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EXHIBITION PROGRAM

OFC

The future of optical networking
and communications

TECHNICAL CONFERENCE

11 - 15 March 2018

EXHIBITION

13 - 15 March 2018

San Diego, California, USA

ofcconference.org

SPONSORED BY:



location

San Diego Convention Center

111 West Harbor Drive
San Diego, California 92101 USA

2018 dates

12 February

Advance Registration Deadline
23:59 EST (04.59 GMT)

15 February

Hotel Reservation Deadline

11 – 15 March

Technical Conference

11 – 12 March

Short Courses

13 – 15 March

Exhibition and Show Floor Programs

support

general information

+1.202.416.1907
+1.800.766.4672
custserv@osa.org

customer service

+1.855.326.8341
+1.224.563.3121
OFC@compusystems.com

hotel reservations

+1.800.465.9101
+1.240.439.2949
OFC@experient-inc.com

exhibit & sponsorship

+1.202.416.1952
sales@dofcconference.org



it's here

OFC 2018 is the year's premier event in telecom and data center optics. In fact, it's the world's largest conference and exhibition for optical communications and networking professionals.

Nearly 15,000 leading manufacturers, developers, end users and other business and technology leaders attend OFC from 65 countries. They come seeking the future direction of the industry, from the latest research developments to the newest technologies.

In an industry that is evolving at such an accelerated pace, OFC is the go-to source for education, collaboration and problem-solving solutions.



it's free

EXHIBITS PASS PLUS REGISTRATION PROVIDES FREE ADMISSION TO THE 3-DAY EXHIBITION AND INCLUDES:

- Access to the exhibit hall with over 700 exhibitors
- Market Watch — 6 panel discussions
- Network Operator Summit — keynote and 2 panels
- Plenary session featuring 3 industry luminaries
- 10 interactive hot topic workshops
- Over 15 educational programs on the show floor
- OFC Career Zone
- OFC 2018 Buyers' Guide
- Product Showcases

Register today for Exhibits Pass Plus!
ofcconference.org/registration

Plenary Speakers

MARCUS WELDON

*President, Nokia Bell Labs,
USA*

Marcus Weldon is considered one of the luminaries in the industry in terms of the clarity, depth and breadth of his vision for the future of networks. He has championed many technological disruptions in telecommunications networks, from the evolution and convergence of networks to “all IP,” the evolution of copper-based access networks to support sophisticated interference cancellation (so-called vectoring), the evolution of wireless networks to highly-distributed networks of small cells and the emergence of virtualization and Software Defined Networking as profound industry changing forces that will drive a new integrated and federated network architecture and economics.

JOHN C. DOYLE

*Jean-Lou Chameau
Professor of Control and
Dynamical Systems,
Electrical Engineering and
BioEngineering, California
Institute of Technology
(Caltech), USA*

John Doyle’s research is on mathematical foundations for complex networks with applications in biology, technology, medicine, ecology, neuroscience and multiscale physics that integrate theory from control, computation, communication, optimization and statistics (e.g., Machine Learning). The emphasis is on universal laws and architectures, robustness/efficiency and speed/accuracy tradeoffs, adaptability, and evolvability and large scale systems with sparse, saturating, delayed, quantized, uncertain sensing, communications, computing and actuation.

CHENGLIANG ZHANG

*Vice President, China
Telecom Beijing Research
Institute, China*

Chengliang Zhang is Vice President of China Telecom Beijing Research Institute and Deputy Director of the China Communications Society Optical Communication Committee and is in charge of optical communication R&D in China Telecom. He has won two National Science and Technology Progress Awards of China as the leader scientist. He has also won more than 10 other major awards in China and contributed in the society both technically and economically. In 2006 the Ministry of Information Industry of China honored Mr. Zhang as “advanced researcher of information industry technology innovation”. In 2013 he became an expert in the National Expert Talents Project, and was awarded the “outstanding young experts” honorary title.

Exhibits Pass Plus schedule

Times reflect Pacific Time Zone	SUNDAY, 11 MARCH	MONDAY, 12 MARCH	TUESDAY, 13 MARCH	WEDNESDAY, 14 MARCH	THURSDAY, 15 MARCH
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GENERAL

Registration	08:00 – 19:30	07:30 – 18:00	07:00 – 19:00	07:30 – 17:00	07:30 – 17:00
Exhibition and Show Floor			10:00 – 17:00	10:00 – 17:00	10:00 – 16:00
Unopposed Exhibit-only Time			10:00 – 14:00	12:30 – 14:00	12:30 – 14:00
OFC Career Zone (online)	08:00 – 19:30	07:30 – 18:00	07:30 – 19:00	07:00 – 17:00	07:30 – 17:00
OFC Career Zone (live)			10:00 – 17:00	10:00 – 17:00	10:00 – 16:00
Short Courses (fee required)	09:00 – 20:00	08:30 – 17:30			
Workshops	12:30 – 18:30				
Plenary			08:00 – 10:00		
Poster Sessions				10:30 – 12:30	10:30 – 12:30

SHOW FLOOR PROGRAMS

Market Watch (sponsored by Huawei)

Panel I: State of the Industry — Analyst Panel	10:30 – 12:00			
Panel II: Optical Bearer Technologies for 5G Networks	12:30 – 14:00			
Panel III: Challenges and Solutions for Delivering 400G+ Client and Line Side Optics	14:30 – 16:00			
Panel IV: High Capacity, Long Distance Transport: Innovation vs. Reality			15:30 – 17:00	
Panel V: Software Innovations in the Next-generation Optical Transport				10:30 – 12:00
Panel VI: IP and Optical Integration: Physical or Control/Management Plane?				12:30 – 14:00

Network Operator Summit (sponsored by Juniper Networks)

Keynote: Najam Ahmad, VP Network Engineering, Facebook, USA			10:30 – 11:00	
Panel I: The Role of “Open Transport” in the New Metro and Inter-Data-Center Architectures			11:00 – 12:30	
Panel II: On the Road to 100G PON (beyond 10G PON)			13:30 – 15:00	

SHOW FLOOR PROGRAMS (CONT'D)

	TUESDAY, 13 MARCH	WEDNESDAY, 14 MARCH	THURSDAY, 15 MARCH
Intra and Inter Data Center Connectivity			
Data Center Summit: Data Center Optical Interconnect — Technologies and Markets	10:15 – 12:15		
Ethernet Roadmaps Update (Ethernet Alliance)	12:45 – 13:45		
COBO Specification Overview and Next Steps (COBO)		10:15 – 11:45	
Server Fibreless Optical Networking (Open19 Foundation)		12:00 – 13:00	
400G Standards Update: What Is on the Horizon?		15:45 – 17:00	
400G Coherent: What Does it Mean to You? (OIF)			10:15 – 11:15
Infrastructure Makeover and Networking			
Fog Computing and Optical Networking — What's Next? (IEEE and OpenFog Consortium)	12:45 – 14:15		
Industry Visions for a Converged Optical Networking Roadmap (ON2020)		13:15 – 15:15	
Machine Learning: Developing Efficiency in Customer Networks		15:30 – 17:00	
SDN and Open Source Community Updates			
Open Management and Monitoring of Multilayer Webscale and Carrier Networks (OpenConfig)	11:00 – 12:30		
Enabling the Key Applications for Transport SDN (OIF)	14:30 – 15:30		
Other			
AIM Photonics: Meeting Challenges of the Marketplace and Providing Innovative Solutions (AIM Photonics)	15:45 – 16:45		
Case Installation of Fiber-based Distributed Antenna System at the San Diego Convention Center	16:15 – 17:00		
POF Symposium (POFTO)			11:00 – 13:00
Commercially Sponsored Sessions			
Disaggregating the Transport Layer: What it Means to the Bottom Line (sponsored by Juniper)	14:00 – 17:00		
Next Generation Coherent: Architectures and Technologies (sponsored by Acacia Communications)		13:30 – 14:30	
Product Showcases			
Company Product Presentations	10:15 – 10:45	10:15 – 13:30	10:15 – 10:45 13:00 – 15:00
Fiber Optic Test & Measurement Center (The Light Brigade)	10:00 – 17:00	10:00 – 17:00	10:00 – 16:00



exhibition

Fit a Year's Worth of Meetings Into Just Three Days!

