Network Application Interface

I-1

Storage Resource Management for Performance Guarantee Cooperated with Management of Optical Path Networks

Yusuke Tanimura, Tomohiro Kudoh

Information Technology Research Institute, AIST

Group A

Papio is our developing software for building a performance-guarantee storage system. The system manages storage resources based on users' advance reservation and tries to satisfy each performance requirement, along with dynamic provisioning of optical path networks.

I-2

Intercloud Resource Management over Network Services

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Information Technology Research Institute, AIST

Group B

Intercloud is a promising technology, which integrates multiple clouds in order to realize 'Big Data' processing, highly available services and disaster recovery. We have developed an intercloud resource management framework called 'GridARS' that enables to integrate multi-domain, multi-cloud resource, dynamically. GridARS has been developed using standard technologies, such as the OGF Network Service Interface (NSI) for dynamic circuit services. We have also contributed the NSI standard discussion and its international plugfests.

I-3

A New ICT Resource Management Platform

Wenyu Shen, Yukio Tsukishima, Kenji Minato, Kazuhisa Yamada, Katsuhiro Shimano

NTT Network Innovation Laboratories

Group A

In order to realize an integrated storage-network resource management system for high-definition video delivery services, we are researching a general and flexible ICT resource management platform characterized by its SDN design.

Dynamic Node Technology

N-1

Study of Scalable Network Topology for Dynamic Optical Path Networks

Kiyo Ishii, Junya Kurumida, Toshifumi Hasama, Hiroshi Ishikawa, Shu Namiki

Network Photonics Research Center, AIST

Group B

Switching in lower layer especially in optical layer is essential to avoid energy crunch in future networks. We investigate the scaling of the number of subscribers and energy consumption with limited optical switch ports.

N-2

A Highly Integrated 8x48 Transponder Aggregator Prototype Based on Si Photonics for Multi-Degree CDC-ROADM

Hitoshi Takeshita, Tomoyuki Hino, Akio Tajima, Souichiro Araki

Green Platform Research Laboratories, NEC Corporation

Group A

A silicon photonics based transponder aggregators (TPA) prototype for 8-degree and 48 transponders have been developed. Experimental results indicate that our prototype can be used with commercial ROADM system.

N-3

Sub Wavelength Path Node

Hiroyuki Honma, Wataru Odashima, Masahiro Shioda, Hiroshi Onaka

Fujitsu Limited

Group B

The number of wavelength which can be assigned into one optical fiber is small. For a optical network, It is efficient to share one wavelength between sub wavelength paths which carry client signals.

N-4	**Fast Wavelength Switching of Fully Heater-tuned CSG-DR Laser**	Hiroyuki Matsuura[1], Toshimitsu Kaneko[2], Ken Tanizawa[1], Eiichi Banno[2], Katsumi Uesaka[2], Haruhiko Kuwatsuka[1], Hidenori Iwai[3], Yoichi Oikawa[3], Shu Namiki[1], Hajime Shoji[2] 1. Network Photonics Research Center, AIST, 2. Sumitomo Electric Industries, Ltd., Japan, 3. Trimatiz Ltd.	Group A
	Dynamic wavelength switching properties of a fully heater-tuned CSG-DR laser are comprehensively studied. More than 1000 source-destination channel pairs are evaluated, 99 % of which exhibit switching time less than 1 msec.		
N-5	**Sub-ns and Full-band Injection Locking Properties of a Monolithically Integrated Tunable Laser with Single Stripe Structure**	Aaron Albores-Mejia[1], Haruhiko Kuwatsuka[1], Toshimitsu Kaneko[2], Katsumi Uesaka[2], Hajime Shoji[2], Hiroshi Ishikawa[1] 1. Network Photonics Research Center, AIST, 2. Sumitomo Electric Industries, Ltd., Japan	Group B
	Full-band injection-locking (IL) properties of a high power, low-phase-noise and tunable CSG-DR-LD (Chirped-Sampled-Grating-Distributed-Reflector-Laser-Diode) are presented. Average 2.6GHz IL-range and fast 0.76ns IL-time make the CSG-DR-LD a highly promising oscillator for future low-power and ultrafast phase-locked frequency-generation systems.		

