Photonics Components & SubSystems

MONTHLY NEWSLETTER

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FTTH ONT transceiver cost trends ($)				
	GPON -- triplexer	BPON -- triplexer	EPON -- diplexer	Ethernet P2P
2005	145	75	60	22
2006	120	65	50	19
2007	96	62	45	18
2008	77	59	41	17
2009	61	56	36	16
2010	52	53	33	15
Source: Roy Rubenstein, FibreSystems Europe				

In This Issue...

NEW PRODUCTS

Lynx introduces a new line of optical amplifiers

Lynx Photonic Networks (www.LynxPN.com), a supplier of optical network solutions, unveiled a new line of optical amplifiers, expanding its LightLEADER family of carrier-class standalone systems. The LightLEADER 6100T is the company's first rack-mountable erbium doped fiber amplifier (EDFA) system and boosts optical signals within fiber networks.

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Telco and cable operators can now extend the distance traffic can be carried by placing the LL6100 along the fiber path, reducing the need for expensive signal regeneration equipment.

EDFAs are used by telecom carriers in long-haul links and are particularly cost-effective when used in conjunction with DWDM links. Moreover, they are increasingly being used in regional and metro networks, as well. CATV networks use EDFAs to boost video signals, allowing distribution to more users at further distances, reducing network cost per subscriber.

"The LightLEADER 6100 was designed to meet the strict reliability criteria that are common to our entire LightLEADER platform," explained Beni Kopelovitz, president and CTO of Lynx. "These systems are based on a proprietary design that extends the product life well beyond what is common in the industry. Additionally, the wide temperature operating range makes the product suitable for deployment in outdoor conditions."

Oki Electric unveils next-generation hybrid STB

Oki Electric Industry Co., Ltd. announced that it will develop a next-generation hybrid set-top box (STB) equipped with Intel's high-performance media processor.

This processor will provide processing power and headroom for computationally intensive applications and services. OKI will provide this to cable and IP TV operators in China starting from the fiscal year ending March 2008.

OKI sees the coming trend in the convergence of broadcasting and telecommunication for broadcasting services in China. This is based on the expectation of digitalization of cable TVs in China with the coming 2008 Beijing Olympics and the termination of analog broadcasting service in 2015.

The need to converge cable and IP will continue to grow, as there have already been advanced cable TV operators who succeeded in launching value-added services using IP in some metropolitan areas.

"Intel welcomes the development of OKI's next-generation hybrid STB. Intel's consumer electronics platform provides a flexible, high-performance, highly integrated solution that will enable OKI to deliver compelling new usage models," said Tim Parker, Great Asia Region marketing director at Intel Corporation.

"The flexibility of this platform can create innovative applications to provide consumers with exceptional entertainment choices."

Bliley Technologies introduces new crystal oscillator

Bliley Technologies Inc., provider of crystal-based frequency control equipment, introduced its latest 5mm by 7mm temperature-compensated, voltage-controlled crystal oscillator (TCVCXO).

Fully RoHS compliant, Bliley's Stratum III TCVCXO is designed for wireless and wireline communication applications that demand high-performance frequency stability in a miniature package, say company representatives.

Target applications include cellular infrastructure, point-to-point radios, broadband access, and test equipment, as well as other communication equipment.

"The challenge for many wireless and wireline communication equipment manufacturers is to provide smaller, cost-effective designs without compromising performance," explained Marty Matthews, vice president of sales and marketing at Bliley Technologies. "Bliley's new T85B TCVCXO provides Stratum III frequency stability in a small, industry-standard package. We also will be introducing additional value-priced standard lines of precision crystals and oscillators in the near future."

Product specifications for Bliley's TCVCXO include the following:

- +/-0.28ppm frequency stability over temperature
- +/-4.6ppm frequency stability over all conditions (20 years of aging)
- Industry standard, 5mm by 7mm ceramic SMD package
- 5 to 52MHz operating frequency range
- Optional voltage-controlled frequency tuning
- Up to -40 degrees C to +85 degrees C operating temperature range
- CMOS or optional Clipped Sine Wave outputs
- 3.3V or 5.0V supply options.

Juniper Networks unveils 40Gbps interface card

Juniper Networks Inc. expanded its portfolio of IP and optical equipment by announcing a new T-series physical interface card (PIC) with long-reach optics and other advanced features that enable providers to reduce the cost and complexity of next-generation core networks.

Juniper's new 4xOC-192 PIC features standards-based 10-Gigabit Small Form Factor Pluggable optical transponders and inverse multiplexing to 40Gbps, providing what the company claims is unprecedented interoperability and service agility over optical transport and IP infrastructures. This flexible approach to optical integration enables service providers to improve operational efficiencies as they deploy next-generation core networks to support the increasing demand for emerging services such as IPTV and advanced multiplay offerings, says the company.

"NTT America has been using Juniper NGN solutions for our most critical backbone networks since 1998," reported Doug Junkins, vice president of IP Engineering, Global IP Network Business Unit, NTT America. "Products like Juniper's new 4xOC-192 PIC, with its range of uses and 40-Gbps capacity, are exactly the reason. These interfaces offer a feature that no one else can give us — we can integrate seamlessly with optical transport equipment while maintaining our existing management operations," he said.

