The future of optical networking and communications

TECHNICAL CONFERENCE
3 – 7 March 2019

SHORT COURSES
3 – 4 March 2019

EXHIBITION
5 – 7 March 2019

San Diego, California, USA

ofcconference.org

Short Courses
Connect with and Learn from Industry Experts
Get the Latest Advancements at OFC

OFC is the world’s largest conference and exhibition for optical communication and networking professionals. The program is comprehensive — from research to marketplace, from components to systems and networks, from technical sessions to the exhibition.

Hear the Latest Research at the Technical Conference

The five day technical conference features peer reviewed presentations and more than 120 invited speakers, the thought leaders in the industry presenting the highlights of emerging technologies. Kicking off the conference are Short Courses taught by experts. Choose from 55 courses on important topics in the industry. Additional technical programming throughout the week includes special symposia, in-depth tutorials, workshops, panels and the thought-provoking rump session.

See New Products at the Exhibition

Over 700 participating companies can help you build your competitive edge. Hear new product announcements, explore innovative and cost-effective solutions and meet industry innovators to learn what’s new and what is coming next.

Attend Educational Programs on the Show Floor

Market Watch, the Network Operator Summit and 25 other show floor programs cover market trends, new technologies and insight into the future. Experts from global brands and key industry organizations provide high-level takes on the state of the industry, hot topics and recommended courses of action to tackle today’s toughest business challenges.

Attend OFC

Be part of the event that brings together the people, products and information that drive optical networking and communications.

ofcconference.org
SHORT COURSE PROGRAM

Get In-depth Training. Take a Short Course.

Stay current in your field by taking a Short Course at OFC. Learn from the experts. These half-day Short Courses are a good way to get clear, concise overviews of important topics in optical communications and networking. Hands-on courses provide demonstrations and the opportunity to use optical equipment. Short Courses cover a broad range of topic areas at a variety of educational levels.

Browse course descriptions, objectives and instruction biographies.
ofcconference.org/shortcourse

Benefits of Attending

• Keep informed on the latest trends with new cutting-edge topics.

• Get clear, concise overviews of research, theoretical background and new applications.

• Learn from the experts – a faculty of distinguished instructors representing the industry’s leading corporations and esteemed learning institutions.

• Receive printed materials with syllabus and course notes.

• Get opportunities for personalized instruction with small class sizes.

• Develop your expertise – become a knowledge center for your team!

Register Early!

Last year Short Courses sold out prior to the conference. Make sure you have a seat in your preferred courses by registering now.

When you register for a Short Course, you also gain FREE admission to the exhibition, educational sessions on the show floor, the plenary session and workshops.

Hear Prestigious Instructors from:
Acacia Communications
ADVA Optical Networking
AT&T Labs
Ciena
Corning
DARPA
Google
Huawei
IBM
Intel
Juniper Networks
Microsoft
MIT
Nokia Bell Labs
TE Subcom
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<td>High-speed Semiconductor Lasers and Modulators</td>
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<td>Optical Communication Technologies for 5G Wireless</td>
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<td>SC460</td>
<td>Digital Coherent Optical System Performance Basics</td>
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<td>SC470</td>
<td>Secure Optical Communications [NEW]</td>
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<td>09:00 – 13:00</td>
<td>SC328</td>
<td>New Developments in High-speed Optical Networking</td>
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<td>SC341</td>
<td>Multi-carrier Modulation and Superchannels for Terabit-class Transceivers</td>
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<td>SC384</td>
<td>Background Concepts of Optical Communication Systems</td>
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<td>Modeling and System Impact of Optical Transmitter and Receiver Components</td>
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<td>Hands-on: Silicon Photonics Component Design &amp; Fabrication</td>
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<td>An Introduction to Optical Network Design and Planning</td>
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<td>Photonic Technologies in the Data Center</td>
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<td>Introduction to Photodetectors and Optical Receivers</td>
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<td>SC459</td>
<td>Space Division Multiplexing Components and Devices</td>
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<td>SC203</td>
<td>400 Gb/s and Beyond Transmission Systems, Design and Design Trade-offs</td>
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<td>SC267</td>
<td>Silicon Microphotons: Technology Elements and the Roadmap to Implementation</td>
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<td>Test and Measurement for Signals with Complex Optical Modulation</td>
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<td>Optical Amplifiers: From Fundamental Principles to Technology Trends</td>
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<td>SC105</td>
<td>Modulation Formats and Receiver Concepts for Optical Transmission Systems</td>
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<td>SC205</td>
<td>Integrated Electronic Circuits for Fiber Optics</td>
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<td>Introduction to Forward Error Correction</td>
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<td>Space Division Multiplexing in Optical Fibers</td>
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<td>SC114</td>
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<td>Software Defined Networking for Optical Networks: a Practical Introduction</td>
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<td>Transmission Fiber and Cables</td>
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<td>Optical Fiber Design for Telecommunications and Specialty Applications</td>
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<td>Optical Fiber Based Solutions for Next Generation Mobile Networks</td>
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<td>SC472</td>
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NEW AND UPDATED FOR 2019