Visit more than 700 exhibiting companies showcasing network equipment and software, active and passive components, test and manufacturing equipment, data center/IT products and cable and fiber. Only OFC offers the size and scope to compare and contrast vendors, giving you the information you need to make all your technology decisions in one place.

View the floor plan, review company descriptions and find products and solutions of interest. ofcconference.org/exhibithall

EXPERIENCE THE MOST COMPREHENSIVE EXHIBIT HALL IN THE INDUSTRY

- See new products
- Compare products
- Meet with vendors
- Explore customized solutions
- Establish new contacts
- Network with colleagues
- Learn what's hot
- Attend educational sessions

exhibitors and sponsors

Exhibitors as of November 2017

3D Glass Solutions	Browave Corporation	Dynaplus Incorporated
3M Electronics Materials Solutions Division	Cadence Design Systems, Inc.	East Photonics, Inc.
7 Pennies Consulting	CAILabs SAS	East Point Communication Technology Co., Ltd.
AC Photonics, Inc.	CALIENT Technologies	East Tender Optoelectronics Corp.
Acacia Communications, Inc.	Cambridge Industries USA, Inc.	ECOC 2018
Accelink Technologies Co., Ltd. & WTD	Carefiber Optical Technology Co., Ltd.	EFFECT Photonics
AC-UNION Technology Co., Ltd.	Centera Photonics, Inc.	EGIDE
Adamant Co., Ltd.	Chang Zhou KangXun Optoelectronic Technology Co., Ltd.	EKINOPS
Adolite, Inc.	Changsha Saneway Electronic Materials Co., Ltd.	Elenion Technologies, LLC
ADSANTEC, Inc.	ChemOptics	Emcore Corporation
ADVA Optical Networking	Chemtronics	Enplas Corporation
Advanced Connectek, Inc.	Cheng Yueg Enterprises Co., Ltd.	Eoptolink Technology Inc., Ltd.
Advanced Fiber Resources, Ltd.	Chengdu Huajing Keli Industry Co., Ltd.	EOSPACE, Inc.
Advanced Microoptic Systems GmbH	Chengdu Superxon Communication Technology Co., Ltd.	Epoxy Technology, Inc.
Advanced Technology Group, Inc.	Chengdu Tsuhan Science & Technology Co., Ltd.	Ethernet Alliance
Advanced Test Equipment Rentals AFL	Chengdu Xinruixin Optical Communication Tech. Co., Ltd.	EXFO
Agilecom Photonics Solutions Guangdong Limited	Chiral Photonics	Experior Laboratories, Inc.
Agiltron, Inc.	Chroma ATE Inc.	Fabrinet
AIM Photonics	Chuxing Optical Fiber Application Technologies, Lt	Ferrotec USA
Aitelong Technology Co., Ltd.	Chuzhou First Technology Co., Ltd.	Fiber Instrument Sales, Inc.
Albis Optoelectronics	Cicor Group	Fiber Optic Center, Inc.
Alight Technologies APS	CIENA Corporation	Fiber Plus International
Alnair Labs Corporation	Cisco Systems, Inc.	Fibercore
AM Compass Group, Inc.	CN-J Technology Co., LTD.	Fiberon Technologies, Inc.
American Technical Ceramics	CoAdna Photonics, Inc.	Fiberpark Technology Co., Ltd.
AMETEK Electronic Components & Packaging	CODIXX AG	FiberPro, Inc.
AMICRA Microtechnologies GmbH	Coherent Solutions	FiberQA LLC
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A-One Technology Ltd.	CorActive High-Tech, Inc.	FOCI Fiber Optic Communications, Inc.
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APAT Optoelectronics	Corning Incorporated	Formerica Optoelectronics Inc.
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OSI Laser Diode Incorporated
OSI Optoelectronics, Inc
Otrans Communication Technologies (Hangzhou) Co., Ltd.
Ousent Technologies Co, Ltd.
OXC Technologies Co., Ltd.
Oxford Fiber, Ltd.
OZ Optics
Pacific Microchip Corp.
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Phoenix Software
Photon Delta
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Plastic Optical Fiber Trade Organization
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POINTek, Inc.
PPI, Inc.

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PriTel, Inc.	Shenzhen Wintop Optical Technology Co., Ltd	Timbercon, Inc.
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Shenzhen Hi-Optel Technology Co., Ltd.	Suzhou TFC Optical Communication Co., Ltd.	Xiamen Beogold Technology Co., Ltd.
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Shenzhen Opway Communication	Tecdia, Inc.	ZGT Optical Comm Limited
Shenzhen Puhuixin Technology Co., Ltd.	Technohands Corp.	Zhejiang Guangda Pute Communication Technology
Shenzhen SDG Information Co., Ltd	Tech-X Corporation	Zhongshan Meisu Technology Co., Ltd.
Shenzhen Sinovo Telecom, Ltd.	Tektronix, Inc.	Zhuzhou Jiabang Refractory Metal Co., Ltd
Shenzhen Solar Valley Scitech Dev. Co., Ltd.	Teledyne LeCroy	ZTE Corporation
Shenzhen SONT Technologies Co., Ltd	Telescent, Inc.	ZTT International Limited
	TeraXion, Inc.	
	The Light Connection, Inc. (TLC)	



educational programs

Three theaters on the show floor feature presentations by experts from major global brands and key industry organizations. Get high-level takes on hot topics and market trends. Learn about the state of the industry, emerging technologies and recommended courses of action to tackle today's toughest business challenges.

NEXT-GEN INDUSTRY KNOWLEDGE

Market Watch and Network Operator Summit are held in Theater I.

Theaters II and III feature more than 15 sessions covering:

- Intra and Inter Data Center Connectivity
- Infrastructure Makeover and Networking
- SDN and Open Source
- And more!

THEATER II - SPONSORED BY



THEATER III - SPONSORED BY



hear industry leaders

COMPANIES PRESENTING IN SHOW FLOOR PROGRAMS

II-VI Photonics	Google	Nokia Bell Labs
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Alibaba	Infinera	Oclaro
Arista Networks	Inphi Corp.	Sedona Systems
China Telecom	Juniper Networks	Senko
Ciena	Kaiaam	TE Connectivity
Cisco	Mellanox	TE SubCom
Coriant	Microsoft	Tencent
Equinix	Molex	Verizon
Facebook	NEC Corp.	ZTE TX
	NeoPhotonics	

HEAR PRESENTATIONS FROM INDUSTRY GROUPS DRIVING THE EVOLUTION OF OPTICAL NETWORKS



Market Watch

GET AN INSIDER'S LOOK AT TODAY'S MOST IMPORTANT INDUSTRY DEVELOPMENTS

This three-day series of panel discussions addresses the latest application topics and business issues in optical communications and networking. Market Watch features esteemed speakers from top carriers, system vendors, market analyst firms and component companies.

