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TOPS Volume 37

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Plus OFC Postdeadline Papers

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2000 25th Anniversary

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Agenda of Sessions

2000 25th Anniversary

Subcommittee category in parentheses (e.g. A, B, C, D, E, F, G)

	309	310	314/315	316/317	318/320	321/323
TUES., MARCH 7						
8:00am–10:30am	Plenary Session, Ballroom					
10:30am-11:00am	Exhibit Grand Open and Coffee Break, Exhibit Hall					
11:00am–12:30pm	TuA • Raman and Broadband Amplifiers (A)	TuB • Fiber Components (B)	**TuC • Tutorial: Chromatic Dispersion Compensation and Measurement (A)**	TuD • High Speed Systems (D)	TuE • Scaling the Optical Network (G)	TuF • Wavelength Conversion (C)
12:30pm–2:00pm	LUNCH - ON YOUR OWN					
2:00pm–4:00pm	TuG • Dispersion Management (A)	TuH • Fiber Bragg Gratings (B)	**TuI • Tutorial: Optical Networking Standards (G)**	TuJ • Dense Wavelength Division Multiplexing (D)	TuK • Optical Network Design and Planning 1 (F)	TuL • Lasers and Tunable Sources (C)
4:00pm–4:30pm	Coffee Break, Exhibit Hall					
4:30pm–6:00pm	TuM • Cross-Connects for WDM Networks (C)	TuN • Digital Processing (E)	**TuO • Tutorial: Understanding the Spectral Response of Fiber Gratings (B)**	TuP • Dispersion Managed Solitons (D)	TuQ • Optical Networking Field Trials (G)	TuR • High-Speed and Short Pulse Technology 1 (C)
6:00pm–7:30pm	Conference Reception, Prefunction Area – Ballroom Level					
WED., MARCH 8						
8:30am–10:30am	WA • Planar and Fiber Amplifiers (A)	WB • Test and Measurement (B)	**WC • Tutorial: PMD in Optical Transmission (D)**	WD • Packet Over WDM (F)	WE • WDM Subsystems (E)	WF • Thin-Film and Bulk-Optic Devices (B)
10:30am–12:30pm	EXHIBITS ONLY TIME and Coffee Break, Exhibit Hall					
12:30pm–1:30pm	LUNCH – ON YOUR OWN					
1:30pm–3:30pm	WG • L-Band EDFAs (A)	WH • Planar Lighwave Circuits (B)	**WI • Tutorial: Technology Alternatives for 10Gbit/sec LANS (E)**	WJ • Access Networks (F)	WK • Performance Monitoring (E)	WL • PMD Modeling (D)
3:30pm–4:00pm	Coffee Break, Exhibit Hall					
3:30pm–5:00pm	WM • POSTER SESSION, Pratt Street Lobby					
5:00pm–7:30pm	SPECIAL OFC® 25TH ANNIVERSARY SYMPOSIUM, Room 310					

	309	310	314/315	316/317	318/320	321/323
THURS., MARCH 9						
8:30am–10:30am	ThA • Fiber Lasers and Nonlinear Effects (A)	ThB • PMD Characterization and Emulation (D)	**ThC • Tutorial: WDM Sources (C)**	ThD • Optical Network Design and Planning 2 (F)	ThE • Optical and Data Internetworking (G)	ThF • All Optical Signal Processing (C)
10:30am–11:00am			Coffee Break, Exhibit Hall			
11:00am–12:30pm	ThG • Microstructured Optical Fiber (A)	ThH • PMD Mitigation (D)	**ThN • Tutorial: Optical– Layer Networking: Opportunities for and Progress in Lightwave Micromachines (F)**	ThI • Novel Waveguide Structures (B)	ThJ • Interconnects and Crosstalk (E)	ThK • Interconnects and Pump Lasers (C)
12:30pm–2:00pm			LUNCH – ON YOUR OWN			
2:00pm–3:30pm	ThL • Fiber Lasers and Nonlinear Effects (A)	ThM • Cross-Phase Modulation (D)		ThO • Advanced Networking Performance and Operations (F)	ThP • Optical Regeneration and Clock Recovery (E)	ThQ • MEMS and Microstructures (C)
3:30pm–4:00pm			Coffee Break, Exhibit Hall			
4:00pm–5:30pm	ThR • Optical Fibers (A)	ThS • Dispersion Mitigation and Error-Correcting Codes (D)	**ThT • Tutorial: Integrated Devices for Optical Signal Processing (C)**	ThU • IP/ WDM Networks (F)	ThV • High Speed TDM (E)	ThW • High-Speed and Short Pulse Technology 2 (C)
5:45pm–7:00pm			POSTDEADLINE PAPER PRESENTATIONS			
FRI., MARCH 10						
8:30am–10:30am	FA • Access and Submarine Network Applications (G)	FB • Novel Waveguide Devices (B)	FC • Transoceanic Systems (D)	FD • CATV and Fiber Radio (E)	FE • Protection and Restoration (F)	
10:30am–11:00am			Coffee Break, Pratt Street Lobby			
11:00am–12:30pm	FF • Raman Amplifiers (A)	FG • High Speed Detection (C)		FH • Microwave Photonics (E)	FI • Testbed Management and Applications (F)	

8:00am–10:30am
Plenary Session and Awards Ceremony

The session includes presentations of the John Tyndall Award and OSA, IEEE/LEOS and IEEE/ComSoc fellowships as well as an address from the general chairs of the meeting and keynote talks by three distinguished speakers.

Stewart Personick
Drexel Univ., USA

13th John Tyndall Award Presentation

The thirteenth John Tyndall Award will be presented at the OFC®2000 Plenary Session. The award is presented to an individual who has made outstanding contributions in any area of fiber-optics technology, including optical fibers themselves, the optical components employed in fiber systems, and electro-optical transmission systems employing fibers. The contributions that the award recognizes should have met the test of time and should have proved a benefit to science, technology or society.

The winner for the 2000 Tyndall Award is Dr. Stewart Personick. His citation will read:

> *For pioneering research in optical receiver design, system engineering, and optical time domain reflectometry, and for leadership in education and the promotion of fiber optics.*

The award honors the memory of Dr. John Tyndall (1820-1893), a distinguished teacher and physicist who was the first to demonstrate the concept of total internal reflection, the phenomenon responsible for light guidance in many types of optical fibers. This award is sponsored by the Institute of Electrical and Electronics Engineers (IEEE)/Lasers and Electro-Optics Society (LEOS) and the Optical Society of America (OSA). The award is a specially commissioned Steuben glass sculpture and an honorarium, funded through an endowment and gift from Corning Glass Works.

Thomas L. Koch and Rajiv Ramaswami, General Chairs of OFC® 2000, are pleased to announce the three plenary speakers for the conference—Clayton M. Christensen, Harvard Business School, George Gilder, Gilder Technology Group, Inc., Vinod Khosla, Kleiner, Perkins, Caulfield and Byers.

George Gilder
GilderGroup, USA

George Gilder is Chairman of GilderGroup and editor of the *Gilder Technology Report (GTR)*. He is also a Senior Fellow at Discovery Institute where he directs Discovery's program on high technology and public policy.