The new 4xOC-192 PIC enables providers to transport either a single OC-768 stream or four discrete OC-192 connections by using cost-effective 10Gbps optical transponders and leveraging their installed base of T-series routers. XFP optics allow non-disruptive upgrades and interface additions while ensuring interoperability with a range of standards-based optical equipment.

"Since 1999, providers have recognized that capital equipment efficiency alone can't control service costs," admitted Tom Nolle, president and CEO of CIMI Corp. "Operations and administration takes about 70 cents of every dollar a provider earns, compared to 14 cents for capital equipment. Juniper is recognizing this reality by adding features to equipment whose goal is to help control operations costs, both by increased use of service automation and by establishing common interfaces and practices. It's not only a constructive step in creating a foundation for profitable services," Nolle says. "It's a critical one."

With an initial range of up to 80km — expandable as new optics become available — the new PIC supports regional inter-POP connections directly from existing routing platforms, reducing costs by eliminating the need for separate optical transponders. Along with the existing OC-768 PIC, the new PIC leverages the service richness of the industry's newest 40Gbps packet forwarding engine for T-series routers.

Juniper says the new PIC augments its existing IP optical integration technologies, including GMPLS innovations and the 10-Gigabit Ethernet (GbE) tunable DWDM PIC, which features extended reach and the ability to use the full ITU grid by selecting from 45 different wavelengths. With the ability to make

software adjustments for future wavelength additions, the M- and T-series PICs eliminate the requirement for external optical transponders in the network and enable immediate capital and operational savings, say Juniper representatives.

"SUNet has had Juniper's tunable 10-GE DWDM PIC installed for the last few months," reported Borge Josefsson, CTO at SUNet, the Swedish University Computer Network. "We strongly believe in this technology and are confident it will contribute to an operationally efficient DWDM solution," he said.

"Multiplay services such as IPTV are changing the face of the core IP infrastructure because they are driving new requirements for increased capacity in the core, as well as integration of the IP and optical networks," added Manoj Leelanivas, vice president of product management, Infrastructure Products Group, Juniper Networks. "Combining the intelligence of IP with the power of high-speed optical technologies is a critical milestone and raises the bar for next-generation core networks. We are very excited to be leading the industry with the introduction of this integrated technology," said Leelanivas, "and we look forwardm to bringing these capabilities and benefits to our customer to help them realize their next-generation network visions."

Kaiser Optical Systems develops advanced pulse compression gratings for ultrafast lasers

Kaiser Optical Systems Inc., a provider of holographic volume phase gratings for telecommunication, astronomy, and ultrafast laser applications, announced that it has developed a new line of pulse compression gratings for ultrafast laser applications.

Kaiser Optical Systems Inc. has developed its volume phase holographic (VPH) transmission gratings to support the ultrafast laser community. VPH gratings have very high diffraction efficiency and are ideal for use as the critical dispersion elements that allow laser pulses to be compressed into the femtosecond regime. A VPH transmission grating exhibits very low loss and low scatter. Each VPH grating is encapsulated between two glass substrates with antireflection coatings applied to the external surfaces. This results in a robust physical package that will withstand typical handling and can be cleaned with the same techniques used on high-quality lenses.

Apogee Photonics introduces next-generation lasers for 100 Gigabit optical networks

Apogee Photonics, supplier of the industry's broadest line of 10Gbps and 40Gbps laser sources for the communications industry, announced that it is introducing new laser sources designed to meet the rapid demand for very high speed optical data links. Apogee's new development efforts will enable the cost-effective transmission of the emerging class of "triple-play" applications — Internet, VoIP, and interactive video services — that are driving the future need for data link transmission speeds approaching 100Gbps.

In support of standards currently under development by the IEEE 802.3 Higher Speed Study Group, Apogee Photonics is developing a family of uncooled CWDM lasers that will support aggregate data rates of more than 100Gbps. Two product variations, both under consideration by the IEEE study group, will be available: first, a 20Gbps 1310nm EML used in a five-channel CWDM configuration and, alternatively, a 25Gbps EML in a four-channel configuration. These CWDM-based approaches to 100Gbps data links build on the highly successful LX4 implementation of 10GbE transponders, as well as the recently announced X40 1310nm CWDM solution for 40Gbps links.

The Apogee Photonics uncooled 20Gbps and 25Gbps 1310 EML lasers are based on the company's successful uncooled 10Gbps 1310nm EML sources, which have best-in-class

mask margin and the ability to operate uncooled over temperature ranges of -20 to 90 degrees Celsius. Apogee Photonics' uncooled 10Gbps 1310nm EML is deployed at Tier 1 OEM and module customers worldwide.

"The key advantage of Apogee Photonics' 10Gbps uncooled 1310nm EML is that the bandwidth can be significantly increased beyond 10Gbps, unlike directly modulated DFB's that are challenged at data rates above 10Gbps," said Milind Gokhale, CTO of Apogee Photonics. "In addition, the 20Gbps and 25Gbps EML sources support the 10km link distance targeted by the 802.3 Study Group."

CEO Mike Decelle said, "Apogee Photonics' goal is to develop enabling photonics technologies that anticipate future customer needs.

While the development of a 100GbE standard is only recently underway, our world-class indium phosphide technology portfolio is fully capable of supporting one of the candidate technologies for implementing the next advance in Ethernet transmission speeds. Our 10Gbps uncooled 1310nm EML is well established as the most reliable and highest performance laser source in its class, and it is upon this foundation that the next-generation of Ethernet technology can be enabled."