New

SC468 Advanced FEC Techniques for Optical Communications

Monday, 4 March
08:30 – 12:30

INSTRUCTOR
Laurent Schmalen, Nokia Bell Labs, USA

DESCRIPTION
The course provides insights on the selection of FEC schemes for different applications, the design of LDPC-based schemes and the design of hardware-emulators to simulate very low bit error rates. Some of the topics covered in the course are hard-decision decoding versus soft-decision decoding, in-depth coverage of low-density parity-check (LDPC) codes and simulation of LDPC codes on FPGA-boards for error floor analysis.

SC469 Laboratory Automation and Control Using Python

Monday, 4 March
13:30 – 17:30

INSTRUCTORS
Nicolas Fontaine, Nokia Bell Labs, USA
Binbin Guan, Acacia Communications, USA
Jochen Schröder, Chalmers University of Technology, Sweden

DESCRIPTION:
This course aims to provide participants with the tools and knowledge to create sustainable automation of your experiments using the Python programming language. You will learn how to install all required Python packages on your computer, write basic programs using the most common scientific packages, apply programming practices and more.

SC470 Secure Optical Communications

Sunday, 3 March
09:00 – 12:00

INSTRUCTORS
Andrew Shields, Toshiba Research Europe Ltd., UK
Helmut Griesser, ADVA Optical Networking SE, Germany

DESCRIPTION
This is an introductory course on encryption for optical networks that explains the basic principles of quantum cryptography and how it can be applied to quantum safe communications. The first part of the course explains the current state of the art. The second part covers most promising concepts to make encryption quantum-resistant, discussing both theoretical information and algorithmic approaches.

SC472 Hands-on: Controlling and Monitoring Optical Network Equipment with Netconf/YANG

Monday, 4 March
13:30 – 17:30

INSTRUCTORS
Ricard Vilalta, CTTC, Spain
Noboru Yoshikane, KDDI Research, Japan

DESCRIPTION
This course offers an overview and hands-on experience on programming the necessary tools to control and monitor network equipment. Part A provides an overview of YANG data modelling language, NETCONF protocol and ONOS and OpenDayLight support for NETCONF. Part B focuses on OpenROADM and OpenConfig. Part C covers RESTconf interfaces and Part D introduces gRPC using pyNMS and pyangbind.
SC473 Photonic Switching Systems
Monday, 4 March
08:30 – 12:30
INSTRUCTORS
David Neilson, Nokia Bell Labs, USA
Benjamin Lee, IBM, USA
DESCRIPTION
This course consists of two parts focusing respectively on free-space switching systems with near-term commercial impact and on chip-scale photonic switching systems with potential for future commercial impact. The course addresses material platform selection, device design, component architecture, system topology and packaging implications. State-of-the-art performance and ultimate limitations of the components and systems will be reviewed.

Updated
SC341 Multi-carrier Modulation and Superchannels for Terabit-class Transceivers
Sunday, 3 March
09:00 – 13:00
INSTRUCTORS
Sander L. Jansen, ADVA Optical Networking, Germany
Dirk van den Borne, Juniper Networks, Germany
DESCRIPTION
This course covers different digital multi-carrier technologies such as OFDM, DMT and SCM and details their impacts on the design of transmission systems, both in performance-optimized long-haul networks as well as cost-optimized short-reach metro-access networks. The course also covers the advantages and disadvantages of Superchannels.