Born in 1939 in New York City, Mr. Gilder is a graduate of Harvard University. At Harvard he studied under Henry Kissinger and co-founded *Advance*, a journal of political thought. During this period he co-authored (with Bruce Chapman) a political history, *The Party That Lost Its Head*. He later returned to Harvard as a fellow at the Kennedy Institute of Politics and editor of the Ripon Forum. In the 1960s Mr. Gilder also served as speech writer for several prominent leaders, including Nelson Rockefeller, George Romney, and Richard Nixon.

In the 1970s Mr. Gilder began an exploration into the causes of poverty, which resulted in his books Men and Marriage and Visible Man; and, hence, of wealth, which led to his bestselling Wealth and Poverty. Mr. Gilder pioneered the formulation of supply-side economics as Chairman of the Lehrman Institute's Economics Roundtable, as Program Director for the Manhattan Institute, and contributor to A.B. Laffer's economic reports and the editorial page of *The Wall Street Journal*. In 1986, President Reagan gave George Gilder the White House Award for Entrepreneurial Excellence. In 1996 he was made a Fellow of the International Engineering Consortium.

The investigation into wealth creation led Mr. Gilder into deeper examination of the lives of entrepreneurs, culminating in a book, *The Spirit of Enterprise*. That many of the most interesting current entrepreneurs were to be found in high technology fields led Mr. Gilder to write the best-selling Microcosm. A subsequent book, *Life After Television*, is a prophecy of the future of computers and telecommunications, and a prelude to his forthcoming book on the future of telecommunications, Telecosm.

Mr. Gilder is a founder of and contributor of Forbes ASAP, and a contributing editor of *Forbes Magazine*. Mr. Gilder hosts the annual Telecosm Conference sponsored by Forbes and the GilderGroup.

Vinod Khosla
Kleiner, Perkins, Caufield & Byers, USA

Terabit tsunami

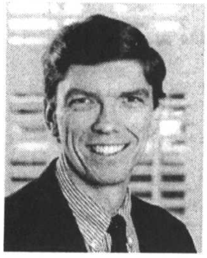
The shape of things to come—the change in networking technologies and their impact on our networks, our companies, our economy. What you should be individually doing and watching for.

Vinod Khosla was a co-founder of Daisy Systems and founding Chief Executive Officer of Sun Microsystems where he prioneered open systems and commercial RISC processors.

He holds a Bachelor of Technology in Electrical Engineering from the Indian Institute of Technology in New Delhi, a Master's in Biomedical Engineering from Carnegie Mellon University and a MBA from the Stanford Graduate School of Business.

Vinod serves on the boards of Asera, Concentric Network, Corio Inc., Corvis Corporation, Doublebill.com, Juniper Networks, Siara Systems and QWEST Communications, plus several other private companies.

Vinod Khosla is a General Partner at Kleiner Perkins Caufield & Byers.



Clayton M. Christensen
Harvard Business School, USA

Managing the threat and opportunity of disruptive technology

Why do some companies fail or stumble when confronted with changes in technology or markets? Although complacency, arrogance and poor management are sometimes to blame, often the reason is just the *opposite*: companies do not respond to important changes in technologies and markets because they are *well*-managed—because they listen very attentively to their customers' needs; watch their competitors closely; and invest aggressively in those new products and services that promise the highest profitability. In this presentation we will study how good management can sow the seeds of failure when companies are confronted with a particular type of change called disruptive technology. We will discuss how disruptive technologies such as internet telephony, electric vehicles, digital photography, the Palm Pilot and Java software protocols could seriously affect the fortunes of many of today's strongest institutions—including Bell Atlantic, Toyota, Kodak, Intel, Microsoft, and the Harvard Business School.

Clayton M. Christensen is a professor of business administration at the Harvard Business School, with a joint appointment in the Technology & Operations Management and General Management faculty groups. His research and teaching interests center on the management of technological innovation, developing organizational capabilities, and finding new markets for new technologies. Christensen holds a B.A. with highest honors in economics from Brigham Young University (1975), and an M.Phil. in applied econometrics and the economics of less-developed countries from Oxford University (1977), where he studied as a Rhodes Scholar. Christensen received an MBA with High Distinction from the Harvard Business School in 1979, graduating as a George F. Baker Scholar. He was awarded a DBA from the Harvard Business School in 1992. He received the Best Dissertation Award for 1992 from The Institute of Management Sciences for his doctoral thesis on technology development in the disk drive industry. Christensen also won the Production and Operations Management Society's 1991 William Abernathy Award, presented to the author of the best paper in the management of technology; the Newcomen Society's award for the best paper in business history in 1993; and the 1995 McKinsey Award for the best article published in the *Harvard Business Review*. His book, *The Innovator's Dilemma*, received the Global Business Book Award for the best business book published in 1997. Christensen's writings have been published in *The Wall Street Journal*, the *Harvard Business Review, Business History Review, Research Policy, Industrial and Corporate Change, Strategic Management Journal, Production and Operations Management*, the *European Management Journal, Management Science*, and *Engineering Management Review*. He advises many of the world's leading corporations concerning their management of technological innovation.

Prior to joining the HBS faculty, Christensen served as chairman and president of Ceramics Process Systems Corporation (CPS), a firm he co-founded with several MIT professors in 1984. CPS is a leading developer of products and manufacturing processes using high-technology ceramics materials such as silicon nitride, silicon carbide, aluminum nitride and aluminum oxide. Through a joint venture company, CPS is also one of the world's leading manufacturers of products made from injection-molded powdered stainless steel. From 1979 to 1984 Christensen worked as a consultant and project manager with the Boston Consulting Group, where he was instrumental in founding the firm's manufacturing strategy consulting practice. In 1982 Christensen was named a White House Fellow, and served through 1983 (on leave of absence from BCG) as assistant to U.S. Transportation Secretaries Drew Lewis and Elizabeth Dole.

Christensen served from 1986 to 1994 as a member of the Program Review Board and Strategic Planning Committee of the Brigham and Women's Hospital in Boston, and was a member and chairman of the board of directors of the Massachusetts Affiliate of the American Diabetes Association between 1984 and 1996. During his tenure on the board, the Affiliate's revenues increased twentyfold. Christensen was also a founding board member of the Combined Health Appeal of Northeastern Massachusetts, and continues to serve on its board of advisers. He was an elected member of the Town Meeting (council) in Belmont Massachusetts for eight years; served as vice-chairman of the town's personnel board; and as chairman of its long-range financial planning task force. Christensen has served the Boy Scouts of America continuously since 1975 as a scoutmaster, cubmaster, den leader and troop & pack committee chairman. Christensen worked as a missionary for the Church of Jesus Christ of Latter-day Saints in the Republic of Korea from 1971 to 1973, speaks fluent Korean, and continues to serve in his church in a variety of ways. He and his wife Christine are the parents of five children, aged 21, 19, 17, 11 and 7. His oldest son, Matthew, is a member of the Duke University varsity basketball team.