The Apogee Photonics EML lasers will be available for sample evaluation in early 2007 and, subject to ratification of the 100GbE IEEE standard, generally available as early as the second half of 2007.

Alfalight qualifies pump

Alfalight Inc., an innovative manufacturer of highly efficient and reliable high-power diode lasers, announced the availability and qualification of its 4-watt, 940nm multimode diode laser in accordance with the requirements of the Telcordia GR-468 standard.

The new diode laser provides exceptional reliability and is ideally suited for CATV and telecom applications.

"Telcordia qualification is a prerequisite to widespread deployment by telecommunications and CATV equipment manufacturers, and this achievement underscores the quality and reliability of Alfalight's diode laser products," said Ron Bechtold, vice president of sales and marketing at Alfalight. "As part of the qualification process, Alfalight provided an extensive range of thermal, mechanical, and environmental testing to prove the durability and lifetime of this laser for our customers."

Ample, Finisar work 10GE

Ample Communications, a provider of communications silicon for wireline network systems, and Finisar Corporation, a provider of fiber-optic solutions for high-speed data networks, announced interoperability between Ample's Redhawk dual-port 10-Gigabit Ethernet MAC and Finisar's pluggable XFP optical transceiver modules. This proven solution enables customers to reduce design time and cost for enterprise, security, and metro Ethernet switching platforms deploying 10-Gigabit Ethernet.

Ample's Redhawk, the industry's first full-rate and oversubscribed two-port 10-Gigabit Ethernet MAC with integrated XFI SerDes, and Finisar's pluggable XFP modules provide customers with a universal 10-Gigabit Ethernet line card that supports short-, long-, and extended-reach functionality for 10-Gigabit Ethernet networking applications. In particular, this interoperability enables higher port density for metro Ethernet networking applications and enterprise switches.

"The combination of our products provides customers with a unique solution for their 10-Gigabit Ethernet platforms," said Mat Steinberg, vice president of business development at Ample Communications. "Establishing interoperability with Finisar is yet another way for us to help our customers bring their platforms to market faster."

OCP extends range

Optical Communication Products Inc., a manufacturer of fiber-optic components, announced the availability of its industrial (-40 to +85C) and extended (-5 to 85C) temperature XFP pluggable optical transceivers.

"We are addressing the expanded application requirements of the XFP market by offering additional operating temperature options to our portfolio," said Kirk Bovill, director of marketing. "We are sampling our cost and performance optimized modules to several customers."

Picolight shows SFP+

Picolight Inc., a designer and manufacturer of optical transceivers and components, announced that the company successfully demonstrated 1310nm vertical cavity surface-emitting laser (VCSEL) transceivers in a 10-Gigabit Small Form Factor Pluggable (SFP+) design for the IEEE 802.3aq serial optical interface standard (10GBASE-LRM). With extended reach capability, small footprint and low power consumption, the new transceivers satisfy a broad range of extended link applications on legacy multimode fiber applications up to 220 meters in enterprise networks, using electronic dispersion compensation (EDC).

Picolight recently conducted the demonstration as part of an Ethernet Alliance interoperability test at the Cisco Photonics Labs in Monza, Italy.

"The success of the product demonstration marks an important milestone in Picolight's continued industry leadership of VCSEL transceivers for extended reach applications," said Vidya Sharma, vice president of marketing, Picolight. "With the recent adoption of the IEEE 10GBASE-LRM standard, Picolight is well-positioned to deliver a more cost-effective and power efficient solution for datacenters and enterprise networks as they look to extend their reach with 10G Ethernet applications."

Earlier this year, Picolight was the first company to demonstrate 10G 850nm and 1310nm VCSEL-based SFP+ transceivers at OFC/NFOEC 2006. Since the initial demonstrations in March 2006, Picolight has sampled 8/10G 850nm SFP+ transceivers to more than 12 strategic customers and partners.

"Picolight was the first company to market 4G 1310nm VCSEL-based transceivers for long-reach Fibre Channel applications and this product demonstration further validates the performance benefits 1310nm VCSEL delivers for the next-generation 10Gbit Ethernet deployments," said Jack Jewell, founder and chief technology officer of Picolight. "Our 1310nm VCSEL-based 10G Ethernet LRM SFP+ transceivers deliver lower power consumption at 450mW, lower electromagnetic interference and lower heat generation compared with distributed feedback laser, resulting in increased performance and reliability of our 10G SFP+ transceivers."

MERGERS AND ACQUISITIONS

PacketFront acquires 42Networks

PacketFront, a provider of open access broadband networking, has acquired the Swedish company 42Networks, a provider of technology for voice-over-IP (VoIP). The acquisition reinforces PacketFront's position in end-to-end solutions for fiber-to-the-home (FTTH) networks. The acquisition will also enable PacketFront's customers to implement a leading VoIP solution as part of the company's suite of services, and will further invigorate its innovation and fuel future integration with related products.

42Networks develops and distributes products and systems for VoIP incorporated among other products in the DRG (Digital Residential Gateway) system. The DRG series — which allows operators and service providers to deliver multiple broadband services with enhanced security and high-quality IP telephony

to residential and enterprise customers — has been on the market since 1999, and is now in its fifth generation. It was first developed within Ericsson Business Innovation, and 42Networks was subsequently established after a management buy-out from Ericsson. Today, the company has 50 employees, with an annual turnover of 43 million SEK in 2005 and an expected annual turnover of approximately 65 million SEK in 2006.