SC357 Circuits and Equalization Methods for Coherent and Direct Detection Optical Links
Monday, 4 March
08:30 – 12:30
INSTRUCTOR
Alexander Rylyakov, Elenion, USA
DESCRIPTION:
This course covers overall transceiver architectures of optical and wireline links and compares coherent vs direct detection. It provides an understanding of the critical interface between analog circuits and optics, analyzes the key performance metrics of drivers and TIAs, compares equalization techniques (CTLE, FFE, DFE) and evaluates and compares power efficiencies of wireline and optical interconnects.
# Short Courses by Topic

55 Short Courses Cover Key Technologies in Three Tracks

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<td>N3 Architectures and software-defined control for metro and core networks</td>
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<td>N4 Optical access networks for fixed and mobile services</td>
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D1: Advances in prototypes and product developments of components and subsystems for data centers and optical networks

SC205 Integrated Electronic Circuits for Fiber Optics
Y. K. Chen, *Nokia Bell Labs, USA*

SC261 ROADM Technologies and Network Applications
Thomas Strasser, *Nistica Inc., USA*

SC347 Reliability and Qualification of Fiber-optic Components
David Maack, *Corning, USA*

SC357 Circuits and Equalization Methods for Coherent and Direct Detection Optical Links
Alexander Rylyakov, *Elenion, USA*

SC359 Datacenter Networking 101
Hong Liu, *Google, USA*

SC385 Optical Interconnects for Extreme-scale Data Centers and HPC
John Shalf, *Lawrence Berkeley National Laboratory, USA*
Keren Bergman, *Columbia University, USA*

SC428 Link Design and Modeling for Intra Data Center Optical Interconnects
Petar Pepeljugoski, *IBM Research, USA*

SC431 Photonic Technologies in the Data Center
Clint Schow, *University of California at Santa Barbara, USA*

SC450 Design, Manufacturing and Packaging of Opto-electronic Modules
Twan Korthorst, *Synopsys, Netherlands*
Arne Leine, *LioniX, Netherlands*
Peter O’Brien, *Tyndall National Institute, Ireland*
Kevin Williams, *Eindhoven University of Technology, Netherlands*

SC462 Introduction to Pluggable Optics
Robert Blum, *Intel, USA*
Sharon Hall, *Oclaro, USA*

D2: Passive optical devices for switching and filtering

SC261 ROADM Technologies and Network Applications
Thomas Strasser, *Nistica Inc., USA*

SC267 Silicon Microphotonics: Technology Elements and the Roadmap to Implementation
Lionel Kimerling, *MIT, USA*

SC325 Highly Integrated Monolithic Photonic Integrated Circuits
Chris Doerr, *Acacia Communications, USA*

SC432 Hands-on: Silicon Photonics Component Design & Fabrication
Loukas Chrostowski, *University of British Columbia, Canada*

SC454 Hands-on: Introduction to Silicon Photonics Circuit Design
Roel Baets, *University of Ghent, Belgium*
Pieter Dumon, *Lucaeda Photonics, Belgium*

SC473 Photonic Switching Systems [NEW]
Benjamin Lee, *IBM, USA*
David Neilson, *Nokia Bell Labs, USA*

D3: Active optical devices and photonic integrated circuits

SC177 High-speed Semiconductor Lasers and Modulators
John Bowers, *University of California at Santa Barbara, USA*

SC205 Integrated Electronic Circuits for Fiber Optics
Y. K. Chen, *Nokia Bell Labs, USA*

SC267 Silicon Microphotonics: Technology Elements and the Roadmap to Implementation
Lionel Kimerling, *MIT, USA*

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Chris Doerr, *Acacia Communications, USA*

SC357 Circuits and Equalization Methods for Coherent and Direct Detection Optical Links
Alexander Rylyakov, *Elenion, USA*
SC431 Photonic Technologies in the Data Center
Clint Schow, University of California at Santa Barbara, USA

SC432 Hands-on: Silicon Photonics Component Design & Fabrication
Loukas Chrostowski, University of British Columbia, Canada

SC433 Introduction to Photodetectors and Optical Receivers
Joe Campbell, University of Virginia, USA

SC454 Hands-on: Introduction to Silicon Photonics Circuit Design
Roel Baets, University of Ghent, Belgium
Pieter Dumon, Luceda Photonics, Belgium

D4: Fibers and propagation physics

SC208 Optical Fiber Design for Telecommunications and Specialty Applications
David J. DiGiovanni, OFS Labs, USA

SC347 Reliability and Qualification of Fiber-optic Components
David Maack, Corning, USA

SC453A and B Hands-on: Fiber Optic Handling, Measurements and Component Testing
Steve Baldo, Seiko Giken Company, USA
Chris Heisler, OptoTest Corporation, USA
Steve Lane, Data-Pixel, France
Julien Maille, Data-Pixel, France