10:30am–11:00am EXHIBIT GRAND OPENING AND COFFEE BREAK, EXHIBIT HALL

Room 309

11:00am–12:30pm
TuA • Raman and Broadband Amplifiers (Cat. A)
Stephen G. Grubb, Corvis Corp., USA, Presider

11:00am
TuA1 (Invited) • Review of wideband hybrid amplifiers, *Hiroji Masuda, NTT Optical Network Systems, Japan.* The configurations and characteristics of several types of wideband hybrid amplifiers are presented. Each of the amplifiers consists of an EDFA and a Raman amplifier (distributed or discrete type) and yields low noise in WDM systems.

11:30am
TuA2 • Low-noise high gain dispersion compensating broadband raman amplifier, *S.A.E. Lewis, F. Koch, S.V. Chernikov, J.R. Taylor, Imperial Col., UK.* A Raman gain module compensating for both loss and dispersion of a 40 km standard telecommunication fiber span over the 1510-1565 nm band is reported. The optimized configuration ensures a low signal-spontaneous noise figure and negligible double Rayleigh scattering noise. The high gain margin of the amplifier makes it applicable for compensation of an 80 km span.

11:45am
TuA3 • Simultaneous bi-directional of C- and L-band erbium doped fiber amplifier, *Mohd Adzir Mahdi, Faisal Rafiq Mahamd Adikan, Prabakaran Poopalan, Selvakennedy Selvadurai, Harith Ahmad, Univ. of Malaya, Malaysia.* A novel wideband amplifier using a single laser diode is demonstrated. Simultaneous bi-directional amplification of conventional- and long-band signals is achieved with utilization of unwanted amplified spontaneous emission and excess pump for the long-band section.

Room 310

11:00am–12:30pm
TuB • Fiber Components (Cat. B)
Turan Erdogan, Univ. of Rochester, USA, Presider

11:00am
TuB1 • Corrugated long period fiber gratings as band-rejection filters, *C.Y. Lin, L.A. Wang, Natl. Taiwan Univ., Taiwan.* We demonstrate a new band-rejection filter made of a corrugated long period fiber grating whose transmission loss and wavelength can be tuned more than 25 dB and 40 nm by applying different amounts of strains and twisting angles.

11:15am
TuB2 • Wavelength tuning range enhanced single resonant band fiber filter using a long period grating (LPG) with ultra thin cladding layer, *Shizhuo Yin, Oleg Leonov, Kun-Wook Chung, Paul Kurtz, Karl Reichard, Pennsylvania State Univ., USA.* A unique fiber filter using a LPG with ultra thin cladding layer (~32 um) is presented, which has a single resonant band within 1000 nm to 1700 nm wavelength tuning sensitivity as large as 30 nm shift for a 2X10-3 surrounging refractive index change.

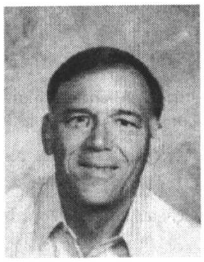
11:30am
TuB3 • Temperature stability and mechanical strength of long-period fiber gratings fabricated with CO_2 laser, *Y.G. Han, H.S. Park, W.T. Han, B.H. Lee, U.C. Paek, Y. Chung, Kwangju Inst. of Science and Tech., Korea; C.S. Kim, Korea Telecom, Korea.* We will present measurement results on two critical aspects of the reliability of long-period fiber gratings, temperature stability of the resonance peak shift and mechanical strength of the optical fiber with large residual mechanical stress.

11:45am
TuB4 • Novel temperature insensitive long-period grating by using the refractive index of the outer cladding, *Joo-Nyung Jang, Se Yoon Kim, Sun-Wook Kim, Minsung Kim, Samsung Electronics Corp, Korea.* We show the temperature sensitivity of LPGs can be completely eliminated by using the outer cladding index. Blue shift of LPG combined with a red shift caused by the recoating led to temperature sensitivity 0.07nm/100oC.

Room 314/315

11:00am–NOON
TuC • Tutorial: Chromatic Dispersion Compensation and Measurement (Cat. A)
Wayne V. Sorin, Agilent Labs., USA, Presider

INSTRUCTOR



Robert Jopson
Lucent Tech., Bell Labs., USA

Chromatic dispersion can cause pulse distortion in lightwave transmission systems. The distortion arises from the different spectral components of a signal traveling at different speeds. Since the process is linear, it can be compensated exactly, in principle. In practice, not only does chromatic dispersion often occur in the presence of fiber nonlinearity, but it is difficult to fabricate compensation components that track the wavelength dependence of fiber chromatic dispersion over a broad bandwidth. Dozens, if not hundreds, of types of chromatic dispersion compensators have been proposed. Some operate optically by providing dispersion that reduces the system dispersion. Other techniques operate at the transmitter to generate input signals that tolerate dispersion. Many techniques operate at the receiver. Despite this inventive activity, the most commonly deployed compensation device is still dispersion compensating fiber.

We will discuss the measurement of chromatic dispersion and a some of the methods used for compensation. We will also look at the pulse distortion caused by chromatic dispersion and dispersion-tolerant modulation formats.

Bob Jopson was born in Altadena, California. He received a B.S. in Physics from the University of California, Davis and a Ph.D. in Physics from Harvard University. After a post-doc at Bell Laboratories he stayed with the firm and started to work on problems in lightwave transmission systems.

Room 316/317

11:00am–12:15pm
TuD • High Speed Systems (Cat. D)
Andrew D. Ellis, British Telecom Res. Labs., UK, Presider

11:00am
TuD1 • Experimental validation of new regeneration scheme for 40 Gbit/s dispersion-manged long-haul, transmission, *Patrick Brindel, Olivier Leclerc, Delphine Rouvillain, Bruno Dany, Emmanuel Desurvire, Alcatel Corp. Res. Ctr., France; Pascale Nouchi, Alcatel Cable, France.* We experimentally show, for the first time, that optical 3R-regeneration by synchronous modulation can be efficiently implemented in dispersion-managed transmission. Successful association of both techniques is demonstrated at 40Gbit/s over more than 10,000 km.

11:15am
TuD2 • Analysis of synchronous intensity modulation control of 40Gbit/s dispersion-managed soliton transmissions, *Erwan Pincemin, Patrice Le Lourec, Olivier Audouin, Bruno Dany, Stefan Wabnitz, Alcatel Corp. Res. Ctr, France.* Transmission control of dispersion-managed solitons by means of in-line synchronous intensity modulators and no filtering is analyzed. The feasibility of a 40Gbit/s dispersion-managed transmission over 20Mm regenerated only by synchronous intensity modulation is demonstrated.

11:30am
TuD3 • Numerical optimization of residual dispersion in dispersion-managed systems at 40 Gbit/s, *Yann Frignac, Sebastien Bigo, Alcatel Corp. Res. Ctr., France.* Through numerical simulations, we optimize the amount of residual chromatic dispersion in 40 Gbit/s single-channel links. It is found proportional to the nonlinear phase, and independent on fiber local dispersion and dispersion map.

11:45am
TuD4 • Eight-channel 40 Gb/s RZ transmission over four 80 km spans (328 km) of NDSF with a net, dispersion tolerance in excess of 180 ps/nm, *Yanjun Zhu, W.S. Lee, G. Pettitt, M. Jones, A. Hajifotiou, Nortel Networks, UK.* We report experimental results on simultaneous transmission and dispersion compensation of eight wavelengths at 200 GHz channel spacing over 328 km of standard NDSF at 40 Gb/s, using a GaAs HBT multiplexer and negative slope dispersion compensators. Individual channel Q values between 7.6 to 8.8 were achieved.

