Program and registration

Technical Meeting: December 1-4, 2014
Tutorials: December 1, 2014
Show Dates: December 2-3, 2014

www.ion.org/ptti
PTTI 2014 Meeting Schedule

Monday, December 1
Tutorials ........................................... 8:30 a.m. – 4:30 p.m.

Tuesday, December 2
Exhibit Hall Open ......................... 8:00 a.m. – 5:00 p.m.
Exhibitor Hosted Breakfast ...... 8:00 a.m. – 9:30 a.m. (Exhibit Hall)
Technical Sessions ................. 9:30 a.m. – 12:00 p.m. and 1:30 p.m. – 5:00 p.m.
Informal Luncheon ............... 12:00 p.m. – 1:30 p.m. (Exhibit Hall)

Wednesday, December 3
Exhibit Hall Open ......................... 8:00 a.m. – 4:30 p.m.
Technical Sessions ................. 8:30 a.m. – 12:00 p.m. and 1:30 p.m. – 5:00 p.m.
Informal Luncheon ............... 12:00 p.m. – 1:30 p.m. (Exhibit Hall)

Thursday, December 4
Technical Sessions ................. 8:30 a.m. – 12:00 p.m. and 1:30 p.m. – 3:00 p.m.
Conference Luncheon .......... 12:00 p.m. – 1:30 p.m.
Speaker: Peter Cash, Microsemi, “Boston’s Role in Atomic Clock Development”

PTTI 2014 Program Committee

General Chair: Francine Vannicola, U.S. Naval Research Laboratory
Tutorials Chair: Ryan Dupuis, Excelitas Technologies
Program Chair: Angela McKinley, U.S. Naval Observatory
Exhibits Chair: Don Mitchell, Geil Marketing Associates

Other Members
Ronald Beard, U.S. Naval Research Laboratory
Nancy Blemly, DoD
Martin Bloch, Frequency Electronics, Inc.
Dr. James Camparo, The Aerospace Corporation
Peter Cash, Microsemi Inc.
Dr. Edoardo Detoma, Avio Group S.p.A., Italy
Dr. Hugo Fruehauf, The Hugo Fruehauf Company
Werner Lange, Lange-Electronic GmbH, Germany
Dr. Judah Levine, National Institute of Standards and Technology
Dr. Robert Lutwak, DARPA
Dr. Robert Tjoelker, NASA Jet Propulsion Laboratory
Dr. Leo Mallette, The Aerospace Corporation
Dr. Robert Tjoelker, NASA Jet Propulsion Laboratory
Clark Wardrip, NASA Goddard (retired)
Greg Weaver, Johns Hopkins University Applied Physics Laboratory
Dr. Patrizia Tavella, Istituto Nazionale di Ricerca Metrologica, Italy
Dr. Robert Tjoelker, NASA Goddard (retired)
Dr. Joseph White, Sotera Defense Solutions Inc.
Dr. Patrizia Tavella, Istituto Nazionale di Ricerca Metrologica, Italy
Dr. Robert Tjoelker, NASA Jet Propulsion Laboratory
Clark Wardrip, NASA Goddard (retired)
Greg Weaver, Johns Hopkins University Applied Physics Laboratory
Dr. Joseph White, Sotera Defense Solutions Inc.
Pre-conference tutorials have been organized to provide in-depth learning prior to the start of the technical program. All courses will be taught in a classroom setting. Paper course notes will be provided to registered attendees the morning of the tutorials. Electronic notes will be made available for download by registered attendees from the meeting website. Power will NOT be made available to course attendees for individual laptop computers; please come prepared with adequate battery power if required.

**Cost and Registration:** $375 for the complete slate of tutorials if registered and paid by October 29; $425 if payment is received after October 29. Tutorial registration includes all tutorials being held on Monday. Tutorials are sold as a full day of courses and cannot be purchased individually, divided or shared between individuals. Registration for the PTTI tutorials is accomplished online through the normal conference registration process. Please reference the PTTI registration form for registration policies. ION reserves the right to cancel a portion of the tutorial program based on availability of the instructor.