"We are very excited to acquire 42Networks," said Martin Thunman, CEO of PacketFront. "We have been partners since 2003 and have always been very impressed with the quality of its products. Operators keen to offer a telephony service equal to the traditional analogue PTT network are very quality focused, and 42Networks' technology is among the best on the market. The combination of the cutting-edge VoIP technology and a similar company culture makes this an excellent match."

"In an environment of anticipated significant growth, not only product excellence, but also company size matters," said Henrik Scharp, CEO of 42Networks. "We have been working closely with PacketFront since the founding of 42Networks and we have followed their fantastic development into a clear market leader in FTTH solutions. It is very exciting to now be able to join our forces to create an even stronger partner for our customers."

The DRG series will complement PacketFront's current product portfolio for FTTH with leading VoIP support — something network owners are increasingly asking for.

"This technology reinforces our end-to-end solution and gives our customers the option to get leading VoIP Residential Gateways from PacketFront," said Stefan Gustafsson, VP product management of PacketFront.

"With this technology in-house, we believe we can further innovate and create future integrated values with our other products. The 42Networks embedded VoIP business will also open up a completely new customer segment to us and strengthen our technology excellence."

Luna Innovations acquires rights to tunable laser from Coherent

Luna Innovations Incorporated has entered into a technology transfer and licensing agreement with Coherent Inc. giving Luna the right to manufacture and sell the former Iolon "Apollo" line of swept tunable lasers. The Iolon laser is a miniaturized, external-cavity laser offering high performance in a compact footprint. Such lasers were designed with systems integration in mind and are applicable to a range of fiber-optic test and measurement, instrumentation, and sensing applications. Under the agreement, Luna acquired manufacturing equipment and inventory previously used by Coherent to manufacture the lasers, as well as non-exclusive licenses to Coherent's patents and other intellectual property rights related to the transferred technology.

Kent Murphy, Luna Innovations' chairman and chief executive officer, commented, "We entered into this agreement with Coherent to allow us to compete more effectively in Luna's existing fiber-optic test and measurement markets by providing our customers with fast, flexible and cost-effective test and measurement products. Acquiring this laser technology also allows us to aggressively pursue business opportunities in new markets such as industrial and medical sensing."

Tunable laser technology is a key element in Luna's existing fiber-optic test, measurement, and sensing products lines. These products employ frequency-tuned lasers to measure various aspects of the transmission properties of telecommunications fiber-optic components and systems. Lasers are also used in fiber-optic sensing applications such as distributed strain and temperature mapping and distributed measurement of shape. The former Iolon laser was also designed for high-volume

manufacturing, which is a critical factor in Luna's growth strategy.

"The Iolon laser comes in a highly reliable, miniaturized package that we believe will improve the scalability, ruggedness and speed of Luna's existing line of fiber-optic test products," said Brian Soller, general manager of Luna Technologies, the test and measurement division of Luna Innovations. "The functionality of this laser allows faster, more flexible solutions for our customers, which ultimately gives them the ability to make better products at lower costs."

FTTX

PMC-Sierra introduces first end-to-end EPON silicon solution with key China Telecom features

PMC-Sierra Inc. announced the availability of the industry's first EPON optical network unit (ONU) and optical line terminal (OLT) silicon devices that support China Telecom-defined algorithms and features for the Chinese telecom market.

The new PAS6301 ONU for customer premises equipment and the PAS5201 OLT for central office equipment together provide an end-to-end EPON solution. The two system-on-chip (SoC) devices are the first to be designed to meet new China Telecom standards that define data encryption and decryption algorithms, quality of service procedures, and classification protocols, making them ideal for emerging high-volume deployments in China. These devices extend PMC-Sierra's product leadership in high-volume EPON devices by providing the first enhanced Forward Error Correction (FEC) in both ONU and OLT devices, enabling higher split ratio and longer physical links in the access network. In addition, the PAS6301 includes voice-over-IP service support to lower the cost of providing voice over fiber. Both devices support large packet buffers for higher-quality IPTV broadcast capabilities, which is a significant improvement over previously available devices.

"We are pleased that a market leader such as PMC-Sierra has introduced EPON devices that support the features that we have deemed important for our marketplace," said Director Wang Zuo Qiang of the Network Technology Department of China Telecom. "We have worked with the industry to define a complete set of features and algorithms so that equipment deployed in China will be compatible with our requirements."

"These new EPON SoCs demonstrate PMC-Sierra's commitment to all Asian markets," said Victor Vaisleib, general manager of the FTTH Business Unit at PMC-Sierra. "They provide key feature integration for supporting China Telecom FTTH deployments as well as providing extended feature sets that result in a lower BOM cost for the system vendors."

"PMC-Sierra is first to market with end-to-end EPON product enhancements that comply with important market-oriented specifications," said Jeff Heynen, directing analyst for broadband and IPTV with Infonetics Research. "According to our research, PMC-Sierra is the volume leader in FTTH devices with millions of devices deployed in Japan. These new devices will position them to support future deployments in China as well."