Room 318/320

11:00am–12:30pm
TuE • Scaling the Optical Network (Cat. G)
Thomas S. Afferton, AT&T Res., USA, Presider

11:00am
TuE1 (Invited) • The impact of nonlinear fiber effects on fiber choice for ultimate transmission capacity, *Michael Eiselt, AT&T Labs–Res., USA.* Nonlinear effects in the transmission fiber, like Self-Phase Modulation, Cross-Phase Modulation, Four-Wave Mixing, and Stimulated Raman Scattering will limit the ultimate capacity of long-haul WDM systems. We discuss the impact of the fiber characteristics on the ultimate limit and draw conclusions for the best choice of the transmission fiber.

11:30am
TuE2 (Invited) • Scaleable trnasport switching systems, *Joseph Berthold, Ciena Corp., USA.* Abstract not available.

Room 321/323

11:00am–12:30pm
TuF • Wavelength Conversion (Cat. C)
Benny Mikkelsen, Lucent Tech., Bell Labs., USA, Presider

11:00am
TuF1 • Polarization-insensitive parametric wavelength converter based on cascaded nonlinearities in $LiNbO_3$ waveguides, *I. Brener, M.H. Chou, E. Chaban, Lucent Tech., USA; K.R. Parameswaran, M.M. Fejer, S. Kosinski, Stanford Univ., USA.* We developed a polarization-independent wavelength converter using periodically poled $LiNbO_3$ waveguides. The device uses a pump in the 1.5 mm band, has negligible polarization sensitivity and a penalty of less than 0.5 dB at 10 Gb/s.

11:15am
TuF2 • Improving performance using waveguide filter and optimal probe and signal powers for all-optical wavelength conversion, *Yi Dong, Liping Lu, Hui Wang, Shizhong Xie, Tsinghua Univ., China.* Improved extinction ratio of output and 80 km G.652 or 240 G.655 SMF transmission experiment in terms of an all-optical wavelength converter based on XGM in SOA at 10Gb/s by using a waveguide filter, optimal probe and signal powers and a DCF compensator are reported.

11:30am
TuF3 • Detailed experimental investigation of an all-active dual-order mode Mach-Zehnder wavelength converter, *D. Wolfson, T. Fjelde, A. Kloch, Res. Ctr. COM, Denmark; C. Janz, F. Poingt, I. Guillemot, F. Gaborit, M. Renaud, Alcatel Corp. Res. Ctr., France.* A new all-active DOMO converter has been assessed experimentally at 10 Gbit/s showing almost wavelength-independent performance for signal and CW wavelengths convering the entire EDFA window. Good performance has also been demonstrated at 20 Gbit/s.

11:45am
TuF4 • Cascadability improvement of a cross-gain modulation wavelength converter using a grating based optical add/drop multiplexer, *Xueyan Zheng, Fenghai Liu, Tech. Univ. of Denmark, Denmark.* By adding a grating based optical add/drop multiplexer, the maximum cascaded number of a cross-gain modulation based wavelength converter is improved from two to six rounds in a loop experiment at 10Gb/s due to the improved high frequency response of the converter.

TuA • Raman and Broadband Amplifiers (Cat. A)—Continued

12:00pm
TuA4 • Measurement of raman gain coefficient for small wavelength shifts, *Gary Shaulov, Vincent J. Mazurczyk, Ekaterina A. Golovchenko, Tyco Submarine Systems Ltd., USA.* Traditionally the calculations of inter-channel power transfer due to stimulated Raman scattering in WDM transmission systems use a wavelength dependence that is a linear approximation of measurements obtained using a 1480 nm pump. We measure the wavelength dependence of the Raman effect for shifts that are typical for the WDM transmission band and use this data to analyze gain tilt in long-haul systems.

12:15pm
TuA5 • Stimulated raman scattering cancellation in wavelength-division-multiplexed systems via spectral inversion, *A.G. Grandpierre, D.N. Christodoulides, C.M. McIntosh, J. Toulouse, Lehigh Univ., USA.* We theoretically demonstrate that stimulated Raman scattering crosstalk in wavelength-division-multiplexed systems can be totally eliminated using spectral inversion techniques. This result is always true irrespective of the specific Raman gain curve or the loss/gain profile of the fiber system.

TuB • Fiber Components (Cat. B)—Continued

12:00pm
TuB5 • High performance fused-type mode selective coupler for two-mode fiber devices, *Kwang Yong Song, In Kag Hwang, Seok Hyun Yun, Byoung Yoon Kim, KAIST, Korea.* We demonstrate a high performance fused-type mode selective coupler that couples the LP11 mode of a two-mode fiber and the LP01 mode of a matching single-mode fiber. the phase-matching condition was satisfied by etching and pre-pulling of a two-mode fiber. the excess loss and the maximum coupling ratio of 0.15dB and 92%, respectively, are achieved.

12:15pm
TuB6 • Fused taper fibre microcoupler, *G. Kakarantzas, T.E. Dimmick, T.A. Birks, P. St.J. Russell, Univ. of Bath, UK.* Single-mode fibre couplers considerably less than 1 mm long are formed by fusing together two tapered fibres using a carbon dioxide laser. This will allow miniature versions of many all-fibre devices to be made.

12:30pm–2:00pm LUNCH – ON YOUR OWN

2:00pm–4:00pm
TuG • Dispersion Management (Cat. A)
Paul A. Williams, NIST, USA, Presider

2:00pm
TuG1 • Influence of polarization dependent loss on birefringent optical networks, *N. Gisin, B. Huttner, Univ. of Geneva, Switzerland; N. Cyr, EXFO Electro-Optical Engineering Inc., Canada.* The addition of polarization dependent losses to birefringent optical networks increases signal distortions. This increase is created by the interaction between polarization mode dispersion and polarization dependent loss. It cannot be explained by either alone.

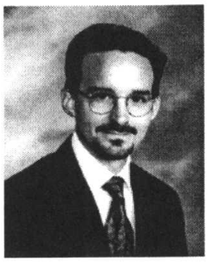
2:15pm
TuG2 • All-optical remote location of high polarization mode dispersion fiber spans using stimulated Brillouin scattering, *S. Lee, A.E. Willner, Univ. of Southern California–Los Angeles, USA.* We report an all-optical remote locator of high PMD fiber spans using stimulated Brillouin scattering (SBS). Both the length of the high PMD fiber span and the magnitude of PMD itself can be inferred from the slope change of the reflected SBS pulse.

2:00pm–4:00pm
TuH • Fiber Bragg Gratings (Cat. B)
Jean-Luc L. Archambault, Ciena Corp., USA, Presider

2:00pm
TuH1 (Invited) • Synthesis of fiber gratings, *Michalis Zervas, Ricardo Feced, Univ. of Southampton, UK.* The main design methods, developed so far for the synthesis of fiber Bragg gratings, are reviewed. We particularly focus on a very efficient method based on a differential layer-peeling algorithm and apply it to design high performance gratings.