SC459 Space Division Multiplexing Components and Devices
Nicolas Fontaine, Nokia Bell Labs, USA

TRACK S: SYSTEMS AND SUBSYSTEMS

S1: Digital subsystems and systems for data centers

SC178 Test and Measurement for Data Center/Short Reach Communications
Greg D. Le Cheminant, Keysight Technologies, USA

SC203 400 Gb/s and Beyond Transmission Systems, Design and Design Trade-offs
Martin Birk, AT&T Labs, USA
Benny Mikkelsen, Acacia Communications, USA

SC205 Integrated Electronic Circuits for Fiber Optics
Y. K. Chen, Nokia Bell Labs, USA

SC328 New Developments in High Speed Optical Networking: OTN beyond 100G, 100G/200G/400G Ethernet, Flex Ethernet
Stephen Trowbridge, Nokia Bell Labs, USA

SC357 Circuits and Equalization Methods for Coherent and Direct Detection Optical Links
Alexander Rylyakov, Elenion, USA

SC428 Link Design and Modeling for Intra Data Center Optical Interconnects
Petar Pepeljugoski, IBM Research, USA
SC461 High-capacity Data Center Interconnects
Sander L. Jansen, ADVA Optical Networking, Germany
Dirk van den Borne, Juniper Networks, Germany

SC462 Introduction to Pluggable Optics
Robert Blum, Intel, USA
Sharon Hall, Oclaro, USA

S2: Optical, photonic and microwave photonic subsystems

SC160 Microwave Photonics
Vince Urick, DARPA, USA

SC443 Optical Amplifiers: From Fundamental Principles to Technology Trends
Shu Namiki, National Institute of Advanced Industrial Science and Technology (AIST), Japan
Michael Vasileyv, University of Texas at Arlington, USA

S3: Radio-over-fiber, free space optics and sensing systems

SC217 Optical Fiber Based Solutions for Next Generation Mobile Networks
Dalma Novak, Pharad, LLC., USA

SC445 Optical Wireless for Mobile Communications
Harald Haas, LiFi Research and Development Centre, The University of Edinburgh, UK

S4: Digital and electronic subsystems

SC105 Modulation Formats and Receiver Concepts for Optical Transmission Systems
Xi Vivian Chen and Peter Winzer, Nokia Bell Labs, USA

SC114 Technologies and Applications for Passive Optical Networks (PONs)
Yuanqiu Luo, Huawei, USA

SC205 Integrated Electronic Circuits for Fiber Optics
Y. K. Chen, Nokia Bell Labs, USA

SC328 New Developments in High Speed Optical Networking: OTN beyond 100G, 100G/200G/400G Ethernet, Flex Ethernet
Stephen Trowbridge, Nokia Bell Labs, USA

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Sander L. Jansen, ADVA Optical Networking, Germany
Dirk van den Borne, Juniper Networks, Germany

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Alexander Rylyakov, Elenion, USA

SC369 Test and Measurement for Signals with Complex Optical Modulation
Michael Koenigsmann and Bernd Nebendahl, Keysight Technologies, Germany

SC384 Background Concepts of Optical Communication Systems
Alan Willner, University of Southern California, USA

SC390 Introduction to Forward Error Correction
Frank Kschischang, University of Toronto, Canada

SC393 Digital Signal Processing for Coherent Optical Transceivers
Chris Fludger, Cisco Optical GmbH, Germany

SC395 Modeling and Simulation of Optical Transmitter and Receiver Components
Robert Palmer and Harald Rohde, Elenion, Germany

SC408 Space Division Multiplexing in Optical Fibers
Roland Ryf, Nokia Bell Labs, USA

SC446 Hands-on: Characterization of Coherent Opto-electronic Technologies and Applications for Passive Optical Networks (PONs)
Robert Palmer and Harald Rohde, Elenion, Germany
SC452 FPGA Programming for Optical Subsystem Prototyping
Noriaki Kaneda, Nokia Bell Labs, USA

SC460 Digital Coherent Optical System Performance Basics
John Cartledge, Queen’s University, Canada
Maurice O’Sullivan, Ciena, Canada

SC468 Advanced FEC Techniques for Optical Communications [NEW]
Laurent Schmalen, Nokia Bell Labs, USA

SC469 Laboratory Automation and Control Using Python [NEW]
Nicolas Fontaine, Nokia Bell Labs, USA
Binbin Guan, Acacia Communications, USA
Jochen Schröder, Chalmers University of Technology, Sweden