ORGANIZER

Frank Chang, *Inphi Corporation, USA*
N5 Network Operator Summit and Market Watch Sub-committee Chair

SPONSORED BY



Panel I: State of the Industry — Analyst Panel

Tuesday, 13 March, 10:30 - 12:00

MODERATOR

Zeljko Bulut, *Coriant, USA*

This is one of the most highly attended panels at OFC. Industry and financial analysts give their views of the optical communications markets including historical data and forecasts. Top trends in all markets are presented with a focus on specific market data points that are helpful to a wide audience. The entire optical communications value chain is represented — components, equipment and services.

SPEAKERS

Lawrence Gasman, *CIR, USA*
Mike Genovese, *MKM Partners, USA*
Ian Radpath, *Ovum, USA*
Simon Stanley, *Heavy Reading, USA*
Nina Wu, *Infostone Communication Consultant, China*

Panel II: Optical Bearer Technologies for 5G Networks

Tuesday, 13 March, 12:30 - 14:00

MODERATOR

Lisa Huff, *Discerning Analytics, USA*

The development of 5G is speeding up recently, and the optical networks including fiber infrastructure and optical bearer technology will be more important for 5G than 4G, due to 5G's higher bandwidth and better performance requirements like lower latency. This panel will focus on the role, technology and market trends of optical infrastructure and technologies for 5G networks. Topics to be covered include: requirements for fiber infrastructure from 5G, bearer requirements for 5G front haul, back haul and middle haul, next generation front haul interface and their influence to optical bearer networks, and candidate bearer technologies for 5G.

SPEAKERS

Mikko Hannula, *Coriant, USA*
Junjie Li, *China Telecom Beijing Research Institute, China*
Hector Menendez, *Nokia, USA*
Jun Shan Way, *ZTE TX, USA*
Ryan Yu, *Molex, USA*

Panel III: Challenges and Solutions for Delivering 400G+ Client and Line Side Optics

Tuesday, 13 March, 14:30 - 16:00

MODERATOR

Andrew Schmitt, *Signal AI, USA*

Data center switches are scaling from 3.2Tb/s to 6.4, 12.8Tb/s. 25 Tb/s switching chips must be on the horizon. A new generation of 400G front panel pluggable optical transceivers are emerging to support the increased bandwidth. Increased electrical speeds of 56 and 64 GBaud and complex signaling

and constellations place increased constraints on the packaging and design of optical components. This panel will debate the pros and cons of the various pluggable options including form factors for client optics, coherent vs. direct detect, backward compatibility, pluggables vs. on-board optics and silicon photonics.

SPEAKERS

Andy Bechtolsheim, *Arista Networks, USA*
Mark Filer, *Microsoft, USA*
Maxim Kuschnerov, *Huawei Technologies, Germany*
Mark Nowell, *Cisco, USA*
Siddharth Sheth, *Inphi, USA*

Panel IV: High Capacity, Long Distance Transport: Innovation vs. Reality

Wednesday, 14 March, 15:30 - 17:00

MODERATORS

Ting Wang, *NEC Laboratories America, USA*
Tiejun Xia, *Verizon Communications, USA*

This panel will discuss current progress and future plans for the application of new transmission and switching technologies at long distance optical transport network with a focus on the long-haul & subsea (SLTE) technology roadmap. The discussion will come from both technology and business perspectives by major component vendors, equipment manufacturers and operators.

Topics to be covered include recent hero experiments, bottlenecks to adoption of the new transport technologies, technologies to help drive down costs, white box strategies and multi-mode and multi-core-based SDM technologies vs. multi-fiber bundles.

SPEAKERS

Yoshihisa Inada, *NEC, USA*
Mike Rieger, *TE SubCom, USA*
Kim Roberts, *Ciena, Canada*
Glenn Wellbrock, *Verizon, USA*

Panel V: Software Innovations in the Next-generation Optical Transport

Thursday, 15 March, 10:30 - 12:00

MODERATOR

Osamu Ishida, *NTT Electronics Corporation, Japan*

Software innovations have become increasingly important for next-generation transport networks, both packet and optical such as open APIs for network programmability, network analytics, SDN controllers and open operating systems. In this panel, senior members of network operations and engineering from service providers (traditional telecom, cable and cloud/content) will debate the importance, challenges and enablers of their adoption.

SPEAKERS

Robert Blum, *Intel, USA*
Marc Bohn, *Elenion Technologies, Germany*
Steve Jia, *Cable Jia, USA*
Rene Schmogrow, *Google, USA*
Masahito Tomizawa, *NTT, Japan*

Panel VI: IP and Optical Integration: Physical or Control/Management Plane?

Thursday, 15 March, 12:30 - 14:00

MODERATOR

Sterling Perrin, *Heavy Reading, USA*

This panel looks at both SDN-based multi-layer interworking and physical multi-layer integration from an architectural perspective, with a focus on the drivers, benefits, technology enablers and primary applications for each.

SPEAKERS

Mark Bieberich, *Juniper, USA*
Adam Carter, *Oclaro, USA*
Mike Freiburger, *Verizon, USA*
Ori Gerstel, *Sedona Systems, Israel*
Chongjin Xie, *Alibaba, China*

Network Operator Summit

GET THE INSIDE PERSPECTIVE FROM NETWORK OPERATORS

This dynamic program presents the inside perspective from service providers and network operators — their issues, drivers and how their requirements may impact the future of the industry. Everyone in the supply chain, from equipment manufacturers to components, will want to hear what's next in meeting the needs of all network operators.

ORGANIZER

Frank Chang, *Inphi Corporation, USA*
N5 Network Operator Summit and Market Watch Sub-committee Chair

SPONSORED BY



Network Operator Summit Keynote Wednesday, 14 March, 10:30 - 11:00

KEYNOTE SPEAKER

Najam Ahmad, *Vice-President, Network Engineering, Facebook, USA*

Panel I: The Role of “Open Transport” in the New Metro and Inter-Data-Center Architectures Wednesday, 14 March, 11:00 - 12:30

MODERATOR

Loukas Paraschis, *Infinera, USA*

This panel reviews the importance of “open transport” technology innovations (hardware and software) in the evolution of different metro network architectures. The session covers the main characteristics of the new metro architectures, the key “open transport” technology innovations (hardware and software), the role of “open transport” and disaggregation specifically in optical networks and

the important commonalities and differences in “open transport” evolution of metro networks.

SPEAKERS

Jamie Gaudette, *Microsoft, USA*
Robert Howald, *Comcast, USA*
Andrew Leong, *Facebook, USA*
Scott Mountford, *AT&T, USA*
Matt Newland, *Google, USA*
Farzam Toudeh-Fallah, *JPMorgan Chase, USA*

Panel II: On the Road to 100G PON (beyond 10G PON)

Wednesday, 14 March, 13:30 - 15:00

MODERATOR

Julie Kunstler, *Ovum, USA*

10G PON is being deployed in quantity and the ecosystem is looking to the next step. The IEEE and ITU-T are both working on 100G PON standards. Several operators and vendors are pushing for EPON/GPON convergence at 100G, citing the benefits to a unified ecosystem. Other operators are focusing on NG-PON2 with its advantages of tunable and multiple wavelengths. Can convergence be achieved at 100G PON and if not full convergence, can unity happen at the optical interface and MAC layers? Will operators be willing to share their respective OMCI to move toward improved interoperability? What are the goals of the various players in the ecosystem as PON moves to its next level?