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<tr>
<th>TIME</th>
<th>COURSES</th>
<th>PRESENTERS</th>
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<tr>
<td>8:30 a.m. – 10:00 a.m.</td>
<td><strong>Introduction to Atomic Clocks</strong>&lt;br&gt;• What is an “Atomic” Clock?&lt;br&gt;• Cesium Beam Frequency Standards&lt;br&gt;• Hydrogen Masers&lt;br&gt;• Rubidium Oscillators&lt;br&gt;• Coherent Population Trapping&lt;br&gt;• Chip-Scale Atomic Clocks</td>
<td>Robert Lutwak,&lt;br&gt;U.S. Defense Advanced Research Projects Agency (DARPA)</td>
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<tr>
<td>10:00 a.m. – 10:15 a.m.</td>
<td><strong>Break</strong></td>
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<tr>
<td>10:15 a.m. – 11:45 a.m.</td>
<td><strong>Precision Measurements and Calibration</strong>&lt;br&gt;• Measurement Accuracy and Uncertainty&lt;br&gt;• Optimal use of Measurements to Estimate the States and Characteristics of Clocks and Oscillators&lt;br&gt;• Use of Measurements in Time and Frequency Calibration&lt;br&gt;• Application of Frequency Standards to Self-calibrating Instruments</td>
<td>Samuel Stein,&lt;br&gt;Microsemi</td>
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<td>11:45 a.m. – 1:15 p.m.</td>
<td><strong>Lunch</strong></td>
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<td>1:15 p.m. – 2:15 p.m.</td>
<td><strong>GPS Overview and GNSS</strong>&lt;br&gt;• GPS Overview&lt;br&gt;• Current and Future Systems&lt;br&gt;• Time References&lt;br&gt;• Interoperability&lt;br&gt;• Applications of GNSS Interoperability/Timing</td>
<td>Edward D. Powers,&lt;br&gt;U.S. Naval Observatory (USNO)</td>
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<tr>
<td>2:15 p.m. – 3:15 p.m.</td>
<td><strong>Time/Frequency Transfer and Applications</strong>&lt;br&gt;• Requirements and Limitations&lt;br&gt;• Methods&lt;br&gt;  • One-way, Two-way&lt;br&gt;  • Common-View, All-in-View&lt;br&gt;• Systems: LF (WWVB, Loran), GPS, Other Satellites, Digital Systems&lt;br&gt;• Algorithms for Clock Modeling &amp; Discipline</td>
<td>Judah Levine,&lt;br&gt;National Institute of Standards and Technology (NIST)</td>
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<tr>
<td>3:15 p.m. – 3:30 p.m.</td>
<td><strong>Break</strong></td>
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<tr>
<td>3:30 p.m. – 4:30 p.m.</td>
<td><strong>IEEE 1588: Application Specific PTP Profiles</strong>&lt;br&gt;• Quick Overview of PTP&lt;br&gt;• The PTP Default Profiles&lt;br&gt;• Profiles for Telecommunications&lt;br&gt;• Profiles for Power Grids&lt;br&gt;• Other Profiles</td>
<td>Douglas Arnold,&lt;br&gt;Meinberg-USA</td>
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</tbody>
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Instructor Biographies: (in order of presentation)

**Introduction to Atomic Clocks**
Robert Lutwak is a Program Manager in the DARPA MicroTechnology Office. Prior to joining DARPA MTO in September, 2013, Dr. Lutwak served as Chief Scientist at Symmetricom’s Technology Realization Center in Beverly, MA. In his fifteen years at Symmetricom, Dr. Lutwak’s responsibilities included support of manufacturing and conventional atomic clock technology as well as research and development of next-generation clocks for deployment in commercial, military, and aerospace applications. From 2001-2010, Dr. Lutwak served as Principal Investigator on the DARPA-MTO sponsored chip-scale atomic clock (CSAC) program, which led to Symmetricom’s 2011 release of the world’s first commercially available CSAC. Dr. Lutwak received his B.S. degree in physics from Miami University in 1987 and his Ph.D. in atomic and optical physics from the Massachusetts Institute of Technology in 1997.