S5: Digital transmission systems

SC102 WDM in Long-haul Transmission Systems
Neal S. Bergano, TE Subcom, USA

SC203 400 Gb/s and Beyond Transmission Systems, Design and Design Trade-offs
Martin Birk, AT&T Labs Res., USA
Benny Mikkelsen, Acacia Communications, USA

SC327 Modeling and Design of Fiber-optic Communication Systems
Rene-Jean Essiambre, Nokia Bell Labs, USA

SC341 Multi-carrier Modulation and Superchannels for Terabit-class Transceivers
Sander L. Jansen, ADVA Optical Networking, USA
Dirk van den Borne, Juniper Networks, Germany

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Alan Willner, University of Southern California, USA

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Roland Ryf, Nokia Bell Labs, USA

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Binbin Guan, Acacia Communications, USA
Jochen Schröder, Chalmers University of Technology, Sweden

SC470 Secure Optical Communications [NEW]
Helmut Griesser, ADVA Optical Networking SE, Germany
Andrew Shields, Toshiba Research Europe Ltd., UK

TRACK N: NETWORKS, APPLICATIONS AND ACCESS

N1: Advances in system, network and service developments and field trials in commercial data centers and networks

SC216 An Introduction to Optical Network Design and Planning
Jane M. Simmons, Monarch Network Architects, USA

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Stephen Trowbridge, Nokia Bell Labs, USA

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David Boertjes, Ciena, Canada
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Achim Autenrieth and Jörg-Peter Elbers, ADVA Optical Networking SE, Germany

SC464 SDN Inside and In Between Data Centers
David Maltz, Microsoft, USA

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Ricard Vilalta, CTTC, Spain
Noboru Yoshikane, KDDI Research, Japan

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SC472 Hands-on: Controlling and Monitoring Optical Network Equipment with Netconf/YANG [NEW]
Ricard Vilalta, CTTC, Spain
Noboru Yoshikane, KDDI Research, Japan

N3: Architectures and software-defined control for metro and core networks

SC216 An Introduction to Optical Network Design and Planning
Jane M. Simmons, Monarch Network Architects, USA

SC261 ROADM Technologies and Network Applications
Thomas Strasser, Nistica Inc., USA

SC328 New Developments in High Speed Optical Networking: OTN beyond 100G, 100G/200G/400G Ethernet, Flex Ethernet
Stephen Trowbridge, Nokia Bell Labs, USA

SC429 Introduction to Flexible Photonic Networks
David Boertjes, Ciena, Canada

SC448 Software Defined Networking for Optical Networks: a Practical Introduction
Ramon Casellas, CTTC, Spain

SC463 Optical Transport SDN: Architectures, Applications and Actual Implementations
Achim Autenrieth and Jörg-Peter Elbers, ADVA Optical Networking SE, Germany

SC472 Hands-on: Controlling and Monitoring Optical Network Equipment with Netconf/YANG [NEW]
Ricard Vilalta, CTTC, Spain
Noboru Yoshikane, KDDI Research, Japan

N4: Optical access networks for fixed and mobile services

SC114 Technologies and Applications for Passive Optical Networks (PONs)
Yuanqiu Luo, Huawei, USA

SC444 Optical Communication Technologies for 5G Wireless
Xiang Liu, Futurewei Technologies, Huawei R&D, USA
## Registration

<table>
<thead>
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<th>Categories</th>
<th>On or Before 4 Feb. (US $)</th>
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<tr>
<td><strong>Short Courses</strong></td>
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## Categories

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<th>Full Conference</th>
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<td>Plenary Sessions</td>
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<td>Technical Sessions and Rump Session</td>
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<td>Exhibition and Show Floor Programming</td>
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<td>Market Watch</td>
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<td>Network Operator Summit</td>
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<td>Sunday and Monday Workshops</td>
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<td>Poster Sessions</td>
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<td>Tuesday’s Conference Reception</td>
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<td>Conference Program Book</td>
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* Members of the IEEE Communications Society, IEEE Photonics Society and/or The Optical Society

** Exhibits Pass Plus is not for use by presiders, poster presenters or speakers. You must register as a Full Conference attendee.

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San Diego Convention Center
111 W Harbor Drive
San Diego, California 92101

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<th>Hotel Name</th>
<th>Convention Center Distance</th>
<th>Rates from (per night)*</th>
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