Samples of the EPON PAS6301 ONU and PAS5201 OLT devices are available now. The PAS6301 ONU is available in a PGBA 456 package, and the PAS5201 is available in a BGA 376 package. For more information, contact a PMC-Sierra sales representative at http://www.pmc-sierra.com/contactSales. A comprehensive support package, including datasheets and application notes, is available at www.pmc-sierra.com/ftth-pon.

Terawave targets GPON

Terawave Communications (www.terawave.com) and K-micro announced that they have worked together to deliver the

industry's highest-performing physical layer ("PHY") ASIC built specifically for Gigabit passive optical networking (GPON) optical line terminals (OLTs). The ASIC enables extremely low GPON physical layer overhead by providing fast phase locking to incoming bursts, along with the associated hardware hooks to synchronize upstream traffic within a few bits at 1244Mbps.

"Terawave BM-CDR technology enables full compliance with GPON ITU-T G.984.x Recommendations for burst-mode operation," said Boris Auerbuch, VP engineering and CTO of Terawave Communications. "The New ASIC supports extended temperature range and can be used for both indoor and outdoor applications."

K-micro has integrated its burst mode clock and data recovery (BM-CDR) technology into this new ASIC.

The device supports arbitrarily long bursts without loss of lock, and incorporates a variety of advanced features to support functions such as optoelectronics control and synchronization, chatter suppression, and auto-discovery. Implementation of this functionality in a pure CMOS process minimizes power dissipation and device cost.

The Terawave TW-800 Family of OLTs comprises the first products to incorporate this technology. The TW-801 OLT is one of a series of OLT packages designed to address the emerging GPON global market. These products are completely G.984.x ITU standards compliant.

"The partnership of Terawave and K-micro has enabled the development of the highest performing single chip PHY in the industry, combining the GPON knowledge and engineering capability of Terawave with K-micro's high-performance SERDES and burst mode CDR has resulted in creating this advanced device," said Vijay Pathak, CTO of K-micro.

The Terawave TW-800 OLT family is available now for customer lab trials and will be generally available in Q1 2007. Terawave is a supplier of GPON technology to Fujitsu for the BT21C network.

France Telecom announces more FTTH plans

France Telecom announced the second phase of its fiber-to-the-home (FTTH) plan, with the early stage deployment of very high speed broadband in France.

Didier Lombard, the group's chairman and chief executive officer, explained, "After an initial pilot phase in 2006, the Group is stepping up a gear, increasing the range of very high speed broadband services available with Orange as well as expanding the regional coverage of its network for the future.

This new phase will pave the way for the broader deployment of fiber to the home which we foresee in 2009 and beyond, when there will be content and services available which would justify such capacity for many of our customers."

With 100,000km of fiber installed, agreements signed with 650 tenant associations, 11,500 homes that can now be connected, 500 customers to date — equivalent to an almost 5 percent penetration rate on connectable homes — and a top-of-the-range offer, the launch of FTTH compares favorably with the successful introduction of ADSL in 1999.

As anticipated, the pilot phase allowed Orange to better define a practical approach for the optimal deployment of the fiber network. In order to reduce installation times and simplify these processes, Orange is working with all those concerned to draw up a "quality charter" for the installation of fiber cables in buildings.

This charter notably provides for the possibility for fiber cables that are installed in buildings by the France Telecom Group to be used by other operators.

The GPON (Giga-Ethernet Passive Optical Network) technology chosen by the group facilitates the sharing of the fiber connections at the base of the building. In

addition, this GPON architecture allows for lower fiber installation and civil engineering costs.

Further information on the pilot offering is available at http://treshautdebit.francetelecom.com.

The range of services available from 2007 onwards will include Internet access with symmetrical speeds of up to 100Mbps, several high-definition TV and PC channels, and unlimited calls. They will be launched in March 2007 in Paris and several neighboring regions, before being rolled out from June 2007 to a dozen large and medium-sized cities, with the first to include Lille, Lyon, Marseille, Poitiers, and Toulouse. This phase will enable Orange to further improve its customer experience outside of the Paris region.

Orange aims to have 150,000 to 200,000 customers connected out of a total addressable client base of more than 1 million by the end of 2008. The total investment over the two years is estimated at EUR270 million, in line with the NExT strategy in terms of the ratio of CapEx to consolidated revenues.

The development of a very high speed broadband for the mass market is going to require certain adaptations by equipment suppliers, operators, and content and service providers.

The group believes it will take at least two years before this adaptation process is complete, thereby permitting very high speed broadband to become available to the mass market. Within a regulatory environment that is well on the way to being clarified, Orange will be able to offer its customers a range of very high speed broadband services, creating value for the group.

Verizon to deploy FiOS in New Jersey

Verizon announced plans to make its FiOS TV service available to about 100 New Jersey communities, after the New Jersey Board of Public Utilities approved the first state-issued video franchise agreement.

"Today's decision opens the door to a new world of superior home entertainment in New Jersey, and it's a huge victory for consumers," said Dennis Bone, president of Verizon New Jersey. "With the New Jersey market now open to competition, we will soon offer this service to hundreds of thousands of consumers in about 100 communities, and it will make New Jersey one of the most competitive states in the nation."

