
OFC/NFOEC'11 Summary

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Lei Shi

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OFC'10 Tracks

- Sessions related with Access Networks:

- NMD FTTX New Technologies
 - NTuD 10 Gb/s PON Technology
 - OWI Energy Efficient Networks
 - NWD Worldwide FTTx Opportunities and Challenges
 - OThB Energy Efficient Optical Access
 - OThT High Speed PON
 - OMP WDM PON
 - OThK Access Systems and Subsystems
 - OThZ Short Reach Enabling Technologies
 - OWK New Approaches in Access
 - NTuB WDM PON Technology
 - OTuD ROADM Technologies I
 - OTuM ROADM Technologies II
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NMD • FTTX New Technologies

Code	Title	Author/Affiliate	Topic	Trends
NMD1 Invited	Passive Optical Networks: Current and Next-Generation Technologies	Elaine Wong, Dept. of EEE, University of Melbourne, Australia.	Introduction of XG-PON, 10G-EPON, WDM-PON, LR-PON, Optical OFDM-PON, WDM-OFDM PON, OCDM PON, OCDM-WDM PON. Focusing on architectures and physical layer realization.	Next Generation PON
NMD2	Stripping-Free Physical Contact Optical Connector	Y. Abe, H. Hirota, S. Matsui, and J. Kobayashi, NTT, Japan	The authors propose a new stripping-free optical connector that enables to realize physical contact (PC) connection and facilitate assembly, and demonstrate PC connection with a low average connection loss of 0.16 dB.	

NMD • FTTX New Technologies

Code	Title	Author/Affiliate	Topic	Trends
NMD3	PON Test Systems – from Theory to Field Deployments	J. Ponchon, A. Champavère, JDSU, France	This paper presents the first feedback from field experiments of remote fiber testing systems using U band, new High Resolution OTDR and Out-of-band reflective markers installed on the ONT side.	Cost, Migration, Energy Efficiency.
NMD4 invited	New Enabling Technologies for Passive Optical Networks with Sustainable Growth	N. Yoshimoto, NTT, Japan	This paper describes promising technologies for access networks from an operator's viewpoint, especially as regards optical cables and transmission through passive optical networks. CapEx/OpEx reduction, Upgrade and migration, Energy Efficiency.	

NTuD • 10 GB/s PON Technology

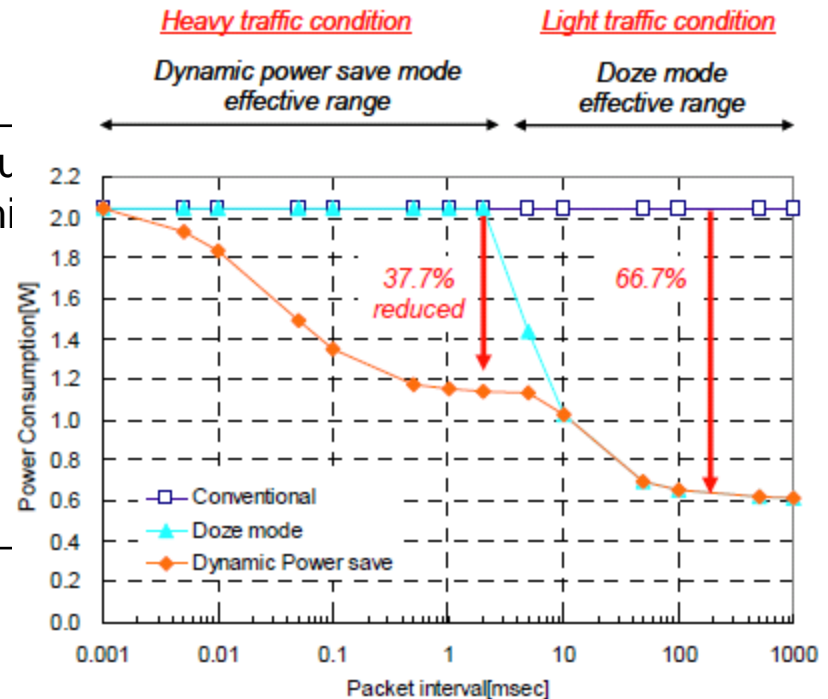
Code	Title	Author/Affiliate	Topic	Trends
NTuD1 Invited	Present State of Standards for Ethernet PON Systems • 10 GB/s PON Technology	G. Kramer, Broadcom, US	This paper discusses the current status of EPON standardization and the relationships among different standards organizations. 1G/10G EPON, Increased rate EPON in China, EPON in VLAN architecture (DSL), DOCSIS over EPON, Service Interoperability in EPON (SIEPON).	SIEPON, Burst mode
NTuD2	Demonstration of a Symmetrical 10/10 Gbit/s XG-PON2 System	D. Veen, et al. Alcatel-Lucent Bell Lab.	Full system demonstration of a FSAN XG-PON2 system, which integrates the medium access control and physical layer incorporating 10 Gbit/s burst mode upstream transmission. A specific challenge addressed was the hardware design of the FEC (RS(248,216)).	