**Precision Measurements and Calibration**
Samuel Stein is Chief Scientist, for Microsemi’s Frequency and Time Division, formerly Symmetricom Inc. Previous to joining Symmetricom in 2006, Dr. Stein was the founder, president and CEO of Timing Solutions Corporation. He has over 30 years of experience in the field of time and frequency and has made numerous individual contributions to precision time measurement technology and new time transfer techniques. He received his doctorate in physics from Stanford University in 1974.

**GPS Overview and GNSS**
Ed Powers received his BS and MS degrees in Electronic Engineering and Instrumental Science from the University of Arkansas in 1984 and 1987, respectively. In 1987, he joined the U.S. Naval Research Laboratory as an engineer working on the GPS clock development program. In 1997, he joined the U.S. Naval Observatory (USNO) in Washington, D.C., and is the GPS Operations Division Chief responsible for development of improved precise time synchronization and GPS timing.

**Time/Frequency Transfer and Applications**
Judah Levine is a Fellow of the National Institute of Standards and Technology and is the leader of the Network Synchronization Project in the Time and Frequency Division, which is located in the NIST laboratories in Boulder, Colorado. Dr. Levine is responsible for the design and implementation of the time scales AT1 and UTC (NIST), which provide the reference signals for all of the NIST time and frequency services. In addition, he designed and built the servers that support the Automated Computer Time Service (ACTS) and the Internet Time Service, which provide time and frequency information to users in a number of different digital formats. The ACTS service is realized using a number of parallel computers that control a 30-line telephone rotary. The ACTS service receives about 12,000 requests per day. The Internet Time Service uses 35 computers which are located at several sites in the US. These computers receive about 8000 million (8 billion) requests per day for time stamps in 3 different standard formats. He received his Ph.D. in Physics from New York University in 1966. Dr. Levine is a member of the IEEE and a Fellow of the American Physical Society.

**IEEE 1588: Application Specific PTP Profiles**
Dr. Douglas Arnold has over 15 years of experience developing precise time and frequency equipment and network time transfer. He is currently a Principal Technologist with Meinberg USA. As part of this role he is a Co-Chair of the IEEE 1588 Working Group, Co-Chair of the IEEE 1588 Architecture Subcommittee, and a Co-Chair of the ISPCS IEEE 1588 Plugfest Committee. He holds a Ph.D. in Electrical Engineering from the University of Illinois.
1: Opening Session and Historical Perspective
Date: Tuesday, December 2, 2014
Time: 9:35 AM - 11:05 AM

1. Meeting Opening, Ms. Francine Vannicola, U.S. Naval Research Laboratory
2. Distinguished PTTI Award Presentation, Dr. Leo Mallette, The Aerospace Corporation
3. Opening Remarks, CAPT Brian Connon, Superintendent, U.S. Naval Observatory
4. TWSTFT: It's History, Evolution and People, Dr. William Klepczynski, U.S. Naval Observatory (Retired)
5. The 50th Birthday of the Two-Sample Allan Variance, Dr. Judah Levine, National Institute of Standards and Technology
6. Time and Navigation: The Untold Story of Getting from Here to There, Dr. Andrew K. Johnston, Smithsonian National Air and Space Museum

2: New Commercial Products for PTTI Systems
Date: Tuesday, December 2, 2014
Time: 11:05 AM - 12:05 PM

Chairs:
Gary Geil, Geil Marketing Associates
Peter Lopez, TRAK Microwave

1. New Line of GNSS Disciplined Oscillator Receivers, G. Passwaters, Furuno GPS/Timing Division
2. The Application of OpenCL to Precision Time and Frequency Algorithms, A. Dowd and W. DeCook, Lithe Technology
3: Time and Frequency Laboratory Activities and Updates

**Date:** Tuesday, December 2, 2014  
**Time:** 1:35 PM - 3:00 PM

**Chairs:**  
Mihran Miranian, *John Hopkins University APL*  
Ronald Beard, *U.S. Naval Research Laboratory*


2. **Time and Frequency Activities at the U.S. Naval Observatory**, W. Walls and D. Matsakis, U.S. Naval Observatory


**Alternate Presentations:**

1. **Timing Activities at Time Service Division of the National Observatory**, R.J. de Carvalho, M.N. Fittipaldi, Time Service Division of National Observatory, Brazil