SPEAKERS

Phillipe Chanclou, *Orange Labs, France*
Jiajin Gao, *China Mobile Technology, China*
Jun-ichi Kani, *NTT, Japan*
Cedric Lam, *Google, USA*
Vincent O’Byrne, *Verizon, USA*
Dezhi Zhang, *China Telecom, China*

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INTRA AND INTER DATA CENTER CONNECTIVITY

Data Center Summit: Data Center Optical Interconnect — Technologies and Markets

Tuesday, 13 March, 10:15 - 12:15

In this panel, industry experts will cover the various types of data center operators, their needs and how they are being addressed including current technologies and equipment, applications and deployment scenarios.

Ethernet Roadmaps Update

Tuesday, 13 March, 12:45 - 13:45

ORGANIZER

Ethernet Alliance

This exciting and interactive panel will discuss the latest developments

in Ethernet that are summarized in the 2018 Ethernet Roadmap, which is an updated overview of the latest Ethernet technologies that are being developed and deployed. While many know about 400 Gbe being the fastest standardized Ethernet speed, other speeds such as 2.5, 5, 25 and 50 GbE have been developed for particular applications. This panel will look at the variety of speeds and the target applications driving them. The roadmap will discuss the speeds as well as the timing of them and their underlying technologies.

COBO Specification Overview and Next Steps

Wednesday, 14 March, 10:15 - 11:45

ORGANIZER

Consortium for On-Board Optics (COBO)

The COBO panel will provide an overview of its on-board optical module specification developed for the data center and coherent markets. The panel will discuss the market outlook and next steps to enable broader market adoption.





Server Fibreless Optical Networking

ORGANIZER

Open19 Foundation

Wednesday, 14 March, 12:00 - 13:00

Open19 is redefining data center strategy and design using a novel, open-source, community approach to solving problems of deployment, management, performance and efficiency at scale. This panel discusses optical server connectivity with speeds of up to 400G per server, without the need for individual fibers per server. The optical interconnect will leverage the Open19 blind-mated snap-on cabling system that extends optical connectivity all the way to each server in this unique new approach.

400G Standards Update: What Is on the Horizon?

Wednesday, 14 March, 15:45 - 17:00

Get an update on the status of key 400G standards and projects. You will hear what is close to coming out and what's currently under consideration. Panelists from several standard setting groups and industry consortiums will each present an overview of their most important activities.

400G Coherent: What Does it Mean to You?

Thursday, 15 March, 10:15 - 11:15

ORGANIZER

Optical Internetworking Forum (OIF)

A panel of industry experts representing the breadth of the coherent eco-system will discuss and debate the conflicting demands for a near-term, high-volume, short reach, DWDM 400G optical link. Power, reach, architecture, etc. are some of the conflicting requirements that will be addressed. The status of the OIF's current project to define a 400ZR link specification will also be provided.

INFRASTRUCTURE MAKEOVER AND NETWORKING

Fog Computing and Optical Networking — What's Next?

Tuesday, 13 March, 12:45 - 14:15

ORGANIZERS

IEEE and OpenFog Consortium

This panel updates important developments during the past year and points toward what's next for Fog Computing and Networking, especially within the optical domain, e.g., for metro-DCI innovations. They will discuss what they have been working on and the technical challenges and opportunities they foresee.

Industry Visions for a Converged Optical Networking Roadmap

Wednesday, 14 March, 13:15 - 15:15

ORGANIZER

ON2020

With significant involvement from major global telecom and datacom network operators, ON2020 attempts to define new optical network requirements and specifications, develop general network technology roadmaps and evolution scenarios, and foster an open and sustainable ecosystem for end users, service providers and equipment and component vendors to collectively address the optical networking demands in the cloud era. The program provides long-term industry visions beyond current product deployments and beyond concrete product roadmaps.

Machine Learning: Developing Efficiency in Customer Networks

Wednesday, 14 March, 15:30 - 17:00

Hear from industry early adopters and what they have learned in working with machine learning to manage a number of applications in optical networks. They will share their experiences in implementing and perfecting a model, then using it in operations. Results in the areas of open saving, people resource saving and other efficiency gains will be presented.

SDN AND OPEN SOURCE COMMUNITY UPDATES

Open Management and Monitoring of Multilayer Webscale and Carrier Networks

Tuesday, 13 March, 11:00 - 12:30

ORGANIZER

OpenConfig

This session will host representatives from web scale operators, carriers and equipment manufacturers to

discuss the challenges in scaling global networks while reducing costs and delivering highly available infrastructure and services. The focus will be on the latest open management interfaces (OpenConfig, NETCONF, OpenFlow, etc.), new monitoring approaches such as streaming telemetry and pub/sub and innovations in SDN and transport-SDN.

Enabling the Key Applications for Transport SDN

Tuesday, 13 March, 14:30 - 15:30

ORGANIZER

Optical Internetworking Forum (OIF)

Learn how OIF is helping to realize commercial Transport SDN deployment and enabling key applications for Transport SDN such as Network Slicing, Virtual Transport Network Services, Network Resiliency and Carrier CORD/DC Interconnection.

OTHER

AIM Photonics: Meeting Challenges of the Marketplace and Providing Innovative Solutions

Tuesday, 13 March, 15:45 - 16:45

ORGANIZER

American Institute for Manufacturing (AIM) Photonics

AIM Photonics seeks to advance integrated photonic circuit manufacturing. Leaders and members of the institute will discuss the latest accomplishments in key projects. They will also provide the most recent data on industry leading services — AIM Photonics' Process Design Kit (PDK), Multi Project Wafers (MPW) and the Grand Opening of the 300mm wafer Integrated Photonics Test, Assembly and Packaging Facility. These services are available to all enterprises, academia and national organizations.

Case Installation of Fiber-based Distributed Antenna System at the San Diego Convention Center

Tuesday, 13 March, 16:15 - 17:00

A panel of the parties responsible for the recent fiber-based Distributed Antenna System installation at the San Diego Convention Center (SDCC) speak to the drivers, challenges, strategy and technology considerations behind the project.

POF Symposium

Thursday, 15 March, 11:00 - 13:00

ORGANIZER

POFTO

This symposium covers recent developments in POF technology, applications, technical standards, industry progress and new markets. Speakers from around the world will review opportunities for POF in areas such as Gigabit POF, 4K/8K ultra high definition television (UHDTV), home networking, IPTV, consumer devices, aerospace & automobile applications, POF sources & sensors and high-temperature POF, among others.

SPONSORED COMMERCIAL SESSIONS

Disaggregating the Transport Layer: What it Means to the Bottom Line

Tuesday, 13 March, 14:00 - 17:00

ORGANIZER

Juniper Networks

Join host Juniper Networks and an expert panel from leading network operators, component and systems vendors to discuss and debate the business case for transport layer disaggregation. Key topics to be covered include: driving network innovation with a disaggregated approach, reducing costs of ownership with disaggregation and timing of migration to disaggregated architectures.

Next Generation Coherent: Architectures and Technologies

Wednesday, 14 March, 13:30 - 14:30

ORGANIZER

Acacia Communications

By leveraging the power of CMOS silicon, coherent technology has been able to accelerate reductions in cost, size and power of optical interconnections for transport applications. New coherent products will offer data rates of 400G to 600G using a single wavelength based on 16nm and 7nm process benchmarks. Advances in optical components are contributing, as well, with higher bandwidth and lower cost packaging technologies. This session will discuss trends in coherent architectures and technologies with an eye toward the future.



short courses

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Half day Short Courses are a good way to get clear, concise overviews of important topics in optical networking and communications. Taught by industry experts, over 50 courses cover key technologies in 15 topic categories. Registration fees are required.