NTuD • 10 GB/s PON Technology

Code	Title	Author/Affiliate	Topic	Trends
NTuD3	AC-coupled Reset-less 10 Gbps Burst-mode 3R Receiver Using an Internal Scrambling Scheme	T. Myouraku, S. Takahashi and A. Tajim, NEC, Japan.	The authors propose and experimentally demonstrate a fully AC-coupled reset-less burst-mode 3R receiver for an easily-implementable 10Gbps PON-OLT. Fast acquisition time of 400 nsec is achieved without external control.	Burst mode, dual rate
NTuD4	Digital multi-rate receiver for 10GE-PON and GE-PON coexistence	J. Manuel D. Mendinueta, J. Mitchell, P. Bayvel and B. C. Thomsen, UCL, UK	The authors demonstrate an NRZ multi-rate digital receiver capable of receiving upstream TDM traffic line-rates from GE-PON to 10GE-PON, that utilizes a simple optical front end and polyphase DSP at 2 samples per bit.	

NTuD • 10 GB/s PON Technology

Code	Title	Author/Affiliate	Topic	Trends
NTuD5	Symmetric 10G-EPON ONU Burst-Mode Transceiver Employing Dynamic Power Save Control Circuit	E. Igawa, M. Nogami, and J. Nakagawa, Mitsubishi, Japan	Symmetric 10G-EPON ONU burst-mode transceiver employing dynamic power save control circuit was, for the first time, developed. Reduction of power	
NTuD6	Frame-level OEO-Regenerating GPON Reach Extender	J. Thogu al., Alphi USA		



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NTuD • 10 GB/s PON Technology

Code	Title	Author/Affiliate	Topic	Trends
NTuD7	Gain-Clamped Semiconductor Optical Amplifiers for Reach Extension of Coexisted GPON and XG-PON	N. Cheng, Z. Liao, S. Liu, and F. Effenberger, Huawei, USA	Optical amplification of coexisted GPON and XG-PON upstreams is demonstrated using a gain-clamped semiconductor optical amplifier (SOA). With gain clamping, performance degradation due to the cross-gain modulation between GPON and XG-PON signals is significantly reduced.	Long reach, Dual mode.

OWI • Energy Efficient Networks

Code	Title	Author/Affiliate	Topic	Trends
OWI1	Energy Efficient Grooming of Scheduled Sub-wavelength Traffic Demands	Ying Chen and Arunita Jaekel, U of Windsor, Canada	We investigate how awareness of demand holding times can be exploited for energy efficient traffic grooming in optical networks. We present an optimal formulation for minimizing the energy consumption of a set of scheduled demands. Power mode, ILP related.	Aggregation vs. bypass
OWI2	Energy Efficiency in Optical IP Networks with Multi-Layer Switching	Michael Z. Feng, Kerry Hinton, Robert Ayre, Rodney S. Tucker, U of Melbourne, Australia	The authors show that significant savings in energy consumption can be achieved in optical IP networks with multi-layer switching by using a coordinated combination of IP aggregation, electronic bypass and optical bypass. IP/WDM, IP/SDH/WDM, GMPLS/ASON. IP aggregation, electronic bypass and optical bypass.	

OWI • Energy Efficient Networks

Code	Title	Author/Affiliate	Topic	Trends
OWI3	Energy-efficient Connection Provisioning in WDM Optical Networks	Cicek Cavdar, Istanbul Technical University, Turkey	A novel energy-efficient dynamic provisioning scheme is proposed by using an intelligent load control mechanism and an auxiliary graph model. Significant reduction in total energy consumption is achieved without a noticeable increase in the blocking probability.	Energy aware routing scheme
OWI4	Design Green and Cost-Effective Translucent Optical Networks	Zuqing Zhu, Cisco, USA. (Assoc. Prof. in USTC, China)	The authors report a network design algorithm to effectively reduce the cost and power consumption of translucent networks by using all-optical 2R regenerators. Simulation results show that the number of O/E/O 3R can be effectively reduced.	