FiOS TV arrives in Richmond

Verizon is introducing FiOS TV over its fiber-optic network to residents of Greater Richmond, Virginia. Verizon delivers FiOS TV over the nation's largest digital, all-fiber network. Only this network has earned the certification of the independent Fiber to the Home Council for providing fiber all the way to customers' homes. "The holidays now are a bit merrier for Richmond-area consumers, who have waited a long time for a better choice in TV service," said Robert W. Woltz Jr., president of Verizon Virginia. "FiOS TV will bring something to consumers they've never had before: incredible picture and sound clarity and innovative new services — all from a brand they know and trust. Customers who liked what FiOS has done for their Internet connection will love what it does for their TV." Verizon FiOS TV is available now to more than 15,000 households in parts of Henrico County, including parts of Innsbrook, Springfield Road, Three Chopt west of Parham Road, and some portions of the Nuckols Road corridor. In addition, Verizon expects to offer FiOS TV to more than 20,000 households in the city of Richmond by the end of the year, including portions of the Fan, Randolph District, Brookland Parkway, Laburnum Park, and West End areas, including Byrd Park.

Teknovus introduces the TK3714 'Turbo' 2.5G EPON ONU Chip

Teknovus, a provider of Gigabit Ethernet Passive Optical Network (GEPON) chips for the

deployment of triple-play services in FTTH (fiber-to-the-home) and FTTB (fiber-to-the-business) broadband access networks, announced deployments of the TK3714, known as the Turbo EPON ONU. The TK3714 is fully compliant with IEEE 802.3ah 1.25G EPON specifications and offers an enhanced Turbo EPON mode for 2.5G operation, thus providing a smooth upgrade to higher speeds.

The TK3714 gives service providers the ability to deliver faster speeds to their customers with the same built-in IPTV architecture and QoS (Quality of Service) pioneered by Teknovus. Similar to the TK3713, the TK3714 allows service providers to manage QoS per service per subscriber, which guarantees quality delivery of bandwidth-sensitive triple-play applications. With a 2.5G Turbo EPON, service providers can offer more HDTV channels using existing fiber plants, thereby reducing CapEx and OpEx per channel. Alternatively, with 2.5G Turbo EPON, service providers may support more subscribers per PON while maintaining strict per service per subscriber QoS.

The TK3714 is fully compatible with existing Teknovus EPON deployments having auto-sensing for detecting downstream speeds. It allows service providers to install 1.25G/2.5G Central Office OLT capability when desired and without costly ONU upgrades. This future-proof Turbo EPON ONU provides ITU-T GPON speeds with all the advantages of widely deployed IEEE EPON, including the high-volume manufacturing EPON ecosystem with numerous optics, components, and equipment vendors. The TK3714 supports an effective and immediate bandwidth upgrade path for more than 25 service-provider EPON deployments across five continents.

KDDI is the first announced customer for the TK3714 Turbo EPON. KDDI is a leading Japanese service provider offering both mobile and fixed communications services. According to Mr. Shigeo Morita, senior manager of KDDI's Terminal System Development, "We are experiencing fast FTTH subscriber growth for our triple-play services, known as Hikari One. Teknovus' EPON chips enable us to rapidly and cost-effectively meet the growing bandwidth requirements of our subscribers.

Teknovus' TK3714 supports our expansion of advanced IP video services while maintaining superb OAM and strict QoS without the costs of additional wavelengths.

The integration of our FTTH network with Tepco's shows our commitment to quality fiber-based networks. Our customer base is expanding rapidly, continuing proof that our long-term business strategy of advanced triple-play services over FMC (Fixed Mobile Convergence) platforms attracts and retains subscribers."

Dr. Rex Naden, CEO of Teknovus, stated, "This next-generation of EPON is testimony to the adoption of Ethernet-based PON around the globe for triple-play services. We are delighted that KDDI represents our first Turbo EPON deployment.

They understand IPTV and its demand by subscribers on both fixed and mobile networks. Our TK3714 enables service providers to migrate to higher speeds while maintaining their existing deployments. EPON is the dominant PON access technology around the globe. The TK3714 demonstrates the ease of moving to higher speeds based on the simplicity and low-cost of Ethernet architecture."

Free uses Cisco for FTTH

Cisco announced that Free (Iliad Group), the leading operator of triple-play over broadband in Europe, is to roll out the first and largest optical fiber network in France based on the Cisco Internet Protocol Next Generation Network (IP NGN) architecture and using Cisco Ethernet fiber-to-the-home (E-FTTH) technology.

According to Free's plan, the first phase of the fiber project will connect more than 2 million people in the city of Paris via the largest fiber network in Europe. Free announced that

residents will have access to broadband speeds that could exceed 50Mbps for EUR29.99 per month, and benefit from advanced services such as high-definition IPTV, video on demand, multimedia communication, and Web 2.0 services.

The fiber network offers the potential of virtually unlimited symmetrical bandwidths, where upstream and downstream traffic can flow at the same speed, which is currently unique for mass-market broadband services.

Michaël Boukobza, chief executive officer of Free, said, "We are building a network of the future for our users and by working with Cisco, we can bring the future closer.

With the ongoing debate about fiber access platforms, we have made a clear choice and decided on Ethernet point-to-point FTTH architecture because it is future proof and maximizes return on such an important infrastructure investment. Other options would not have set us so clearly apart from the competition. By taking fiber-optic links directly to the home, we can be sure that France will continue to be at the forefront in technology and applications for the next few years, and even the next few decades!"