2. **Works at the State Time and Frequency Standard of Russia**, I. Blinov, Y. Domnin, S. Donchenko, N. Koshelyaevsky, V. Kostromin, Y. Smirnov, The Main Metrology Center of the State Service for Time and Frequency, FGUP “VNIIIFTRI”, Mendeleevo, Russia

4: Traditional and Alternate Time and Frequency Transfer Methods

**Date:** Tuesday, December 2, 2014  
**Time:** 3:35 PM - 4:40 PM

**Chairs:**  
Dr. Sven-Christian Ebenhag, *SP Technical Research Institute of Sweden*  
Dr. Stefania Römisch, *National Institute of Standards and Technology*

1. **A 300-Kilometer Optical Fiber Time Transfer Using Bidirectional TDM Dissemination**, L. Hu, G. Wu, H. Zhang, and J. Chen, State Key Laboratory of Advanced Optical Communication Systems and Networks, Department of Electronic Engineering, Shanghai Jiao Tong University, China

2. **Noise Processes on Optical Fibre Links and Clock Frequency Comparisons**, F. Stefani, Laboratoire National de Métrologie et d’Essais – Système de Références Temps-Espace and Université Paris, France; A. Bercy, Université Paris and Laboratoire National de Métrologie et d’Essais – Système de Références Temps-Espace, France; O. Lopez, A. Amy-Klein, Université Paris, France; P-E. Pottie, Laboratoire National de Métrologie et d’Essais – Système de Références Temps-Espace, France


**Alternate Presentations:**

1. **White Rabbit Time Transfer on Medium and Long Fibre Hauls at INRIM**, G. Cerretto, G. Fantino, R. Costa, D. Calonico, Istituto Nazionale di Ricerca Metrologica (INRIM), Italy
5: Precise Network Timing Standards, Requirements and Applications
Date: Wednesday, December 3, 2014
Time: 8:30 AM - 9:55 AM
Chairs:
Dr. Douglas Arnold, JTime! Meinberg-USA
Dr. Dirk Piester, PTB, Germany

1. Experimental Data from ntp-monitoring and Uncertainty Estimation in Nationwide Network, P. Olof Hedekvist, C. Rieck, K. Jaldehag, SP Technical Research Institute of Sweden; J. Backefeldt, TeliaSonera AB, Sweden

2. International Comparisons of Network Time Protocol Servers, M.A. Lombardi, J. Levine, National Institute of Standards and Technology (NIST), United States; J.M. Lopez, F. Jiménez, Centro Nacional de Metrología (CENAM), Mexico; J. Bernard, M. Gertsvolf, National Research Council (NRC), Canada; H. Sanchez, O.G. Fallas, Instituto Costarricense de Electricidad (ICE), Costa Rica; L.C. Hernández Forero, Instituto Nacional de Metrología (INM), Colombia; R.J. de Carvalho, M. Fittipaldi, National Observatory (ONRJ), Brazil; R.F. Solis, Centro Nacional de Metrología de Panama (CENAMEP). Panama; F. Espejo, Instituto Boliviano de Metrología (IBMETRO), Bolivia

3. Developing Low-Cost NTP Stratum 1 Servers with Linux PTP and GPS, R.E. Schmidt, Richard E. Schmidt & Associates

4. Time Transfer with Nanosecond Accuracy Using Ethernet, C. Rieck, SP Technical Research Institute of Sweden, Chalmers University of Technology, Sweden; K. Jaldehag, SP Technical Research Institute of Sweden

6: Time Scales, Algorithms and Methods
Date: Wednesday, December 3, 2014
Time: 10:30 AM - 11:55 AM
Chairs:
Dr. Elisa Felicitas Arias, Bureau International des Poids et Mesures (BIPM), France
James Skinner, U.S. Naval Observatory

1. An Approach to the Uncertainty Estimation of [UTC-UTC(k)], Z. Jiang, Bureau International des Poids et Mesures (BIPM), France