OWI • Energy Efficient Networks

Code	Title	Author/Affiliate	Topic	Trends
OWI5 Tutorial	Energy Efficient Networks	Dan Kilper, Bell Labs, Alcatel-Lucent	High level image of Energy issue. Network Modeling Methods. Optical Networking. Multilayer cross design, Follow the wind, Energy aware routing, Optical bypass.	

NWD • Worldwide FTTX Opportunities and Challenges

Code	Title	Author/Affiliate	Topic	Trends
NWD1 invited	The Business Case for PON	Lowell D. Lamb, Broadcom, USA	The need for upgrading the access network to PON is reviewed from technical and environmental perspectives, and an order-of-magnitude financial model is developed to estimate the costs, time-line, and return-on-investment.	Business model
NWD2 invited	Investment Optimization Planning for the Access Network	Joseph Finn, Verizon, USA	Verizon is nearing completion of its plan to deploy FTTP passed 18 million Wireline premises. This paper covers Verizon's investment analysis of alternative access technologies and architectures to serve more than 10 million remaining premises. GPON/ADSL2+/VDSL2. Peak bandwidth demand of average household is 50mbps now and 160mbps in 2020.	

NWD • Worldwide FTTX Opportunities and Challenges

Code	Title	Author/Affiliate	Topic	Trends
NWD3 invited	Regulation Environment around the World: Impacts on Deployments	Fabrice Bourgart, France Telecom – Orange Labs. France.	Optical access systems aim at covering worldwide requirements. Nevertheless, a great disparity in FTTx deployments between countries is observed. Among several factors, regulation choices play a major role for which after analysis some guidelines will be given.	FTTx deployments.
NWD4 invited	FTTP Opportunities in Emerging Markets	Benoit Felten, Diffraction Analysis.	Aggregative FTTP deployment in Emerging Asia, Middle East and Africa, Latin America and Eastern Europe suggests that there are business models for FTTP in emerging economics, although the market rationale and deployment models might be significantly different from what we see in developed countries.	

OThB • Energy Efficient Optical Access

Code	Title	Author/Affiliate	Topic	Trends
OThB1 invited	Energy Efficient Optical Access Network Technologies	J. Kani, S. Shimazu, N. Yoshimoto, H. Hadama, NTT, Japan.	This paper summarizes recent technologies for reducing the power consumption of optical access networks and discusses trends in network evolution focusing on energy efficiency. Cyclic sleep for ONU, ALR, EEE, Advanced Link Aggregation for SNI in OLT, Energy-efficient configuration of OLT.	Energy Efficiency, Long reach.
OThB2	Energy efficiency scenarios for long reach PON Central Offices	F. Saliou, P. Chanclou, N. Genay, F. Laurent, Orange Labs, France.	Energy saving is compared for long reach PONs using passive or active scenarios. Inserting active equipments such as Extender Boxes lead to energy saving when the number of COs and filling ratio are optimized.	

OThB • Energy Efficient Optical Access

Code	Title	Author/Affiliate	Topic	Trends
OThB3	Cost-Effective and Power-Efficient Extended-Reach WDM/TDM PON Systems	Hao Feng, Chang-Joon Chae, and An V. Tran, Victoria Research Lab/ U of Melbourne, Australia.	We propose a remote channel combine/split module for extended-reach WDM/TDM PON systems to significantly reduce initial investment with saving up to 60% and achieve good power efficiency when fully loaded with saving up to 35% by inserting a channel combine/split module (CCS) in the remote active node of a WDM/TDM PON system.	Energy Efficiency, Long reach.
OThB4	An SLA-Based Energy-Efficient Scheduling Scheme for EPON with Sleep-Mode ONU	Lei Shi, Sang-Soo Lee, and Biswanath Mukherjee, UC Davis, USA.	The authors propose an SLA-based scheduling scheme for EPON in which OLT can adjust sleep time and ONU can quit sleep mode for sending expedited frames. Considerable energy can be saved under practical power consumption settings.	

OThB • Energy Efficient Optical Access

Code	Title	Author/Affiliate	Topic	Trends
OThB5	Influence of Broadcast Traffic on Energy Efficiency of Long-Reach SARDANA Access Network	A. Lovrić et al., Vienna U of Tech./UPC..., Europe.	We propose a remote channel combine/split module for extended-reach WDM/TDM PON systems to significantly reduce initial investment with saving up to 60% and achieve good power efficiency when fully loaded with saving up to 35% by inserting a channel combine/split module (CCS) in the remote active node of a WDM/TDM PON system.	Energy Efficiency, Long reach.
OThB6	A Cost-effective Pilot-Tone-based Monitoring Technique for Power Saving in RSOA-based WDM-PON	Kam-Hon Tse, Wei Jia, and Chun-Kit Chan, CUHK, China.	The authors propose and experimentally demonstrate a simple and novel monitoring technique with the modulation of RSOA's ASE by the pilot-tone monitoring signal at the ONU, to provide power saving in RSOA-based WDM-PON.	