2:00pm–3:00pm
TuI • Tutorial: Optical Networking Standards (Cat. G)
Laurel Clark, Telcordia Tech., Inc., USA, Presider

INSTRUCTOR



Paul Bonenfant
Lucent Tech., Bell Labs., USA

Equipment supporting Dense Wavelength Division Multiplexing (DWDM) has seen widespread deployment in recent years. With the introduction of wavelength add/drop capability to these systems, coupled with the introduction of optical add/drop multiplexers (OADMs) and optical cross-connects (OXCs), the ability to add, drop, and in effect construct wavelength-switched and wavelength-routed networks will quickly emerge, as will the age of Optical Networking. This tutorial will review international standards development efforts underway that will lay the foundations for—indeed, the blueprints for—*the transformation*

(continued on page 34)

TuG • Dispersion Management (Cat. A)—Continued

2:30pm
TuG3 • Dual-band hybrid transmission line consisting of pure silica core fiber and dispersion compensating fiber, *E. Yanada, M. Tsukitani, E. Sasaoka, Y. Ohga, Y. Makio, M. Nishimura, Sumitomo Electric Industries, Ltd., Japan.* Ultimately small dispersion slope less than 0.003ps/nm2/km was realized for both C and L bands by a novel pure-silica core fiber/ dispersion compensating fiber hybrid transmission line, which also exhibited small average attenuation of 0.205dB/km and low non-linearity.

2:45pm
TuG4 • Dispersion slope compensating fibers for L-band WDM systems using NZ-DSF, *Ryuichi Sugizaki, Kazunori Mukasa, Atsushi Umeda, Yoshihisa Suzuki, Furukawa Electric Co., Ltd., Japan.* Dispersion slope Compensating fiber, which upgrades installed NZ-DSF to L-band D-WDM transmission line, was designed and fabricated. Both PMD and bending loss are low enough for moduling. It can compensate the dispersion of +NZ-DSF transmission line within +/-0.3ps/ nm/km over 1580-1620nm.

3:00pm
TuG5 • Large effective area dispersion compensating fiber for cabled compensation of standard single mode fiber, *Stig Nissen Knudsen, Lucent Tech. and Tech. Univ. of Denmark, Denmark; Torben Veng, Lucent Tech., Denmark.* Production of wideband dispersion and dispersion slope compensating fiber with 35 um2 effective area and low attenuation is demonstrated. This fiber is optimized for cable deployment in a 1:1 length ratio with standard single mode fiber.

3:15pm
TuG6 • New dispersion compensating fibers for simultaneous compensation of dispersion and dispersion slope of non-zero dispersion shifted fibers in the C or L band, *Lars Groner-Nielsen, Torben Veng, Stig Nissen Knudsen, C. Christian Larsen, Bent Edvold, Lucent Tech., Bell Labs., Denmark.* A new dispersion compensating fiber with extremely high negative dispersion slope is reported. Low insertion loss between 1530 and 1610 nm is demonstrated using a new splice technique.

3:30pm
TuG7 • Temperature dependence of chromatic dispersion in various types of optical fibers, *Takatoshi Kato, Yasushi Koyano, Masayuki Nishimura, Sumitomo Electric Industries, Ltd., Japan.* Temperature dependence of chromatic dispersion is examined for various types of fibers. Its coefficient is found strongly dependent on dispersion slope, indicating that low dispersion slope transmission lines are desirable for future high bit-rate transmission.

TuH • Fiber Bragg Gratings (Cat. B)—Continued

2:30pm
TuH2 • Temperature stabilized tunable fiber grating devices with integrated on-fiber thin film heaters, *B.J. Eggleton, J.A. Rogers, P. Kuo, Bell Labs., Lucent Tech., USA.* We demonstrate a simple approach to stabilized control of thermally tuned fiber grating devices that use integrated thin film resistive heaters. This technique exploits the temperature dependence of the resistance of the integrated heater as a sensors to accurately and continuously measure the fiber temperature.

2:45pm
TuH3 • New and efficient technique for suppressing the peaks induced by discrete cladding mode coupling in fiber slanted Bragg grating spectrum, *Isabelle Riant, Cecile Muller, Thierry Lopez, Vincent Croz, Pierre Sansonetti, Alcatel Corp. Res. Ctr., France.* A new design of fiber slanted Bragg grating exhibiting a smooth transmission spectrum without the need of a specific paclaging to transform the cladding modes into a continuum of radiation modes is reported.

3:00pm
TuH4 • Advanced fiber Bragg gratings for high performance dispersion compensation in DWDM systems, *Michael K. Durkin, Ricardo Feced, Carlos Ramirez, Michalis N. Zervas, Univ. of Southampton, UK.* We present experimental results of fiber Bragg gratings designed by inverse-scattering for dispersion compensating 80km of standard fiber on a 50GHz grid. The device offers significantly improved bandwidth utilisation and dispersion linearity over conventional designs.

3:15pm
TuH5 • Increase of photosensitivity in Ge-doped fibers under strain, *E. Salik, J. Feinberg, Univ. of Southern California, USA; D.S. Starodubov, V. Grubsky, D-STAR Tech., Inc., USA.* The index change produced in Ge-doped fibers by UV light is enhanced by ~5 when the fiber is strained during UV exposure. This can open a door to faster fabrication of fiber gratings.

3:30pm
TuH6 • Photosensitivity in tin-doped silica optical fibres, *Gilberto Brambilla, Valerio Pruneri, Laurence Reekie, Southampton Univ., UK.* Permanent gratings (refractive index modulation $\sim 3 \cdot 10^{-4}$) were written in tin-doped silica optical fibres with low levels on SnO_2 (~0.15 mol%). In Ge-doped silica, ~10 mol% GeO_2 is required to produce comparable photorefractivity under similar conditions.

TuI • Tutorial: Optical Networking Standards (Cat. G)—Continued

of DWDM from a solution for capacity exhaust (a fiber multiplier), to a true networking technology. Included will be an overview of Optical Networking standards—in various stages of development—that address: network architectures; protection and restoration schemes; network node interfaces; network elements and equipment; network components and subsystems; and physical layer interfaces for applications ranging from short-haul, metropolitan to ultra long-haul, global Optical Networks.

Paul Bonefant joined Lucent Technologies-Bell Laboratories in 1997, where he is currently a Manager in Lucent's Optical Networking Group. His responsibilities include Optical Networking architecture and product evolution planning, and associated global standards development. From 1989–1996, Paul had responsibility for the definition of requirements and standards for SONET network management interfaces, SONET bidirectional line-switched rings, and WDM systems at Bell Communications Research (Bellcore). He received a B.S. degree in Engineering and Applied Science in 1989, and an M.S. degree in Electrical Engineering in 1990, both from the California Institute of Technology in Pasadena, California.

Room 316/317

TuD • High Speed Systems (Cat. D)—Continued

12:00pm
TuD5 • Unrepeatered 80 Gbit/s RZ single channel transmission over 160 km of standard fiber at 1.55 μm with a large wavelength tolerance, *U. Feiste, R. Ludwig, S. Diez, C. Schmidt, H.J. Ehrke, H.G. Weber, Heinrich-Hertz-Inst., Germany; F. Kuppers, T-Nova Deutsche Telekom Innovationsgesellschaft mbH, Tech., Germany.* Unrepeatered 80 Gbit/s RZ single channel transmission over 160km of standard single-mode fiber at 1.55μm is reported using passive compensation of dispersion and dispersion-slope. Error-free transmission (BER = 10-9) with a receiver sensitivity of - 22 dBm and a wavelength tolerance of 10 nm was achieved.