7 NEW SHORT COURSES

Topics covered include: SDM components and devices, digital coherent optical system performance, high-capacity data center interconnects, pluggable optics, optical transport SDN, SDN inside and in between data centers and transmission fiber and cables.

For complete course descriptions, visit ofcconference.org/shortcourses

short course schedule

SUNDAY, 11 MARCH		
09:00 – 12:00	SC177	High-speed Semiconductor Lasers and Modulators
	SC328	New Developments in High-speed Optical Networking: OTN Beyond 100G, 100G/200G/400G Ethernet, Flex Ethernet
	SC444	Optical Communication Technologies for 5G Wireless
	SC447	The Life Cycle of an Optical Network: From Planning to Decommissioning
	SC463	Optical Transport SDN: Architectures, Applications and Actual Implementations [NEW]
09:00 – 13:00	SC105	Modulation Formats and Receiver Concepts for Optical Transmission Systems
	SC384	Background Concepts of Optical Communication Systems
	SC395	Modeling and System Impact of Optical Transmitter and Receiver Components
	SC454	[Hands-on] Introduction to Silicon Photonics Circuit Design
	SC461	High-capacity Data Center Interconnects [NEW]
13:00 – 16:00	SC216	An Introduction to Optical Network Design and Planning
	SC429	Introduction to Flexible Photonic Networks
	SC433	Introduction to Photodetectors and Optical Receivers
	SC462	Introduction to Pluggable Optics [NEW]
13:00 – 17:00	SC203	100 Gb/s and Beyond Transmission Systems, Design and Design Trade-offs
	SC325	Highly Integrated Monolithic Photonic Integrated Circuits
	SC369	Test and Measurement for Metro and Long-haul Communications
13:30 – 17:30	SC267	Silicon Microphotronics: Technology Elements and the Roadmap to Implementation
	SC327	Modeling and Design of Fiber-optic Communication Systems
	SC393	Digital Signal Processing for Coherent Optical Systems
	SC450	Design, Manufacturing and Packaging of Opto-electronic Modules
17:00 – 20:00	SC205	Integrated Electronic Circuits for Fiber Optics
	SC217	Optical Fiber Based Solutions for Next Generation Mobile Networks
	SC408	SDM Based Fiber-optic Transmission Systems
	SC451	Optical Fiber Sensors

MONDAY, 12 MARCH

08:30 – 12:30	SC102	WDM in Long-haul Transmission Systems
	SC114	Passive Optical Networks (PONs) Technologies
	SC178	Test and Measurement for Data Center/Short Reach Communications
	SC443	Optical Amplifiers: From Fundamental Principles to Technology Trends
	SC446	[Hands-on] Characterization of Coherent Opto-electronic Subsystems
	SC452	FPGA Programming for Optical Subsystem Prototyping
	SC453A	[Hands-on] Fiber Optic Handling, Measurements and Component Testing
	SC460	Digital Coherent Optical System Basics: Transceiver Technology and Performance [NEW]
09:00 – 12:00	SC176	Metro Network Evolution
	SC359	Datacenter Networking 101
	SC390	Introduction to Forward Error Correction
	SC411	Multi-layer Interaction in the Age of Agile Optical Networking
	SC428	Link Design for Short Reach Optical Interconnects
	SC442	Free Space Switching Systems: PXC and WSS
	SC448	Software Defined Networking for Optical Networks: a Practical Introduction
	SC459	SDM Components and Devices [NEW]
	SC465	Transmission Fiber and Cables [NEW]
13:30 – 16:30	SC208	Optical Fiber Design for Telecommunications and Specialty Applications
	SC261	ROADM Technologies and Network Applications
	SC385	Optical Interconnects for Extreme-scale Computing
	SC431	Photonic Technologies in the Data Center
	SC445	Visible Light Communications — the High Bandwidth Alternative to WiFi
	SC464	SDN Inside and In Between Data Centers [NEW]
13:30 – 17:30	SC160	Microwave Photonics
	SC341	Multi-carrier Modulation: DMT, OFDM and Superchannels
	SC347	Reliability and Qualification of Fiber-optic Components
	SC432	[Hands-on] Silicon Photonics Component Design & Fabrication
	SC449	[Hands-on] An Introduction to Writing Transport SDN Applications
	SC453B	[Hands-on] Fiber Optic Handling, Measurements and Component Testing

short courses

SC102: WDM in Long-haul Transmission Systems

Neal S. Bergano, *TE Subcom, USA*

Review the important issues regarding the use of WDM in long-haul transmission systems including an introduction to long-haul undersea cable transmission systems, the amplified transmission line, dispersion/nonlinear management, transmission formats, measures of system performance, forward error correction, the importance of polarization effects, experimental techniques and results, a transmission line design example and future trends including coherent transponders.

SC105: Modulation Formats and Receiver Concepts for Optical Transmission Systems

Peter Winzer and Xi Chen, *Nokia Bell Labs, USA*

Learn the basic concepts behind advanced optical modulation formats, their performance and their generation using state-of-the-art opto-electronic components and digital signal processing. In addition, get the basic concepts of optical receiver design and the interplay between modulation format, transceiver design and transmission impairments.

SC114: Passive Optical Networks (PONs) Technologies

Yuanqui Luo, *Huawei, USA*

Get an introduction to the architectures of passive optical networks (PONs) and review the various types of PONs by identifying the major features and market deployments. Learn the key technologies to enable PONs, the advantages and limitations and the guidelines of PON planning and deployment.

SC160: Microwave Photonics

Vince Uric, *DARPA, USA*

This course analyzes microwave photonic components, subsystems and systems and contrasts analog and digital fiber optics. It covers basic concepts such as microwave performance metrics, sources of noise and distortion in analog photonics and modulation/demodulation techniques. It then reviews applications including links, delay line signal processing, phased arrays, frequency translation, microwave generation, and conversion between analog and digital signals.

SC176: Metro Network Evolution

Loudon Blair and David Krauss, *Ciena Corp., USA*

This course reviews new service trends and how they are changing network traffic characteristics across the metro area. It explores resulting metro network architectures and examines the key networking technologies for next generation metro networks, including DWDM, OTN, Ethernet and IP/MPLS. Get an introduction to IP, Carrier Ethernet and optical services, and how supporting implementations are evolving to achieve desired performance.

SC177: High-speed Semiconductor Lasers and Modulators

John Bowers, *Univ. of California, Santa Barbara, USA*

This course reviews the fundamental physics and design of optical modulators, with an emphasis on electroabsorption modulators. Other topics covered include the microwave characteristics of semiconductor lasers, methods to increase the bandwidth and analog and large-signal modulation issues important for applications in communication systems.

SC178: Test and Measurement for Data Center/Short Reach Communications

Greg D. LeCheminant, *Keysight Technologies, USA*

This course covers measurement tools and techniques that characterize signal quality and how well it is maintained when transmitted through a data center/short reach optical system. It focuses on three measurement areas: bit-error-ratio (BER) analysis, oscilloscope waveform analysis with emphasis on the NRZ and PAM4 eye diagrams and jitter analysis.

SC203: 100 Gb/s and Beyond Transmission Systems, Design and Design Trade-offs

Martin Birk, *AT&T Labs, USA*
Benny Mikkelsen, *Acacia Communications, USA*

This course provides an overview of the drivers and applications of 100Gb/s transmission systems in backbone, regional and metro networks. It describes the requirements and expectations in regard to cost, power consumption, footprint, reliability, optical performance and interoperability. Also covered are practical design issues of 100Gb/s line-cards.

