Centre for Integrated Photonics

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Innovative reflective semiconductor optical amplifier optimized for next-generation passive optical networks

** low-cost TO-56 device delivers 1.25 Gbits/sec transmission with uncooled and 'colourless' operation*
** allows PON fiber infrastructure to be upgraded to high capacity WDM*

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At OFC 2007, the photonics supplier, **The Centre for Integrated Photonics (CIP)** is launching an innovative reflective semiconductor optical amplifier (RSOA) family which offers both the performance and economy needed to implement advanced PONs (passive optical networks) based on wavelength division multiplexing (WDM).

Capable of delivering more than 20 dB of optical gain, the new component provides optical data transmission at rates up to 1.25 Gbits/sec - without need for either a local wavelength stabilised source or temperature control. This combination of performance and economy for consumer optical network unit (ONU) applications provides a platform for access network providers to boost performance radically compared with today's EPON/GPON (Ethernet/Gigabit-capable) PON technologies.

To support the cost and manufacturing demands of access network companies, the RSOA component is being made available in a low-cost TO-56 can package, for easy integration into micro-optic assemblies for consumers. CIP has also entered into a manufacturing agreement with an Asia-Pacific optics producer with the capacity to deliver the high volumes required for major PON roll-outs. The RSOA device itself is monolithic, and fabricated using a proven InP (indium phosphide) process that is well suited to high-yield volume manufacture.

CIP's RSOA component provides high-speed transmission capability for clients in WDM-PON networks by reflecting and modulating a 'seed' light that is transmitted throughout the network. Light from a broadband source can be split into different wavelengths easily for use in different segments of the network by means of an arrayed waveguide grating (AWG) — a readily available component. This architecture allows the RSOA to deliver dedicated gigabit optical data transmission facility to clients in fiber-to-the-home/premises (FTTH/FTTP) access network architectures — without the expense of a tuneable wavelength source at the ONU. In addition to minimizing the costs of the 'BIDI' (bidirectional) fiber optic assembly required for client premises, this approach allows one standard BIDI to be manufactured and installed for all users.

WDM-based PONs can provide significant performance advantages, as they can upgrade the capacity of a single wavelength system by as many as 32. A WDM network can also eliminate or reduce the contention inherent in the time-domain multiplexed architectures of current EPONs/GPONs - providing operators with much more service flexibility and making the network more suitable for low latency applications such as gaming.

Research and development engineers have been investigating reflective SOAs for use in PON applications for a number of years, but such work is often based on standard amplifiers with less than optimal characteristics. CIP's new RSOA family features a novel curved waveguide architecture that provides a designed-for-purpose solution for WDM-PONs.

Data can be modulated at rates of up to 1.25 Gbits/sec from standard production devices (in lab conditions, CIP has achieved 2.5 Gbits/sec performance).

Two versions of the RSOA device are offered initially: polarization sensitive or polarization insensitive. The polarized version is able to operate over a range of 0 to 70 degrees C without any need for a temperature control device such as a TEC, further lowering the cost of transceiver assemblies for volume consumer applications.

Among the performance attributes for the polarization insensitive version, are smooth output characteristics with a gain ripple of just 0.5 dB typical and a small signal gain of 20 dB typical over a wavelength range from 1530 to 1570 nm in the C band (CIP can also produce the device for other wavelengths if required).

This highly optimized performance - which is believed to be unique on the market - provides the first practical building block for the development of flexible and cost-effective PONs based on wavelength division multiplexing. CIP is already working with PON systems partners who see this technology as ideal for next-generation networks.

The Centre for Integrated Photonics (CIP) is a leading supplier of advanced photonic hybrid integrated circuits and InP based optoelectronic chips, devices and modules for communications, biomedical, defence and industrial markets. CIP is also a major provider of technical services and consultancy in the photonics field. With 500 years of combined expertise in photonics, CIP refines research into viable products based on leading edge technologies, thus helping customers develop the photonic products of tomorrow. CIP's wide range of competencies is based on world-renowned research and is uniquely broad, incorporating III-V photonic materials, silicon micromachining, planar silica waveguides and systems measurements expertise. Together with state-of-the-art, ISO9001:2000 registered, co-located fabrication and pilot production facilities, CIP is able to help customers realise new exciting product ideas based on these technologies.

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