Room 318/320

TuE • Scaling the Optical Network (Cat. G)—Continued

12:00pm
TuE3 (Invited) • Sprint perspective on next generation multi-service transport and switching networks, *Robert K. Buttler, Sprint, USA.* This paper describes evolving transmission and switching technology, services and performance requirements and discusses factors influencing the deployment of next generation systems. The significant distinctions between metropolitan and long-haul applications are also presented.

Room 321/323

TuF • Wavelength Conversion (Cat. C)—Continued

12:00pm
TuF5 • Ultrafast locking optical clock for IP packet switching applications, *S. Bauer, C. Bornholdt, O. Brox, D. Hoffmann, M. Möhrle, G. Sahin, B. Sartorius, S. Schelhase, Heinrich Hertz Inst.fur Nachrichtentechnik, Germany; B. Lavigne, D. Chiaroni, Alcatel Corp. Res. Ctr., France* The locking time of an all-optical clock is investigated. Self-pulsating DFB lasers with detuned gratings are applied. The clock locks within 10 "one" bits (1 ns) to injected data packets and keeps synchronized for some hundred "zero" bits.

12:15pm
TuF6 • Sixteen-channel wavelength selector monolithically integrated on InP, *R. Mestric, C. Porcheron, B. Martin, F. Pommereau, I. Guillemot, F. Gaborit, C. Fortin, J. Rotte, M. Renaud, OPTO, France.* A 16-channel wavelength selector was realised by monolithic integration on InP of phased-array wavelength demultiplexers and semiconductor optical amplifiers. Zero fibre-to-fibre loss was obtained for 50 mA driving current.

12:30pm–2:00pm LUNCH – ON YOUR OWN

2:00pm–4:00pm
TuJ • Dense Wavelength Division Multiplexing (Cat. D)
Per B. Hansen, Lucent Tech., Bell Labs., USA, Presider

2:00pm
TuJ1 (Invited) • High-spectral-efficiency transmission systems, *Michel Chbat, Alcatel, USA; Denis Penninckx, Alcatel CIT, France.* Spectrally-efficient transmission techniques provide the capability for higher channel density in WDM systems and, in some cases, allow the extension of the transmission distance limited by physical fiber impairments, such as chromatic dispersion and polarization mode dispersion. We review the main techniques and evaluate the potential of their implementation in dense WDM systems.

2:00pm–4:00pm
TuK • Optical Network Design and Planning 1 (Cat. F)
Ori Gerstel, Tellabs, USA, Presider

2:00pm
TuK1 • Traffic model for USA long-distance optical network, *Anurag Dwivedi, R.E. Wagner, Corning Inc., USA.* Voice, transaction data, and internet traffic models are developed and used to estimate the traffic demand and growth between major US cities. Shortest path routing is used to estimate the capacity required on individual links, as well as traffic granularity and the fraction of traffic dropped at each city.

2:15pm
TuK2 (Invited) • Backbone network architectures for IP optical networking, *Stefano Baroni, M. Akber Qureshi, Antonio Rodriguez-Moral, David Sugerman, Bell Labs., Lucent Tech., USA.* Novel service layer (IP/MPLS) and transport layer (SONET/SDH, WDM) network architectures are analyzed and compared for IP backbones, considering multiple parameters: network capacity, cost, restoration strategy, reconfigurability and accommodation of preemptable traffic. The results show the value of transport layer networking in multi-terabit IP backbones.

2:00pm–4:00pm
TuL • Lasers and Tunable Sources (Cat. C)
Scott Burroughs, CoreTek, Inc., Presider

2:00pm
TuL1 • Compact high-power wavelength selectable lasers for WDM applications, *M. Bouda, M. Matsuda, K. Morito, S. Hara, T. Fujii, Y. Kotaki, Fujisu Labs Ltd., Japan; T. Watanabe, Fujisu Quantum Devices Ltd., Japan.* Wavelength selectable lasers with record +10dBm fiber coupled output power and uniform characteristics have been realized by integration of eight-channel distributed feedback laser arrays with low-loss multi-mode interference combiners and optical amplifiers with a length of only 2mm.

2:15pm
TuL2 • Accelerated aging and reliability studies of multisection tunable GCSR lasers for dense WDM applications, *Olga A. Lavrova, Daniel J. Blumenthal, Univ. of California–Santa Barbara, USA.* We report on the results of an accelerated aging study of tunable GCSR lasers. Frequency, power and SMSR stability as a function of operation time at elevated temperatures were studied. The effective lifetime of device operation is estimated.

TuJ • Dense Wavelength Division Multiplexing (Cat. D)—Continued

2:30pm
TuJ2 • WDM transmission over dispersion shifted fiber in L-Band with 25 dB span loss, *S. Y. Park, G.J. Pendock, A.K. Srivastava, K. Kantor, J.W. Sulhoff, S.J. Sheih, C. Wolf, Y. Sun, Lucent Tech., USA.* Low error-rates were obtained from the transmission of twenty 10 Gb/s channels with 100 GHz spacing over four 80 km (25dB) spans of DSF in the lower wavelength region of the L-band where the nonlinear effects are largest due to lower dispersion.

2:45pm
TuJ3 • High-Speed WDM transmission using highly dispersed pulses, *Sang-Gyu Park, A.H. Gnauck, J.M. Wiesenfeld, L.D. Garret, AT&T Labs-Res., USA.* Two channel transmission at 40 Gb/s is demonstrated over 800km of conventional fiber, using 2.5 to 3.7 ps pulses for RZ format to minimize nonlinear effects and enable localized dispersion compensation. Channel separations as close as 1.8 nm are possible, for spectral efficiency of 18%.

3:00pm
TuJ4 • 32x10 Gbit/s transmission over 8000 km using hybrid Raman-Erbium doped fiber optical amplifiers, *J.B. Leroy, P. Marmier, C. Laval, O. Gautheron, Alcatel Submarine Networks, France.* A 32 x 10 Gbit/s transmission experiment over 8000 km has been carried out using hybrid optical amplifiers composed of Raman and erbium doped fiber amplifiers. Active gain equalization based on Raman amplification has been also demonstrated.

3:15pm
TuJ5 • 400 Gb/s transmission (40 ch. x 10 Gb/s) over 544 km from a supercontinuum source, *L. Boivin, C.R. Doerr, P. Schiffer, L.W. Buhl, Lucent Tech., Bell Labs., USA; S. Taccheo, Politecnico di Milano, Italy; W. Lin, R. Monnard, Lucent Tech., USA.* We report the error-free transmission over 544 km of standard fiber of 40 channels at 9.953 Gb/s from a spectrum-sliced supercontinuum source. All but three of the transmitted channels have error floors better than log(BER)=-16.