2. A Gradient Method for Clock Weighting in an Ensemble Timescale Filter, M.J. Coleman, Naval Research Laboratory

3. Software-based Time Synchronization Method for Multi-radio Integrated Navigation Systems, M. Koo, Chungnam National University, South Korea; S.H. Oh, Navcourcs Co., Ltd., South Korea; H. So, 7th R&D Instrument, Agency for Defense Development, South Korea; D-H. Hwang, Chungnam National University, South Korea

4. Generation of Ensemble Timescales for Clocks at the Naval Research Laboratory, K. Senior and M.J. Coleman, Naval Research Laboratory

Alternate Presentations:
1. Time and Frequency Reference Frame to Evaluate Uncertainties of Caesium Fountain Primary Standards, A. Boyko, Y. Domnin, N. Koshelyaevsky, O. Sokolova, The Main Metrology Center of the State Service for Time and Frequency, FGUP “VNIIFTRI,” Russia
7: PTTI Systems Calibration and Applications
Date: Wednesday, December 3, 2014
Time: 1:35 PM - 3:55 PM

Chairs:
Michael Lombardi, National Institute of Standards and Technologies
Werner Lange, Lange-Electronic GmbH, Germany

1. Absolute Calibration of GNSS Time Transfer Systems at CNES, A. Kanj, D. Valat, J. Delporte, CNES/BIPM, France
4. Implementing a Wide Area High Accuracy UTC Service via eLoran, G. Offermans, E. Johannessen, UrsaNav, USA; C. Curry, Chronos Technology, UK

Alternate Presentations:
1. Calibration Comparison Between Optical Fiber and GPS Time Links, Z. Jiang, Bureau International des Poids et Mesures, France; A. Czubla, Central Office of Measures, Poland; J. Nawrocki, Astogeodynamic Observatory of Space Research Center, Poland
3. Measured Ionosphere Delay Correction for Code-based GPS Time Transfer, V. Zhang and Z. Li, Time and Frequency Division of National Institute of Standards and Technology

8: Advanced Clocks
Date: Wednesday, December 3, 2014
Time: 3:35 PM - 4:40 PM

Chairs:
Dr. Robert Tjoelker, Jet Propulsion Laboratory
Ryan Dupuis, Excelitas Technologies

2. Progress Towards Building Optical Clocks for Land and Space at AFRL, C. Erickson and J. Burke, Air Force Research Laboratory
3. Progress on a Miniature Cold-Atom Frequency Standard, D.R. Scherer, Microsemi; R. Lutwak, DARPA; M. Mescher, R. Stoner, B. Timmons, F. Rogomentumich, G. Tepolt, C.S. Draper Laboratory; S. Mahnkopf, Avo Photonics; J. Noble, S. Chang, D. Taylor, Microsemi
9: GNSS Present and Future
Date: Thursday, December 4, 2014
Time: 8:30 AM - 9:55 AM

Chairs:
Dr. Pascale Defraigne, Royal Observatory of Belgium
Francine Vannicola, U.S. Naval Research Laboratory

1. GPS Measurements Anomaly and Continuous GPS Carrier-Phase Time Transfer, J. Yao and J. Levine, Time and Frequency Division and JILA, National Institute of Standards and Technology and University of Colorado, Boulder
2. Precise Point Positioning When GNSS Carrier Phase and Pseudorange Disagree, D. Matsakis, U.S. Naval Observatory
3. Characterization of Short-Term GNSS Satellite Clock Stability, E. Griggs, University of Colorado, Boulder; E.R. Kursinski, Moog Advanced Missions and Science; D. Akos, University of Colorado, Boulder
4. GPS to Galileo Time Offset Message, E. Powers, B. Fonville, S. Mitchell, United States Naval Observatory; J. Hahn, A. Mudrak, European Space Agency, The Netherlands

Alternate Presentations:
1. Measuring ADS-B Out's Latency from GNSS’s RF Source, R. Dehmohsnei, Northrop Grumman Corporation
2. VBOC1(?) Generalized Multidimensional Geolocation Modulation Waveforms, I.F. Progri, Giftet Inc.