SC205: Integrated Electronic Circuits for Fiber Optics

Y. K. Chen, *Nokia Bell Labs, USA*

This course describes the functions and performance of high-speed electronics for optic fiber terminals and associated designs and implementation of physical layer transceiver electronics. It also describes commonly used circuit architectures and broadband digital, analog and mixed-mode circuits and introduces advanced modulation and signal processing architecture and related broadband data converters.

SC208: Optical Fiber Design for Telecommunications and Specialty Applications

David J. DiGiovanni, *OFS Labs, USA*

This course discusses the basics of optical propagation and fiber design. It reviews an array of current fiber technologies and considers the role and capabilities of materials, structures and waveguide design for both fiber and fiber-based photonic components. The focus is two-fold: coverage of commercial fiber technology and demonstration of the many opportunities available with new and specialty optical fibers.

SC216: An Introduction to Optical Network Design and Planning

Jane M. Simmons, *Monarch Network Architects, USA*

This course introduces optical network design and planning for backbone, regional and metro-core networks. It discusses the role of network elements, including ROADMs and addresses the benefits of equipment features such as ‘colorless,’ ‘directionless,’ ‘contentionless’ and ‘gridless.’ It covers the principles of routing and wavelength assignment (RWA).

SC217: Optical Fiber Based Solutions for Next Generation Mobile Networks

Dalma Novak, *Pharad, LLC., USA*

This course covers the requirements for next generation mobile networks, optical fiber-based architectures for emerging systems and relevant technologies, solutions and implementation approaches.

SC261: ROADM Technologies and Network Applications

Thomas Strasser, *Nistica Inc., USA*

Get an historical perspective of how ROADM systems evolved the numerous network benefits driving commercial adoption. The course defines the different ROADM architectures competing in the market and compares their functional differences. It also describes how these technologies are being integrated into WDM systems and what types of networks most fully leverage the new capabilities to provide network value.

SC267: Silicon Microphotonics: Technology Elements and the Roadmap to Implementation

Lionel Kimerling, *MIT, USA*

This course evaluates the most promising silicon photonics components and progress along the path to monolithic electronic-photonics integration. It presents case studies in design, fabrication and performance for silicon-based PICs, devices (waveguide, filter, photodetector, modulator and lasers) and system applications. Get an overview of the silicon microphotonic platform drivers and barriers in design, fabrication, packaging and test.

SC325: Highly Integrated Monolithic Photonic Integrated Circuits

Chris Doerr, *Acacia Communications, USA*

This course provides a deeper understanding of photonic integrated circuits (PICs) for telecom and datacom describing the pros and cons of PICs and providing details about the most popular material systems, especially silicon photonics and indium phosphide photonics. It covers the basics of optical waveguides and describes many state-of-the-art devices. It also provides details on the design and process flow.

SC327: Modeling and Design of Fiber-optic Communication Systems

Rene-Jean Essiambre, *Nokia Bell Labs, USA*

This course provides a comprehensive overview of nonlinear propagation modeling in optical fibers. It describes the generic building blocks of fiber-optic transmission systems, including basic transmitter and receiver designs for direct and coherent detection, a comparison of optical amplification technologies and a brief introduction to linear transmission effects in fibers. It then focuses on the various techniques suitable for modeling nonlinear propagation of advanced modulation formats, highlighting the advantages and drawbacks of various methods.

SC328: New Developments in High-speed Optical Networking: OTN beyond 100G, 100G/200G/400G Ethernet, Flex Ethernet

Stephen Trowbridge, *Nokia, USA*

This course provides an introduction to a complementary set of technologies for high-speed optical networking including the Optical Transport Network (OTN) standardized by ITU-T Study Group 15, higher speed Ethernet (100 Gb/s, 200 Gb/s, 400 Gb/s) standardized by IEEE 802.3, and the Flex Ethernet implementation agreement developed by the Optical Internetworking Forum (OIF).

SC341: Multi-carrier Modulation: DMT, OFDM and Superchannels

Sander L. Jansen, *ADVA Optical Networking, Germany*

Dirk van den Borne, *Juniper Networks, Germany*

This course provides an understanding of both the theory and practical realization of DMT, OFDM, subcarrier multiplexing and DWDM superchannels as well as their most relevant applications in different types of optical transmission networks.

The goal is to explain the flexibility of multicarrier modulation to design adaptive and scalable optical interfaces vs. single carrier modulation formats.

SC347: Reliability and Qualification of Fiber-optic Components

David Maack, *Corning, USA*

This course covers the importance, tools, methodologies, mathematics and benefits of reliability programs. You will understand the requirements, tests, benefits and limitations of qualification programs and learn the strategic and tactical differences between qualification testing and reliability modeling.

SC359: Data Center Networking 101

Hong Liu, *Google, USA*

This course describes architecture philosophies and technological considerations in constructing modern data center networks, with an emphasis on the roles of optical networking technologies. It covers the key optical technologies for intra and inter data center networks, the trade-offs among various implementation options and the trends in the next 3 to 5 years.

SC369: Test and Measurement for Metro and Long-haul Communications

Bernd Nebendahl and Michael Koenigsmann, *Keysight, Germany*

This course explains how components and subsystems for dense wavelength division multiplexed (DWDM) systems and coherent transmission systems like optical filters, wavelength selective switches, fiber amplifiers, coherent transmitters and receivers are characterized. It covers measurements of wavelength and polarization dependent properties of DWDM components, the required performance of test and measurement equipment and comparisons of the quality of various transmitters through the use of EVM measurements.

SC384: Background Concepts of Optical Communication Systems

Alan Willner, *Univ. of Southern California, USA*

This course covers the basic concepts of an optical communication system including different types of modulation and multiplexing formats and the key differences between direct and coherent detection systems.

SC385: Optical Interconnects for Extreme-scale Computing

Keren Bergman, *Columbia Univ., USA*
John Shalf, *Lawrence Berkeley National Laboratory, USA*

The course provides an introduction to the system organization and architectures of today's top supercomputers as well as the emerging interconnection networking challenges. It also covers the potential applications of integrated photonics in future supercomputing and datacenters including the design, power consumption and performance analysis.

SC390: Introduction to Forward Error Correction

Frank Kschischang, *Univ. of Toronto, Canada*

This course defines the key parameters of an error-correcting code, explains the system-level benefits provided by forward error correction (FEC) and discusses the existence of fundamental limits (Shannon capacity) on FEC.

SC393: Digital Signal Processing for Coherent Optical Systems

Chris Fludger, *Cisco Optical GmbH, Germany*

This course gives a basic introduction to coherent transceivers and takes a more in-depth view of the DSP building blocks and their implementation in a high-speed ASIC.

SC395: Modeling and System Impact of Optical Transmitter and Receiver components

Harald Rohde and Robert Palmer,
Elenion, Germany

This course focuses on the properties and impairments of IQ-Modulators, Driver Amplifiers and Integrated Coherent Receivers. Based on the numerical component models, the impact of real life device impairments is shown and evaluated. The course demonstrates how different design parameters influence the properties of the components.

SC408: SDM Based Fiber-optic Transmission Systems

Roland Ryf, *Nokia Bell Labs, USA*

This course discusses how modes or multiple cores can be exploited to improve a fiber optic communication channel, summarizes the key advantages and limitations of different fiber types for space-division multiplexing, compares space-division multiplexing to other multiplexing techniques and lists the key advantages and potential fields of application.