3:30pm
TuJ6 • Transmission of 80x10 Gbit/s WDM channels with 50 GHz spacing over 500 km of LEAF fiber, *Sergio Tsuda, Valeria L. da Silva, Corning Inc., USA.* We demonstrate transmission of 80 x10 Gbit/s channels over 5 x100 km of LEAF fiber. The impact of optical nonlinearities for 50 GHz channel spacing is evaluated by comparing the results of different interleaved channel polarization experiments.

TuK • Optical Network Design and Planning 1 (Cat. F)—Continued

2:45pm
TuK3 • Unification and extension of the traffic-grooming problem in WDM ring networks, *Wonhong Cho, Jian Wang, Biswanath Mukherjee, Univ. of California-Davis, USA; Behzad Moslehi, Richard J. Black, Intelligent Fiber Optic Sys., USA.* The traffic-grooming problem multiplexes smaller-rate traffic streams into higher-rate streams using the smallest number of SONET Add-Drop Multiplexers (S-ADMs). By unifying and extending previous work,two new approaches — single-hop and multihop — are introduced and evaluated.

3:00pm
TuK4 • Reconfiguration in IP Over WDM access networks, *Jennifer Yates, Gisli Hjálmtýsson, Albert Greenberg, AT&T Shannon Lab., USA.* This paper examines a high-speed IP over WDM access network. The performance benefits of dynamically allocating wavelengths to access routers are examined and compared with static wavelength allocation. It is shown that dynamic reconfiguration can significantly improve network performance.

3:15pm
TuK5 • Dynamic routing, rearrangement, and defragmentation in WDM ring networks, *David K. Hunter, Univ. of Strathclyde, UK; Dominique Marcenac, BT Lab., UK.* Simulation studies of dynamic routing with rearrangement in WDM ring networks indicate that up to five addition paths may be accommodated with 16 wavelengths. Dynamic alteration of a paths wavelength is necessary to achieve this.

3:30pm
TuK6 • Statistical study of the influence of topology on wavelength usage in WDM networks, *Christian Fenger, Emmanuel Limal, Tele Denmark Development, Denmark; Ulrik Gliese, Tech. Univ. of Denmark, Denmark and Corning Inc., USA.* We present a statistical study of wavelength usage in relation to topology characteristics for optical WDM networks. New general correlations between topology parameters and wavelength usage are identified that can simplify a network planning process

TuL • Lasers and Tunable Sources (Cat. C)—Continued

2:30pm
TuL3 • 2.5 Gbit/s error-floor free transmission with high extinction ratio using directly modulated, 1.55 µm tapered lasers, *Bruno Thedrez, J.M. Rainsant, N. Aberkane, V. Voiriot, S. Hubert, J.L. Lafragette, L. Roux, M.F. Martineau, F. Gaborit, B. Fernier, Alcatel Corp. Res. Ctr., France; D. Domingues, Alcatel Optronics, France.* The emergence of BER floor using directly modulated laser is studied versus the modulation extinction ratio. A selection on efficiency leads to a 100% DFB yield for floor-free transmission at a high E.R. of 14 dB.

2:45pm
TuL4 • Mode stabilization technique for the multi-frequency laser, *L. Möller, C.R. Doerr, C.H. Joyner, M. Zirngibl, Lucent Tech., USA.* A mode stabilization technique for waveguide grating router lasers which allows suppression of multi-longitudinal mode operation while simultaneously decreasing the laser chip size and increasing the maximum modulation speed is described.

3:00pm
TuL5 • 1.55-µm wavelength-selectable microarray DFB-LDs with integrated MMI combiner, SOA, and EA-modulator, *Koji Kudo, Kenichiro Yashiki, Tatsuya Sasaki, Yoshitaka Yokoyama, Kiichi Hamamoto, Takao Morimoto, Masayuki Yamaguchi, NEC Corp., Japan.* We developed compact (1.136 mm^2) eight-channel wavelength selectable microarray DFB-LDs with monolithically integrated 8x1 MMI combiner, SOA, and EA-modulator. The wavelength tuning range of 15.3 nm with uniform device characteristics and 2.5-Gbit/s modulation performance were successfully demonstrated.

3:15pm
TuL6 • Characteristics of sampled grating DBR lasers with integrated semicondutor optical amplifiers and electroabsorption modulators, *Beck Mason, Greg A. Fish, Agility Comm., Inc., USA; Volkan Kaman, Jonathon Barton, Larry A. Coldren, Steven P. DenBaars, John Bowers, Univ. of California-Santa Barbara, USA.* A state-of-the-art demonstration of photonic integration with results illustrating integrated widely-tunable lasers capable of high output power (> 8 dBm), wide tuning ranges (50-70 nm), and electro-absorption modulation (2.488 Gb/s) is presented.

3:30pm
TuL7 • Step-wise tunability of a DBR laser with a superimposed fiber grating external cavity, *Mattias Adomat, Pierre-Yves Fonjallaz, Fredrik Olofsson, Acreo AB Isafjordsgatan, Sweden.* A DBR laser is step-wise tunable thanks to a superimposed fiber grating external cavity. The stability against tuning current variations in the DBR is excellent. Single-mode operation is achieved with SMSR better than 30 dB.

TuG • Dispersion Management (Cat. A)—Continued

3:45pm
TuG8 • Enhanced wavelength resolution chromatic dispersion measurements using fixed sideband technique, *Rance Fortenberry, Hewlett-Packard, USA.* We describe a new chromatic dispersion measurement technique that enables sub-picosecond timing and sub-picometer wavelength accuracy simultaneously. Experimental results comparing the new measurement technique with the standard modulation phase shift method are shown.

4:00pm–4:30pm COFFEE BREAK, EXHIBIT HALL

4:30pm–5:45pm
TuM • Cross-Connects for WDM Networks (Cat. C)

Karl Martin Kissa, Uniphase, USA, Presider

4:30pm
TuM1 (Invited) • Compact optical cross-connect switch based on total internal reflection in a fluid-containing planar lightwave circuit, *Julie Fouquet, Agilent Labs, USA.* Optical cross-connect switch matrices have demonstrated transmission losses of 0.07 dB per crosspoint, crosstalk of -70 dB per crosspoint and switching times of 1 msec. We are now extending this technology to 32x32-size matrices.

5:00pm
TuM2 • Strictly non-blocking NxN thermo-capillarity optical matrix switch using silica-based waveguide, *Mitsuhiro Makihara, Fusao Shimokawa, Kazumasa Kaneko, NTT Telecomm. Energy Lab., Japan.* We propose a silica-based strictly non-blocking NxN thermo-capillarity optical matrix switch. The feasibility of 2-dimensional batch oil injection and multi-layered wiring were confirmed by fabricating a prototype 16x16 optical matrix switch.

4:30pm–5:45pm
TuN • Digital Processing (Cat. E)

Karen Liu, Tellabs Operations Inc., USA, Presider

4:30pm
TuN1 (Invited) • Digital optical processing, *Alistair Poustie, BT Adastral Park, UK.* Optical digital processing is a key technology that will allow advanced functionality to be obtainable directly at the optical layer in future photonic networks. Recent progress in all-optical functional circuits will be discussed.