10: Precise Network Timing Standards, Requirements and Applications 2
Date: Thursday, December 4, 2014
Time: 10:30 AM - 11:55 AM

Chairs:
Dr. Judah Levine, National Institute of Standards and Technology
Dr. Edoardo Detoma, AvioGroup S.p.A, Italy

2. Precise Timing Requirements in Telecom Networks Today and Tomorrow, P. Diamond, Diamond Consulting
3. PTP-Based Out-of-Band Direct End-to-End Latency Measurement, I-C. Chao, S-Yan Lin, National Taiwan University and Chunqhua Telecom Company Ltd., Taiwan; C-C. Shen, University of Delaware, USA; K.B. Lee, F. Proctor, National Institute of Standards and Technology, USA; F-R. Chang, National Taiwan University, Taiwan
4. Revisiting and Improving the Amortization of Time Discontinuity in Clock Synchronization Algorithms, E. Martins de Oliveira Junior, M. Lopes de Oliveira e Souza, National Institute for Space Research – INPE, Brazil
5. Boston's Role in Atomic Clock Development, Speaker: Mr. Peter Cash, Microsemi
11: Enhancing Resilience of Timing and Critical Infrastructure
Date: Thursday, December 4, 2014
Time: 1:35 PM - 2:55 PM

Chairs:
Dr. John W. Betz, The MITRE Corporation
Edward Powers, U.S. Naval Observatory

1. Ethernet Time Transfer Through a U.S. Commercial Optical Telecommunications Network, M. Weiss, NIST Time and Frequency Division; L. Cosart, Microsemi Corp.; J. Hanssen, Time Service Department, US Naval Observatory
2. Metamodel-Assisted Disciplining Algorithm for Detecting Spoofed GNSS Time Signals, O. Garitselov and D. Sohn, Spectracom
3. CSAC-Aided GPS Multipath Mitigation, S. Preston and D. M. Bevly, Auburn University

12: Space PTTI Applications
Date: Thursday, December 4, 2014
Time: 3:35 PM - 4:40 PM

Chairs:
Dr. James Camparo, The Aerospace Corporation
Dr. Thomas McClelland, Frequency Electronics, Inc.

1. 9800B VHF OCXO: Production Results, M. Stanczyk, P. Cash, D. Harvey, J. Branch, Microsemi
2. Spacecraft Atomic Clock Flight Simulation and Test Station: Slaving a Crystal Oscillator Clock to a Master Atomic Clock, H. Wang, G.H. Iyanu, and D.L. Caponi, The Aerospace Corporation
13: Boston's Role in Atomic Clock Development

Date: Thursday, December 4, 2014
Time: 12:00 PM - 1:30 PM

Chair:
Peter Cash, Microsemi

Mr. Peter Cash of Microsemi will be speaking about "Boston's Role in Atomic Clock Development" during the conference luncheon. The Boston area's Universities and Companies have played an indispensable role in the development of atomic clocks for the world. This lunch-time presentation will provide some historical background and the current state of the technology in the region.
Exhibit Hall

SEAPORT BOSTON HOTEL, BOSTON, MASSACHUSETTS

Exhibitors as of August 27, 2014

Show Hours

Tuesday, December 2, 2014
8:00 a.m. – 5:00 p.m. Exhibit Hall Open
8:00 a.m. – 9:30 a.m. Exhibitor Hosted Breakfast

Wednesday, December 3, 2014
8:00 a.m. – 4:30 p.m. Exhibit Hall Open

Registration

Online: www.ion.org/ptti

Mail or Fax: Complete and return registration form on next page

Make Your Hotel Reservation Before Registering

Before registering, make your hotel reservation with the Seaport Boston Hotel. PTTI attendees will save $200 by entering their confirmation number from the Seaport Boston Hotel at the start of the registration process. You will need your valid hotel confirmation number to claim this discount during registration. Want to know why we do this? Visit www.ion.org/ptti/why-stay.cfm

Registration Questions?