SC411: Multi-layer Automation in the Age of Agile Optical Networking

Ori A. Gerstel, *Sedona Systems, Israel*

This course describes IP layer behaviors that affect multi-layer networking, explains types of multi-layer interactions (physical integration, control plane, SDN, management plane) and defines their functionality (restoration, reoptimization, disaster recovery, etc.). Learn how IP and optical networks are planned today, and how multi-layer interactions enable significant savings in the network.

SC428: Link Design for Short Reach Optical Interconnects

Petar Pepeljugoski, *IBM Research, USA*

This course provides an understanding of the components of short multimode fiber links, describes the basic elements of power budget and possible trade-offs. It identifies suitable models

for various components of the link to be used in the design phase and provides in-depth insight in multimode fiber propagation, including launch conditions and connector effects. It also covers the advantages and disadvantages of advanced modulation formats in short optical interconnects.

SC429: Introduction to Flexible Photonic Networks

David Boertjes, *Ciena, Canada*

This course reviews the most common types of flexible photonic networks being deployed today including an exploration of the underlying technologies and the capabilities and challenges of adopting these technologies. You will gain an understanding of CD and CDC ROADM technologies, flexible grid, routing and spectrum assignment, flexible modulation format, on-demand vs. end-of-life planning, capacity optimization and network defragmentation.

SC431: Photonic Technologies in the Data Center

Clint Schow, *Univ. of California, Santa Barbara, USA*

This course compares the different optical technologies (including VCSELs, Si Photonics, and InP platforms) used in data centers today and identifies their strengths and limitations. It defines the requirements for photonic links at different levels of network hierarchy in terms of reach, power, cost and density and describes the factors that have driven the current implementation of systems as well as future trends that will drive technologies.

SC432: [Hands on] Silicon Photonics Component Design & Fabrication

Lukas Chrostowski, *Univ. of British Columbia, Canada*

This course explains how to model select silicon photonic components, create compact models for silicon photonic components and use commercial modelling tools (Lumerical Solutions).

The course goes through a step-by-step design methodology to design ring resonators and ring modulators, including identifying target specifications, analytic modeling, photonic circuit modeling for choosing parameters, waveguide modeling, directional coupler design, manufacturing variability analysis, design of experiment, layout for fabrication, and finally, experimental data analysis.

SC433: Introduction to Photodetectors for Optical Communications

Joe C. Campbell, *Univ. of Virginia, USA*

This course focuses on the photodetectors most frequently employed for optical receivers, primarily p-i-n and avalanche photodiodes. Their performance parameters and the physical effects that determine those parameters will be discussed. This course also covers fundamental optical receiver concepts and implementations including direct detection and coherent receivers.

SC442: Free Space Switching Systems: PXC and WSS

David Neilson, *Nokia Bell Labs, USA*

This course provides an overview of photonic cross connects (PXC) and wavelength selective switches (WSS), how they work and their design trade-offs. The requirements and performance for these switching subsystems will be reviewed as well as the fundamental optical schemes for these switches. An overview of the basic requirements and capabilities of the switching technologies, such as MEMS, LCOS and others will be given.

SC443: Optical Amplifiers: From Fundamental Principles to Technology Trends

Shu Namiki, *National Institute of Advanced Industrial Science and Technology (AIST), Japan*

Michael Vasilyev, *Univ. of Texas at Arlington, USA*

This course describes stimulated emission processes as the operating principle of optical amplification and

then reviews the basic roles and key parameters of the optical amplifiers in communication systems, and classifies the amplifiers into lump or distributed, phase-insensitive or phase-sensitive, etc. The course also describes several optical amplifier platforms, discusses the main properties and practical considerations of each and introduces future trends.

SC444: Optical Communication Technologies for 5G Wireless

Xiang Liu, *Futurewei Technologies, Huawei R & D, USA*

This course describes 5G wireless trends and technologies such as cloud radio access networks (C-RAN), massive multiple-input and multiple-output (MIMO), and coordinated multipoint (CoMP). It also provides insight into recent advances on the common public radio interface (CPRI), the Ethernet-based CPRI (eCPRI) and the next-generation fronthaul interface (NGFI). It identifies promising applications of optical communication technologies in future 5G wireless networks such as 100+Gb/s coherent, low-cost IM/DD transmission and associated DSP techniques.

SC445: Visible Light Communications — The High Bandwidth Alternative to WiFi

Harald Haas, *LiFi Research and Development Centre, The Univ. of Edinburgh, UK*

After an introduction to optical wireless communications and visible light communication, this course discusses the relationship between VLC and LiFi (light fidelity), introducing the major advantages, existing challenges and recent advancements of each. The course also covers channel modelling techniques, an overview of standardization activities and commercialization challenges of this disruptive technology.

SC446: [Hands-on] Characterization of Coherent Opto-electronic Subsystems

Harald Rohde and Robert Palmer,
Elenion, Germany

This course discusses the main characteristics of lasers, IQ modulators and coherent receivers and the advantages and disadvantages of different measurement techniques. In a hands-on section the instructors explain a setup for laser and ICR characterization. You then jointly perform your own measurements and evaluate the captured data. Bring your own laptop and evaluate the data from the measurement setup.

SC447: The Life Cycle of an Optical Network: From Planning to Decommissioning

Andrew Lord, *BT Labs, BT, UK*

This course demonstrates the entire optical network life cycle from an operator's point of view —from the initial requirements, vendor selection, network design and planning, installation and provisioning, operation and management and final use as a legacy technology before retiring the network. This broad course covers high speed coherent-based optical core networks, flexibility in the optical layer and an introduction to the capabilities of more automated management solutions such as SDN.

SC448: Software Defined Networking for Optical Networks: A Practical Introduction

Ramon Casellas, *Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain*

This is an introductory course to Software Defined Networking (SDN) as a control plane (CP) technology for optical networks. The main drivers, uses, key benefits and current trends around the concept of an SDN control plane are presented,

focusing on transport networks and covering the access, aggregation and core network segments. The course describes control plane architectures and protocols and advantages and drawbacks of each. It also covers more complex use case scenarios and current and new trends in control plane design including network virtualization, network slicing and the ongoing integration of SDN and NFV.

SC449: [Hands-on] Introduction to Writing Transport SDN Applications

Karthik Sethuraman, *NEC Corporation of America, USA*

Ricard Vilalta, *Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain*

This course takes participants through all the key steps in writing a simple but complete SDN application that could be used to control an optical transport network through the ONF Transport API. The course covers open source tools to review and modify models for SDN control. Simple code will be developed implementing the models and applications in a standard REST-based protocol.

SC450: Design, Manufacturing and Packaging of Opto-electronic Modules

Twan Korthorst, *Phoenix Software, Netherlands*

Arne Leinse, *LioniX International, Netherlands*

Peter O'Brien, *Tyndall National Institute, Ireland*

Kevin Williams, *Eindhoven Univ. of Technology, Netherlands*

This course identifies the distinctive features of packaging and testing for optical integrated modules when compared with discrete optical products and integrated electrical systems. It covers the different stages of testing and compares custom product development with generic foundry methodologies. Various assembly techniques are covered and their impact on chip layout and test requirements.

SC451 Optical Fiber Sensors

Zuyuan He, *Shanghai Jiao Tong Univ., China*

William Shroyer, *SageRider, Inc., USA*

This course reviews basic fiber-based devices and typical “point” sensors followed by a focus on the principles, limiting factors and performance trade-offs of “distributed” fiber optic sensing.

SC452 FPGA Programming for Optical Subsystem Prototyping

Noriaki Kaneda, *Nokia Bell Labs, USA*

Laurent Schmalen, *Nokia Bell Labs, Germany*

This course covers the key applications, approaches, functionalities and capabilities of FPGA prototyping in optical subsystems. It covers FPGA programming by providing a hands-on experience of materials related to FPGA prototyping of digital signal processing (DSP) and forward error correction algorithms used in coherent optical transceivers.