Optical Path Conditioning			
C-1	**Prototype Development of Parametric Tunable Dispersion Compensator**	Ken Tanizawa[1], Hiroyuki Matsuura[1], Shigihiro Takasaka[2], Stephane Petit[3], Hiroshi Ota[3], Kazuya Ota[3], Yoichi Oikawa[3], Takeshi Yagi[2], Shu Namiki[1] 1. Network Photonics Research Center, AIST, 2. Furukawa Electric Co., Ltd., 3. Trimatiz Ltd.	Group A
	We are developing a black-box parametric tunable dispersion compensator (P-TDC) for autonomous dispersion compensation in dynamic optical path networks. Target specifications and recent developments of the optical part of the P-TDC are shown in this poster.		
C-2	**Optical Path-Conditioning with Digital-Coherent Systems**	Takashi Inoue, Ken Tanizawa, Shu Namiki Network Photonics Research Center, AIST	Group B
	We study optical-path conditioning technologies from the aspect of digital-coherent systems. As an example, we investigate the performance of parametric tunable dispersion compensation for WDM channels of conventional OOK format with a mixture of QPSK format with digital-coherent detection.		
C-3	**Enhancing The Phase Sensitivity of Phase Sensitive Amplifiers for Efficient Phase Regeneration**	Mingyi Gao, Takashi Inoue, Takayuki Kurosu, Shu Namiki Network Photonics Research Center, AIST	Group A
	We have clarified a mechanism that sidebands entailed by phase sensitive amplification significantly increase gain extinction ratio, by scrutinizing the trajectories of the output signal vector in the complex plane with increasing nonlinear phase shift.		
C-4	**Intra-Node Optical Path Conditioner for Dynamic Optical Path Networks**	Junya Kurumida, Mingyi Gao, Ken Tanizawa, Shu Namiki Network Photonics Research Center, AIST	Group B
	We propose an intra - node optical path conditioner using a parametric process of highly nonlinear fibers for dynamic optical path networks. Fundamental intra - node operation of the parametric optical path conditioner (P - OPC) using a 43 - Gb/s RZ - DPSK signal is confirmed. Wavelength - transparent operation of the optical node with dispersion compensation and signal regeneration function is demonstrated.		
C-5	**Direct Observation of Cross-Phase Modulation-Induced Nonlinear Phase Noise**	Hidemi Tsuchida Electronics and Photonics Research Institue, AIST	Group A
	Nonlinear phase noise in dispersion-shifted and single-mode optical fibers was investigated using the delayed self-heterodyne method, which agreed well with the theory taking account of the GVD and the polarization-dependent phase shift.		

C-6	**Specialty Fiber-Development for Dynamic Optical Path Network**	Shigehiro Takasaka, Masanori Takahashi, Takeshi Yagi FITEL photonics Laboratory, Furukawa Electric Co., Ltd.	Group B
	We developed; #1. a credit-card sized PM-HNLF module with 4.5-dB SBSsuppression, #2. downsized single mode fiber with mode-field and cladding diameter of 4.5 μ m and 53 μ m, respectively, for a fiber-array interface of silicon optical switch.		
C-7	**Development of a Polarization Insensitive Wavelength Converter for The C-Band Using Low-Dispersion-Slope PM-HNLFs**	Stephane Petit[1], Ken Tanizawa[2], Shigehiro Takasaka[3], Kazuya Ota[1], Hiroshi Ohta, Hiroyuki Matsuura[2], Takeshi Yagi3, Yoichi Oikawa[1], Noriyasu Shiga[1], Shu Namiki[2] 1. Trimatiz Ltd., 2. Network Photonics Research Center, AIST, 3. Furukawa Electric Co., Ltd.,	Group A
	We are developing a wavelength converter consisting of a cascaded operation of degenerated four-wave-mixing over the C-band with a polarization diversity scheme, using low-dispersion-slope PM highly nonlinear fibers with cancellation of the effect of the pump dithering on the converted wavelength.		
C-8	**Modeling and Characterization of Integrated Silicon Waveguides and Germanium Photodiode for Optical Performance Monitoring**	Hiroyuki Kusaka, Kazuhiro Goi, Akira Oka, Kensuke Ogawa Optics and Electronics Laboratory, Fujikura Limited	Group B
	Mach - Zehnder interferometer for optical performance monitoring is designed, fabricated and characterized. The interferometer waveguide has a monitor port waveguide with which Ge photodiode is integrated on silicon - on - insulator wafer. Photoresponse of the Ge photodiode is also characterized.		
C-9	**Optical Multiplexing Using Fiber-Optic Signal Processing**	Tomoyuki Kato, Ryo Okabe, Shigeki Watanabe Fujitsu Laboratories Ltd.	Group A
	Highly efficient optical multiplexing technology on a single carrier light by frequency segmented modulation is investigated. Transparent, broadband, and high-speed fiber-optic signal processing is effectively used to multiplex the distributed optical signal.		
C-10	**Ultrafast Complex Optical Field Monitoring by use of Linear Optical Sampling**	Dexiang Wang, Sze Y. Set Alnair Labs Corporation	Group B
	We introduce the ultrafast monitoring method of complex optical filed of optical signals with high sensitivity, high temporal resolution, and phase sensitivity using dual-channel linear optical sampling. Eye diagrams and constellation diagrams are reconstructed using advanced software algorithm.		

