter that can transmit data in optical transmission networks with a bit rate change in a hitless way," said Arnaud Dupas, NOKIA Bell Labs, France. "As network demands continue to grow, this device will help to enable optical networks of the future with seamless network optimization and flexibility."

Dupas will be describing the device at The Optical Fiber Communication and Exhibition Conference (OFC), held 20-24 March in Anaheim, California, USA.

The growth of data traffic has required the development of elastic optical networks, which are flexible enough to handle a wide range of data types and transmission rates. But even without these networks, traffic is dynamic, depending on the time of day and changing demands.

Signals also don't simply travel from one point to another. Nodes in the networks have filtering functions that select and redirect signals, adding another level of variability. And, the networks themselves constantly evolve over time, as people add and change those filtering functions.

A transmitter that can adjust for varying bandwidths allows for optimized performance without requiring constant upgrades of infrastructure – which would be impractical and expensive.

Most BVTs work by changing the format of the optical signal, converting between digital and analog formats, Dupas said. But the researchers' new BVT instead changes the symbol rate, also known as Baud rate, which is the number of signal events transmitted per second (a single signal event can encode one or several bits of information).

The advantage of focusing on the symbol rate is that it's easier to implement with electronics and is cost-effective, Dupas explained. This approach incorporates smart processing and makes the transmitter hitless, allowing it to work without interruption and data loss. Normally, transmitters have to reconfigure themselves when interrupted, which can take several seconds or minutes and requires the traffic to be stopped. But the new transmitter can configure itself in less than 450 microseconds.

The device connects to a commercially available optical transport network switch, which aggregates all kinds of signals, such as video and audio, and puts it through the transmitter. It works at a bit rate between 10 and 107 Gigabits per second.

The BVT is still a prototype, and would be only one piece of a large flexible optical network. The next step, Dupas says, will be to test it in the field with network operators, integrating it with the management software and systems that control a network from end-to-end.

**More information:** Presentation: "Hitless 100 Gbit/s OTN Bandwidth Variable Transmitter for Software-Defined Networks," by A. Dupas, P. Layec, E. Dutisseuil, S. Bigo, S. Belotti, S. Misto, S. Annoni, Y. Yan, E. Hugues-Salas, G. Zervas, and D. Simeonidou

Provided by Optical Society of America