SC453A and B: [Hands-on] Fiber Optic Handling, Measurements and Component Testing

Steve Baldo, *Seikoh Giken, USA*

Keith Foord, *Greenlee Communications, USA*

Chris Heisler, *OptoTest Corporation, USA*

Steve Lane and Julien Maille, *Data-Pixel, France*

This course focuses on the practical aspects of working with fiber optic components and instrumentation used to make optical performance characterization measurements. Get the basic concepts and hands-on use of basic component testing, launch condition effects on multimode fibers, fiber optic test overview and tips, end face polishing and interferometry measurements on single and multi-fiber connects.

SC454: [Hands-on] Introduction to Silicon Photonics Circuit Design

Wim Bogaerts, *Univ. of Ghent, Belgium*

This course describes state-of-the-art silicon photonic systems including commercialized and research results. It provides tutorials on the design of such systems including identifying target specifications, compact models for silicon photonic components, photonic circuit modeling, manufacturing variability analysis and layout for fabrication and packaging. Temporary licenses to Lumerical Solutions and open-source tools are provided for participants to complete a design.

SC459: Space Division Multiplexing Components and Devices [NEW]

Nicolas Fontaine, *Nokia Bell Labs, USA*

This course is an introduction to components and devices that enable space-division multiplexing (SDM) over optical fibers supporting multiple spatial modes/cores. It covers design and scalability of photonic lantern and multi-plane light conversion mode multiplexers, implementation of spatial diversity and joint switching techniques inside wavelength selective switches, all optical multiple input multiple output processing and mode dependent gain minimization techniques for multimode optical fiber amplifiers.

SC460: Digital Coherent Optical System Performance Basics: Transceiver Technology and Performance [NEW]

Maurice O'Sullivan, *Ciena, Canada*

John Cartledge, *Queen's Univ., Canada*

This course provides a basic understanding of implemented electric field modulation and coherent detection on two polarizations and explains how to estimate and compare link performance in practical coherent transmission applications including nonlinear WDM propagation.

SC461: High-capacity Data Center Interconnects [NEW]

Sander L. Jansen, *ADVA Optical Networking, Germany*

Dirk van den Borne, *Juniper Networks, Germany*

This course gives a broad overview of data center interconnect (DCI) architectures and technology, ranging from short-haul interconnects to metro and to long-haul deployments. It covers the full range of transmitter and receiver technologies, modulation formats, protocols and data rates and system design aspects such as open line systems and encryption. Attendees get an understanding of system design trade-offs in terms of cost, capacity, density, power consumption and complexity.

SC462: Introduction to Pluggable Optics [NEW]

Robert Blum, *Intel Corp., USA*

Sharon Hall, *Oclaro, USA*,

This course covers the different pluggable optics solutions and form factors ranging from 1Gbps to the latest 400Gbps and the advantages and disadvantages of each. Detailed information is provided on optical and electrical technologies used, data rates supported, power classes, thermal challenges, and the overall dimensions, which determine the maximum front panel density for each of the form factors available.

SC463: Optical Transport SDN: Architectures, Applications and Actual Implementations [NEW]

Achim Autenrieth and Jörg-Peter Elbers, *ADVA Optical Networking SE, Germany*

This course covers practical applications of SDN in optical transport networks. Following a problem-and-solution approach, network examples illustrate the challenges and how transport SDN (T-SDN) addresses them. The course

introduces the T-SDN architecture and related data models, protocols, concepts and frameworks, investigates commercial use cases from (named) service providers and data center operators and presents a live demonstration of a T-SDN application.

SC464: SDN Inside and in Between Data Centers [NEW]

David Maltz, *Microsoft, USA*

This course explains each of the layers of the network, from the physical switches and fiber, through the software that runs on the switches, through the Software Defined Networking layers that provide a customizable virtual network while enabling the cloud platform to optimize its resource usage and automatically mitigate faulty equipment. Drawing examples from Microsoft Azure, the course covers how large cloud networks are designed and operate.

SC465 Transmission Fiber and Cables [NEW]

Chris Towery and Michael Ellwanger, *Corning Optical Communications, USA*

This course discusses the fundamentals of optical fiber production methods and provides insight into the history of optical fiber and the physical principles that enable an optical fiber to be such a capable medium for communications. It addresses the different categories of transmission of optical fibers that have been deployed, as well as the newer fibers. A focus of this course will also be on the cabling options, standards and performance considerations for various environments and the trade-offs.

SHORT COURSE REGISTRATION

Each Short Course requires a separate registration fee. Register early as each course has limited seating. Last year 85% of courses were sold out prior to the conference, and there will not be a wait list for sold out courses. Tickets are required for admission to Short Courses and for Short Course Notes, which are distributed on-site. Short Course Notes are not available for purchase separately.

Short Course registration also includes admission to the plenary session, exhibit hall, Market Watch, Network Operator Summit, the OFC Career Zone, workshops, poster sessions and OFC 2018 Buyers' Guide.

	Half Day Short Course (US\$)	Hands-On Course (US\$)	SC432 Hands-On Course (US\$)
Advance Registration thru 12 February			
Member*	\$275	\$335	\$435
Nonmember	\$350	\$410	\$510
Registration after 12 February			
Member*	\$335	\$385	\$485
Nonmember	\$410	\$480	\$580

SHORT COURSE OFFER FOR STUDENT MEMBERS

Student members of IEEE/COMSOC, IEEE/Photonics Society and OSA may register for US\$ 30 for select Short Courses not yet at capacity after 15 February 2018. New this year, student members will receive a copy of the full color Short Course notes.

* Member of IEEE Communications Society, IEEE Photonics Society or The Optical Society

registration

Advance Registration Deadline: 12 February 2018

Categories	Thru 12 February (US\$)	After 12 February (US\$)
Exhibits Pass Plus*	\$0	\$0
Full Conference		
Member**	\$665	\$790
Student Member**	\$195	\$275
Nonmember	\$835	\$970
Student Nonmember	\$235	\$355
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Exhibition and Show Floor Programming	•	•
Market Watch	•	•
Network Operator Summit	•	•
OFC Career Zone	•	•
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Conference Program Book	•	
Technical Digest (USB Drive)	•	
Postdeadline Papers Book	•	
OFC Buyers' Guide	•	•

* Not for use by technical program presidents, poster presenters or speakers

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	Convention Center Distance	Rates from (US\$, per night)*
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Hard Rock Hotel San Diego	.2 mile	\$269
Hilton San Diego Bayfront	.2 mile	\$275
Hilton San Diego Gaslamp Quarter	.3 mile	\$270
Horton Grand Hotel	.4 mile	\$199
Hotel Palomar San Diego	1 mile	\$229
Hotel Solamar	.5 mile	\$239
Manchester Grand Hyatt	.3 mile	\$277
Marriott Marquis San Diego Marina	.2 mile	\$275
Omni San Diego Hotel	.5 mile	\$271
San Diego Marriott Gaslamp Quarter	.5 mile	\$265
The Bristol Hotel	1 mile	\$210
The Pendry	.3 mile	\$259
The Sofia Hotel	.9 mile	Standard \$229 SGL Student Only \$189 SGL
The US Grant San Diego	.9 mile	\$261
The Westgate Hotel	1 mile	\$239
Westin Gaslamp Quarter	.7 mile	\$250

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Ends 12 February 2018**

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