5:00pm
TuN2 • Variable-bit-rate header recognition for reconfigurable networks using tunable fiber-Bragg-gratings as optical correlators, *M.C. Cardakli, D. Gurkan, S.A. Havstad, A.E. Willner, Univ. of Southern California–Los Angeles, USA.* We demonstrate variable-bit-rate recognition of the header information in a data packet. Our technique is reconfigurable for different header sequences and uses optical correlators as look-up tables. We use this optical technique to recognize the header and switch a series of incoming data packets at 155 Mb/s, 622 Mb/s, and 2.5 Gb/s to one of two outputs in a reconfigurable network. Penalty-free routing with a 1.6-ns guard time is achieved.

4:30pm–5:30pm
TuO • Tutorial: Understanding the Spectral Response of Fiber Gratings (Cat. B)

Laura Ann Weller-Brophy, Corning, Inc., USA, Presider

INSTRUCTOR
Leon Poladian
Australian Photonics, CRC, Australia

This tutorial will focus on physically intuitive descriptions of wave propagation in fiber gratings. It will begin by showing how the traditional coupled mode approach to gratings can be reformulated as an effective medium description. This provides the basis for the ideas throughout the tutorial. The use of photonic band diagrams to predict spectral response will be covered along with the meaning and relative importance of bulk and edge effects. A large variety of different types of gratings will be used as examples.

The role of fundamental principles such as reciprocity and causality and their impact on what can and can't be done with gratings will also be explored. In particular, the relationship between the amplitude and dispersion spectra of gratings will be explained. These ideas will also provide techniques for analyzing group delay ripples in dispersion compensators and fundamental limitations to minimizing adjacent channel effects in WDM filters. A conceptual understanding of important differences between reflected and transmitted spectra will also be presented.

Dr. Leon Poladian did an undergraduate degree and Ph.D. in theoretical physics at the University of Sydney. In 1990 he obtained an Australian National University Postdoctoral Fellowship with the Optical Sciences Centre to work on spatial solitons and nonlinear couplers. He joined the Optical Fiber Technology Center in 1992 as a Queen Elizabeth II Fellow. He is currently an Australian Research Council Senior Research Fellow. His research activities include fibre design, nonlinear optics and fiber gratings.

TuJ • Dense Wavelength Division Multiplexing (Cat. D)—Continued

3:45pm
TuJ7 • Highly efficient 1Tb/s (50chx20Gb/s) 2000km RZ transmission experiment by suppressing XPM with optimized pulsewidth, *Gyaneshwar Chandra Gupta, Kiyoshi Fukuchi, Takaaki Ogata, NEC Corp., Japan.* High spectral efficiency was realized in 20-Gbit/s-based DWDM experiment by manipulating the pulsewidth to suppress XPM. In optimum pulsewidth 25ps case, 50ch x 20Gbit/s signals were transmitted 2,000 km in high local dispersion-managed line with high spectral efficiency of 0.4bit/s/Hz.

TuK • Optical Network Design and Planning 1 (Cat. F)—Continued

3:45pm
TuK7 • Wavelength reusability in wavelenghth-routed optical network, *Xiong Yizhi, Zeng Qingji, Wu Kai, Cheng Yang, Shanghai Jiao Tong Univ., China.* Wavelength reusability is proposed as an efficient criterion to evaluate the network performance in wavelength-routed optical networks. The maximum wavelength reusability is limited for a given network. The maximum wavelength reusability mainly depends on the average nodal degree.

TuL • Lasers and Tunable Sources (Cat. C)—Continued

3:45pm
TuL8 • Fiber pigtail detachable plastic MiniDIL tranmitter with a tool-free optical connector, *K. Tatsuno, K. Harada, S. Takahashi, H. Naka, K. Yoshida, Hitachi Ltd., Japan; S. Gardner, D. Spear, J. Severn, Nortel Networks Ltd., UK.* A fiber-pigtail-detachabel plastic MiniDIL transmitter module that has a tool-free optical connector and meets the OC 3 and OC 12 has been developed to endabble low-cost fabrication. The optical connector can be connected and disconnected from the module without any specific tool. Fiber output of more that 0.4 mW, insertion loss of less than 0.3 dB, return loss of more that 42 dB, and repeatability of more than 30 times were achieved.

4:00pm–4:30pm COFFEE BREAK, EXHIBIT HALL

4:30pm–5:45pm
TuP • Dispersion Managed Solitons (Cat. D)

Alexei N. Pilipetskii, Tyco Submarine Systems Labs, USA, Presider

4:30pm
TuP1 (Invited) • Dispersion mapping in soliton DWDM Systems, *Thierry Georges, Francois Favre, Algety Telecom, France.* Dispersion-managed soliton WDM systems exhibit superior transmission quality as soon as Kerr nonlinearity is non negligible. Influence on dispersion mapping is discussed.

5:00pm
TuP2 (Invited) • High speed soliton transmission on installed fibers, *Peter A. Andrekson, Chalmers Univ. of Technology, Sweden.* In this paper we will discuss the soliton field experiments that have been conducted in Japan, in Europe, and in the U.S. over the past five years. A comparison with soliton laboratory experiments will also be made.

4:30pm–6:00pm
TuQ • Optical Networking Field Trials (Cat. G)

Pawan Jaggi, Level3 Comm., USA, Presider

4:30pm
TuQ1 (Invited) • Field trial of a European self-healing WDM optical network, *Lars Gillner, Jörgen Karlsson, Edgard Goobar, Anders Lundberg, Ericsson Telecom, AB, Sweden; Stefan Magnusson, Stefan Melin, Telia Validation, Sweden; Ylva Nilsson, Telia Network, Sweden.* An optical self-healing WDM ring developed by Ericsson - the FlexingBus - has been successfully tested in a field trial in Telia's network in Stockholm, Sweden. The ring carried SDH, Gigabit Ethernet, and digital video (CIR) traffic.

5:00pm
TuQ2 (Invited) • Photonic transport field, *Ken-ichi Sato, NTT Optical Network Systems Labs, Japan.* This presentation will address photonic transport network field experiments that have been conducted since September 1999 in NTT. Photonic network operation technologies developed for the testbed will be highlighted.

4:30pm–6:00pm
TuR • High-Speed and Short Pulse Technology (Cat. C)

Liang Tzeng, Multiplex, Inc., USA, Presider

4:30pm
TuR1 • 10-Gbit/s RZ pulses using an all-silicon nonlinear transmission line integrated circuit, *Martin Birk, Leda M. Lunardi, Alan H. Gnauck, AT&T Lab., USA; Hermann Schumacher, Univ. of Ulm, Germany; Dag Behammer, Daimler Chrysler Res., Germany.* We demonstrate 25-ps wide electrical pulses using a nonlinear transmission line (NLTL) integrated circuit fabricated on high-resistivity silicon. These pulses are modulated electrically and used to drive a LiNbO3 Mach-Zehnder modulator to create optical 10 Gbit/s RZ data with 27-ps pulse width.

4:45pm
TuR2 (Invited) • High-speed optical devices for 40Gbit/s optical receivers, *Yutaka Matsuoka, Tadao Ishibashi, NTT Photonics Lab., Japan.* This paper reviews recent progress in wide-band photoreceiver OEICs composed of a waveguide pin photodiode and a HEMT distributed amplifier and high-output photodiodes called uni-traveling-carrier photodiodes in which only electrons act as carriers.