OFC highlights 10 & 40 Gb/s advances

Despite any slowdown in overall demand from telecoms system suppliers for optical components (see page 17), March's Optical Fiber Conference 2001 in Anaheim, CA. USA drew 80,000 visitors and over 800 exhibiting companies. It showed, in particular, that there is still strong demand for high-end fibre optic components, with many start-ups flourishing (see pages 24-30).

The continued demand for greater Internet speed and bandwidth is driving fibre optic networks to the OC-192 (10 Gb/s) data rate. OC-192 is fast becoming mainstream, especially since it allows cost - service providers are having to go to more efficient networks. This has led to a shortage of OC-192 components.

Companies showing OC-192 products at OFC included Larent Technologies spin-off Aarte Systems Inc (see page 26). Their 10Gbps tunable laser transmitter (for short- and long-haul networks) has a transmis- sion rate of up to 20 optical channels at 50 GHz intervals. The device is based on an electroabsorptive modulated laser (EML) technology that allows it to combine a tunable laser and an electroabsorptive modulator on a common platform, enabling reduced component inventories.

In particular, use of indium phosphide takes advantage of the physical phenomenon of electro-absorption by InP: This allows modulation of the continuous-wave optical output from DWDM lasers, as well as making the modulator much smaller and improving simplicity and system integration cost.

A higher level of integration and functionality of the device enables provisioning applications that are wavelength- and polarization- agile (i.e. switching different wavelengths in real time). This allows a shortened time-to-market for high-speed optical networking systems and cost savings through a reduction in component inventories.

Also evident at OFC, many new start-ups are turning toward the challenge of OC-768 (40 Gb/s) data rates (expected to enter volume production by 2003), while systems companies are developing all-optical switching, and others focus on the integration of photonics components (analogous to the creation of ICs in electronics), such as Genoa's semiconductor-based Linear Optical Amplifier (see page 30).

However, OC-768 will pose new challenges. Among problems at 40 Gb/s is chromatic mode dispersion (CMD), where the different transmission speed of different wavelengths of light in the fibre can degrade the digital signal.

The dispersion in the fibre can be counteracted by introducing a length of fibre with the correspondingly opposite dispersion. But this is not possible when more than one wavelength is transmitted in a WDM system, because each wavelength has a different rate of dispersion.

LaserComm (Plano, TX, USA) has developed its Hi-Mode Dispersion Management Device, which converts each wavelength to a higher harmonic mode at which it can accommodate precisely for each wavelength's dispersion. For 10 Gb/s, a Chirped version is in trials with DWDM suppliers. However, since carriers are aiming to double the number of channels per fibre to 160 by also using the longer wavelength L-band, an L-band version has been demonstrated (due for shipment in Q2/2001). However, these are passive devices. For OC-768 LaserComm plans an active device that will use feedback loops to detect any drift in the compensation process (which becomes more of a problem at higher speeds).

Phaethon Communications (Fremont, CA, USA) has also launched a dispersion management device based on a fibre Bragg grating, which uses a feedback loop to monitor the optical signal and adjust the grating as necessary.

However, another problem is polarisation mode dispersion (PMD), in which the light's polarisation drifts along the fibre. Phaethon is testing three methods and hopes to combine one of them with its CMD device.

Apart from the news from the Optical Fiber Communications conference in this issue (pages 22-30), such challenges for 40 Gb/s OC-768 data transmission will also be considered in a feature article in the next issue covering the choice between InP GaAs and SiGe for 40 Gb/s microelectronic ICs.

Network Photonics Inc (Boulder, CO, USA) has agreed a strategic partnership with Agility Communications Inc (Santa Barbara, CA, USA) to purchase their MP-based 40/10 High-Power Wavelength Tunable Lasers. They will also jointly develop and integrate them into all-optical networks (currenty being tested) - "essential to helping Network Photonics deliver its third-generation DWDM optical switching and transport systems".

The 4 mW 10nA laser (generally available in September) tunes to more than 100 ITU channels at any C-band wavelength in less than 10 ms. This enables dynamic management of DWDM optical networks and providing bandwidth on demand [unattainable with fixed wavelength or narrowly tunable lasers in current network infrastructure], while reducing network complexity and cost.

Agility's fab has the capacity to ramp to 1m lasers per year.

Agility has agreed a multi-source initiative with ADC (a provider of fibre optics, network equipment, software and integration services) to work towards initial standards for a 40-pin parallel form factor, electronic interfaces and host level software commands. This should provide:

- open interface options enabling easier design of systems around common, compatible widely tunable laser interfaces;
- at least two suppliers able to provide compatible products. Agility is also participating in similar initiatives through the Optical Internetworking Forum.