OThB • Energy Efficient Optical Access

Code	Title	Author/Affiliate	Topic	Trends
OThB7	On an ONU for Full-Duplex 10.5 Gbps/lamda with Shared Delay Interferometer for Format Conversion and Chirp Filtering	B. Schrenk, UPC/NTU of Athens/ Telecom Paris Tech, Europe.	Chirped IRZ downstream is used together with a delay interferometer and a RSOA at a low complexity ONU for full-duplex 10.5Gbps transmission on a single wavelength, supported by modulation format conversion and optical offset filtering.	

OThT • High Speed PON

Code	Title	Author/Affiliate	Topic	Trends
OThT1	A 10 Gb/s Passive-Components-based WDM-TDM Reconfigurable Optical Access Network Architecture	N. Tran et al., COBRA Research Institute, Eindhoven U of Tech, Netherland.	The authors propose a cost-effective, reconfigurable optical access network by employing passive components in the remote node and dual conventional optical transceivers in ONUs. The architecture is demonstrated with bidirectional transmission at 10 Gb/s.	WDM Long reach. RSOA.
OThT2	10 Gbit/s modulation of Reflective SOA without any electronic processing	G. Valicourt et al., Telecom ParisTech, France.	For the first time, we demonstrate that the use of a long RSOA as remote modulator enables short distance (2km) transmission on SMF below the FEC limit at 10 Gbit/s without any electronic processing.	

OThT • High Speed PON

Code	Title	Author/Affiliate	Topic	Trends
OThT3 invited	Over-Sampling based Burst-mode CDR Technology for High-speed TDM-PON Systems	N. Suzuki et al, Mitsubishi, Japan	The authors review recent progress of a over-sampling based burst-mode CDR as the key device for supporting next-generation, 10Gbps capable TDM-PON systems. For the essence of circuit design, its burst-mode sync time and pulse-width distortion tolerance are also presented.	40G
OThT4	40Gbit/s lamda-tunable stacked-WDM/TDM-PON using dynamic wavelength and bandwidth allocation	H. Nakamura, NTT, Japan.	This paper proposes a configuration and a dynamic wavelength and bandwidth allocation for the upstream signal in 40Gbit/s lamda-tunable stacked-WDM/TDM-PON. An upstream transmission experiment with 10Gbit/s burst-mode receivers and fast-switching tunable filters is first demonstrated.	

OThT • High Speed PON

Code	Title	Author/Affiliate	Topic	Trends
OThT5	100-km uplink transmission of 10G- and 1G-ONU co-existing TDM-OCDMA-PON system using dual-rate burst-mode receiver	Y. Tanaka et al., Osaka U / Mitsubishi, Japan.	In a cost-effective TDM-OCDMA-PON system without en/decoder at each ONU, the uplink dispersion-compensation-free 10 Gbps/1 Gbps-co-existing TDM x 4-OCDMA transmission over 100 km SMF is demonstrated by adopting 10G/1G dual-rate burst-mode receiver.	Long reach
OThT6	Wide-range BER Measurement Scheme by Estimating BER of Discarded Frames for 10 G-EPON Systems	N. Ikeda et al., NTT, Japan.	This paper describes a new BER measurement method obtaining the BER by estimating the number of error bits in discarded frames using the rate of discarded frames. The BER is obtained precisely by the method.	

OThT • High Speed PON

Code	Title	Author/Affiliate	Topic	Trends
OThT7	Remotely Pumped WDM-PONs for Bidirectional 10-Gb/s Transmission with Channel Fault Monitoring	S. Lin et al., National Taiwan U.	WDM-PONs for 10-Gb/s bidirectional transmission are realized with REAMs as ONUs and ASE source for channel fault monitoring. The remotely pumped scheme can simultaneously boost up- and down-stream signals and enhance OSNR of monitoring signals.	Long reach

Trends

- ❑ Long Reach / Extend reach
 - ❑ Energy Efficiency
 - ❑ WDM-PON RSOA.
 - ❑ Migration to new system, dual speed, hybrid PON.
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Thank you!