"Today's announcement demonstrates Free's commitment to continuously innovate and maintain its lead in the triple-play market," said Thierry Drilhon, managing director of Cisco France and vice president, Cisco Europe. "We have seen increasing interest in FTTH networks throughout Europe and this is an important endorsement for Cisco's IP NGN technology approach. With the Cisco ServiceFlex design and Ethernet point-to-point architecture, we have armed our new-generation E-FTTH solutions with more of the features that users require, including high bandwidth, high availability, high security and low latency, all backed up by performance assurance, especially when the subscriber's usage profile is difficult to predict in terms of bandwidth and 'burstiness'."

SureWest unveils package

Beginning Tuesday, December 19, SureWest Broadband will begin to offer residential customers over its fiber-to-the-home (FTTH) network a new Internet service offering up to 50Mbps of hyper-speed access as it continues to add to its data product portfolio, which also includes packages for speeds up to 20 and 10Mbps. Similar to its 20 and 10Mbps offerings, the 50Mbps product is synchronous, meaning that consumers receive up to 50Mbps for both uploading and downloading.

"When it comes to broadband, SureWest transport speed standards are much higher than industry standards," says Steve Oldham, SureWest's president and CEO. "We are providing a product that utilizes our large data pipe for residential customers who are looking for the fastest Internet around. Because our fiber delivers 100Mbps of synchronous bandwidth directly to a customer's home, we are able to offer products like this which differentiate us from our competitors."

BUSINESS

Optical Communication Products announces management changes and promotions

Optical Communication Products Inc., a manufacturer of fiber-optic components, announced the resignations of company founders Dr. Muoi Van Tran and Susie L. Nemeti effective December 31, 2006.

Dr. Tran, chairman and chief technology officer, was appointed to his current position in July 2006 and has been a director of the board since 1992. Dr. Tran served as OCP's president from September 1994 to July 2006, and chief executive officer from March 1999 to July 2006. OCP's senior vice president of corporate development, Susie Nemeti, was appointed to her current position in May 2006. Ms. Nemeti served as OCP's chief financial officer since the company's inception. Dr. Tran will continue to

serve as chairman of the board of directors, and both Dr. Tran and Ms. Nemeti will be available to assist in consulting roles as the company executes its operational transition during fiscal 2007. Mohammad Ghorbanali, chief operating officer and a cofounder of the company, departed from OCP in October and also continues to provide certain consulting services.

President and CEO Philip F. Otto stated, "We wish to express our deep gratitude to Dr. Tran, Ms. Nemeti and Mr. Ghorbanali for their innumerable contributions over the years and instrumental involvement in building OCP to what it is today. On behalf of the Board, we wish them every success in their future endeavors."

OCP also announced the promotions of David Jenkins, Ph.D. to vice president and managing director, Europe and Middle East, and Terry Basehore to vice president of sales, North America.

Dr. Jenkins joined OCP in July 2000 as managing director of European operations. Dr. Jenkins has over 25 years of experience in the field of fiber optics and has held senior positions with leading fiber-optic equipment manufacturers, including Agilent Technologies and Hewlett Packard. He earned his Ph.D. in electron microscopy from Oxford University.

Prior to joining OCP in 2003, Mr. Basehore served as the president and general manager of Gould Fiber Optics. In addition, Mr. Basehore held a number of sales and marketing positions at AMP Incorporated, including the role of director of US field sales.

The company also summarized previously announced management changes that occurred during fiscal 2006:

- Philip F. Otto was appointed president and chief executive officer in July, bringing extensive fiber optics knowledge and broad experience in the telecommunications industry to his leadership role;
- Frederic T. Boyer was named senior vice president and chief financial officer in August, bringing a seasoned background in financial management for several publicly traded companies;
- Dr. Liew-Chuang Chiu, OCP's director of manufacturing, who joined the company in 2005, was promoted to vice president of worldwide manufacturing;
- Dr. Jacob Tarn, CEO of OCP's GigaComm acquisition in Taiwan, has assumed responsibility as general manager of OCP Asia;
- In accordance with the company's bylaws, the board of directors increased the authorized number of directors from seven to eight and appointed Mr. Otto to the board.

"OCP has undergone a series of pivotal management changes over the past nine months," Otto continued, "and our new management team is eager to accelerate our global market initiatives and capitalize on growing opportunities in the fiber-optic components and fiber-to-the-home markets. We wish to congratulate David Jenkins and Terry Basehore on their promotions which recognize their outstanding performance and dedication. As a team, we look forward to working diligently to advance OCP's position as a globally competitive supplier."

SYSTIMAX GigaSPEED X10D solution passes test

SYSTIMAX Solutions from CommScope, a provider of structured connectivity solutions, in collaboration with Solarflare Communications, has confirmed that its SYSTIMAX GigaSPEED X10D Solution performed to their specifications in full-day certification test demonstrations of 10GBASE-T technology on 100-meter links held at Solarflare's labs in Irvine, California. More exhaustive stress tests to continue the collaborative engineering effort are planned in the SYSTIMAX cabling labs in Richardson, Texas. The ability to utilize high-performance Ethernet connections for copper cabling is expected to lower the cost of 10Gbps networking, making it more accessible to datacenters and enterprises.