Optical Path Processor			
P-1	**Design Considerations of Silicon 32 x 32 Matrix Switch**	Keijiro Suzuki, Satoshi Suda, Guangwei Cong, Sang-Hun Kim, Katsumasa Tashiro, Hitoshi Kawashima Network Photonics Research Center, AIST	Group A
	We discuss challenges in realizing a silicon 32 x 32 matrix switch for optical path-network, and show a preliminary design of the switch. The challenges include propagation loss, crosstalk at intersection and fabrication process.		
P-2	**Crossings-Waveguide Based on a Tilted Multimode-Interference**	Sang-Hun Kim, Guangwei Cong, Hitoshi Kawashima, Toshifumi Hasama, Hiroshi Ishikawa Network Photonics Research Center, AIST	Group B
	Crossings-waveguide based on a tilted multimode-interference (MMI) for silicon wire is reported. For ultra-low crosstalk and low-loss, crossing-angles are optimized. The measured crosstalk of TE-TE crossing-MMIs with optimal tilted angles of 20° is about -44dB at operating wavelength of 1550 nm while crosstalks of TE-TM crossing-MMIs with angle of 15° are less than -40 dB.		

P-3	**Monolithic Integration of MOSFET and Thermo-Optical MZI-Switch on SOI platform**	Guangwei Cong[1], Takashi Matsukawa[2], Tadashi Chiba[2], Hirofumi Tadokoro[2], Masashi Yanagihara[2], Morifumi Ohno[2], Hitoshi Kawashima[1], Haruhiko Kuwatsuka[1], Yasushi Igarashi[2], Meishoku Masahara[2], Hiroshi Ishikawa[1] 1. Network Photonics Research Center, AIST 2. Nanoelectronics Research Institute, AIST	Group A
	Monolithic integration between MOSFET and thermo - optical MZI - switch was achieved through standard CMOS process on SOI platform. The MZI switch was successfully driven by MOSFET in both static and dynamic ways.		
P-4	**Pattern-Effect-Free Wavelength Conversion Via FWM in Hydrogenated Amorphous Si Wire Waveguides**	Satoshi Suda[1], Ken Tanizawa[1], Youichi Sakakibara2, Toshihiro Kamei[3], Takeshi Ogasawara[1], Ryohei Takei[2], Hitoshi Kawashima[1], Shu Namiki[1], Masahiko Mori[4], Toshifumi Hasama[1], Hiroshi Ishikawa[1] 1. Network Photonics Research Center, AIST 2. Nanoelectronics Research Institute, AIST 3. Research Center for Ubiquitous MEMS and Micro Engineering, AIST 4. Innovation Center for Advanced Nanodevices, AIST	Group B
	We investigate wavelength conversion performance of a hydrogenated-amorphous-silicon waveguide with fast free-carrier decay time. No noticeable penalty between BER curves for 2.5-ps RZ-OOK 10-Gb/s signals of PRBS 2^7-1 and $2^{31}-1$ was observed.		
P-5	**Low Crosstalk and Low Operation Power Cascaded Mach-Zehnder Silicon Optical Switches**	Takeshi Matsumoto, Shigeaki Sekiguchi, Teruo Kurahashi, Ken Morito Fujitsu Laboratories Ltd	Group A
	Previously we proposed MZ optical switches with SiGe waveguide core or SiO_2 passivation layer and demonstrated low switching power. This time, we have successfully reduced crosstalk of Si switches with SiO_2 passivation layer by utilizing cascaded structures.		
P-6	**Control Scheme for Integrated Silicon Photonic Switch**	Shigeru Nakamura, Masatoshi Tokushima, Shigeki Takahashi, Jun Ushida, Ichiro Ogura, Kazuhiko Kurata Green Platform Res. Labs., NEC Corporation	Group B
	Silicon photonics is attractive for developing compact and efficient optical switches by densely integrating many ultra-small element devices. Toward real application, we are developing low loss optical coupling between silicon waveguides and optical fibers and establishing switch element control scheme.		
P-7	**Packaging Design of Silicon Switch**	Toshio Sugaya, Toshio Kimura Furukawa Electric Co., Ltd.	Group A
	We show the packaging design of the silicon switch. Three key techniques are adopted, the flip-chip bonding for the electrical interconnect, the spot size matching for the optical coupling, and the encapsulation by resin for protection.		
P-8	**Novel NxM WSS for Next Generation Optical Networks**	Hisato Uetsuka[1], Hitoshi kawashima[2], Masahiko Mori[3], Toshifumi Hasama[2], Hiroshi Ishikawa[2], Hiroyuki Tsuda[4], Nazirul Afham Idris[4], Keisuke Sorimoto[4] 1. Hitachi Cable, Ltd., 2. Network Photonics Research Center, AIST, 3. Innovation Center for Advanced Nanodevices, AIST, 4. Keio University	Group B
	We have been developing a novel MEMS-based WSS, that has 5x5 port count (input x output) and 46 channels with 100 GHz-spacing. The PLC, cylindrical optics and densely integrated 2D-MEMS mirror array enables colorless, contentionless and directionless operation. It is useful for next generation optical ROAD systems.		