The recently published IEEE 802.3an-2006 Standard for 10GBASE-T requires all 10GBASE-T physical layer chips to reach 100 meters on Category 6A cabling. The California-based tests were conducted using Solarflare's 10GBASE-T physical layer (PHY) evaluation boards and a 100-meter SYSTIMAX GigaSPEED X10D UTP channel in a worst-case, full-reach, four-connector channel configuration (as specified in the TIA: Addendum 10 for Category 6A and ISO/IEC 11801: 2002 Amendment 1 for Class EA draft standards). A "six-around-one" configuration was utilized, with six disturbing cables tightly bundled around one "victim" or "disturbed" cable. The 10GBASE-T signals were launched through a generator at the standard XAUI interface to the PHY evaluation boards. The signals from the receive packets, or frames, at the far-end transceiver were compared to those from the send frames. 10Gbps Ethernet traffic was carried simultaneously on all six disturbing channels, simulating a worst-case environment for alien crosstalk. There were no errors detected during the certification demonstrations on channel lengths up to 100 meters.

FINANCING

Redfern raises $7 million venture capital financing

Redfern Integrated Optics Inc. (RIO), a developer and manufacturer of low-cost, high-performance optical transmitters for telecommunications, data transmission, and other markets, announced that it has secured an additional $7 million from TMT Ventures, Tallwood Venture Capital, and Jolimont Capital. In connection with the new equity financing, Teresa Engelhard of Jolimont Capital joined RIO's board of directors.

"We have proven the value proposition of our silicon integrated photonics products by delivering low-cost, long-reach, high data rate communications optics in small form factors, with very low-power dissipation and unparalleled wavelength stability — across industrial temperature range," said Radu Barsan, president and CEO of RIO. "RIO has made substantial progress over the past fiscal year, has diversified its product portfolio and has seen increased market traction with several new design wins. This additional financing is a testimony to the confidence in RIO's commercial success."

MARKET INTELLIGENCE

CIR releases report on the market for 100-GigE and other next-generation networks

With the recent endorsement of 100Gbps Ethernet by an IEEE Study Group, new opportunities for modules and component firms are about to appear. To help clients better understand and capitalize on these opportunities, CIR, a leading industry analysis firm, announced the release of a new report titled "Beyond 10 & 40Gbps; Next-generation Ethernet and Sonet/SDH." The report examines the evolution of networking beyond 10Gbps and 40Gbps speeds and shows where the next big wave of high-speed network commercialization will hit. Additional details about the report, including a summary and outline, can be found on the firm's Web site at http://www.cir-inc.com.

CIR claims that development efforts geared towards moving beyond current line rates will impact the networking value chain much sooner than expected and in a number of different ways.

- Optical integration to revive — While optical integration rose and fell with the boom and bust of optical networking, it now seems essential to creating the cost-effective very high speed transceivers required for networks operating at above 40Gbps. Firms such as Apogee and Infinera are already building integrated optical components for next-generation networks, and Intel seems likely to move in that direction, as well. CIR expects to

see exotic new chips emerge that combine the functionality of lasers and amplifiers, receivers and mux/demux, and/or even laser arrays integrated with an optical routing device.

- Beyond SFP+ — These development efforts will also drive down the costs of available technologies. Renewed interest in optical integration coupled with the new technology of silicon photonics will lead to even smaller and lower-cost 10Gbps transceivers. Luxtera is already pioneering this approach. While there is currently considerable excitement in the industry about the XFP and SFP+ formats, these may not turn out to be the ultimate in 10Gbps modules, and these new technology directions could help 10-GigE become dominant in the server space.

- The MSAs circus never stops — CIR believes that the 100-GigE MSA process will be just as messy as the one for 10-GigE. Early 100-GigE MSAs may be derived from the XENPAK, IBPAK, or 300-pin MSAs for 10-GigE, but module manufacturers will soon be jockeying for market share with ever smaller MSAs and MSAs that are favored by the big equipment manufacturers, especially Cisco.

- The future of SONET/SDH? — While the networking world is now moving towards 100-GigE, there is little currently underway to take SONET/SDH standards beyond 40Gbps. The future of public networking may now lie in the ITU's much-touted OTN with SONET/SDH carried on a lambda. Or, it may lie in some carrier-class version of next-generation Ethernet. Whatever the outcome, the adoption of a 100Gbps Ethernet standard means that SONET/SDH and Ethernet are going their own way.

- Future-proofing for network managers — As the standards for 100-GigE begin to emerge, network managers will face new questions on how to build their network infrastructure for the future. Should enterprise networks shift to OM3 or make a rapid transition to SMF in the enterprise? Does it make sense to buy from vendors who are further down the path to 100-GigE Ethernet? Will proprietary high-speed networking products prove useful and economical in the medium-term future?

CIR's new report, "Beyond 10 & 40Gbps; Next-generation Ethernet and Sonet/SDH" includes an analysis of the opportunities and addressable markets for emerging markets for TDM, Ethernet, and WDM networks operating at above 40Gbps. It covers both optical and electronic components including lasers, modulators, detectors, electronic and optical dispersion products, amplifiers, WDM components, MAC, PMD and PHY chips, and many other areas. The report also discusses the firms that are already making waves in this space and provides an assessment of the addressable market for these next-generation networks over the next decade. Firms covered in this report include Apogee, Avago, Avanex, Bookham, Broadcom, Emcore, ExceLight, Finisar, Fujitsu, Infinera, Intel, JDSU, Hitachi Cable, Luxtera, MergeOptics, OCPI, NEC, Picolight, Opnext, and Vitesse, among others. Additional information is available at http://www.cir-inc.com.