Please contact us:

Institute of Navigation
8551 Rixlew Ln., Ste 360
Manassas, VA 20109
Phone: 703-366-2723
Email: registration@ion.org
Hotel and Travel Information

Welcome to Boston
Founded in 1630, only 10 years after the Pilgrims landed in Plymouth, Boston began as a harbor town. Boston's hospitality and friendly spirit make it one of the premiere meeting destinations in the United States. Come explore Boston's wonderful blend of stylish sophistication and historic New England charm. History buffs can uncover the city's past on a walking tour, harbor cruise, whale watch or by visiting one of the city's many museums. If you're looking for more modern exploration, you can see a play, shop at Faneuil Hall Marketplace, or dine in one of the area’s fantastic new restaurants. For more information on the Boston area, visit www.bostonusa.com.

Hotel Accommodations
Located on the waterfront in the bustling Seaport District, the Seaport Boston Hotel offers you luxury accommodations with dazzling city and harbor views and incredibly convenient access to all major points of interest including the Financial District, Freedom Trail, Faneuil Hall, Fan Pier and the North End. The Seaport Boston Hotel is just minutes from Logan International Airport, with its own MBTA and water taxi stops. In-room internet is complimentary for Seaport Boston Hotel guests, and complimentary wireless internet access is available throughout the hotel.

A block of rooms have been set aside for conference attendees until Wednesday, October 29, 2014 at the prevailing government per diem rate ($170 per night, may be adjusted in October 2014) for single/double occupancy. Reservations made after this date will be on a space-available basis and may not be at the special ION rate. Please note that the room block does sell out quickly, so we strongly encourage you to make your hotel reservations early. Make your reservations by October 29, 2014 to qualify for discounted conference rates.

Reserve Your Room
- Online: Visit www.ion.org/ptti/hotel.cfm
- By Phone: Call the hotel at 617-385-4000. Be sure to identify yourself as a PTTI meeting participant to receive the special attendee rate!

Transportation
Taxi: The Seaport Hotel Boston is located 3 miles (10 minutes) from Logan International Airport. Taxis are available on the front of each terminal (arrival level) curbside. One-way taxi fare is approximately $20.

Airport Shuttle: Super Shuttle offers shuttle service between the Seaport Hotel and Logan International Airport starting at $18 per person, each way. Make a reservation online at www.supershuttle.com or call 1-800-258-3826.

Subway: The MBTA Silver Line Waterfront (SL1) provides service from the WTC Station to Logan International Airport terminals every 10 minutes during the weekday and every 15 minutes during the weekend. The Silver Line station is located adjacent to the hotel.

Water Taxi: The scenic way to travel - hop on the water taxi shuttle at your airport terminal and enjoy the ride. The stop for pick up and drop off is at the Seaport World Trade Center (Stop 5), directly across the street from the Seaport Hotel.

Parking at Seaport Hotel: Overnight parking is $34 per night for self-parking. Hourly and valet parking are also available. See www.ion.org/ptti/travel.cfm for rates.

For more hotel and travel information, please see the PTTI website at www.ion.org/ptti/travel.cfm.

Visas and Machine Readable Passports

Letter of Invitation Requests. Conference attendees requesting a Visa letter to attend a conference must:

1) Register and pay the conference registration fees BEFORE a letter of invitation will be sent.
2) Submit the visa letter request form located at www.ion.org/ptti/travel.cfm.

Exemptions to this policy apply only to those authors whose papers have been accepted for presentation, company personnel working in the exhibit area or trade associated press.

Visa Letter of Invitation Policy: If the attendee is unable to secure a visa, he/she will need to apply for a refund according to the printed refund rules of the event. Visa letter requests will only be reviewed after you have submitted the visa letter request form for your desired conference.

We recommend that you apply for your visa at least three months in advance. Currently there is a mandatory security check period of 30 days for people whose passports are issued from several countries. U.S. consular offices now interview most applicants as part of the application process. Please ensure you arrive at the embassy with all required documentation at the time of your interview. Not that the Institute does not intervene in U.S. State Department's issuance of visas.

Visa waiver travelers from ALL 27 Visa Waiver Program countries must present wither a machine-readable passport or a U.S. visa.

To learn more about the Visa Waiver Program & Machine Readable Passports go to http://travel.state.gov/visa

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PTTI 2014 Registration Form

You can register online at www.ion.org/ptti. Expect confirmation within one week. Please call the ION if you do not receive confirmation within one week.

**STEP 1: TUTORIAL REGISTRATION**

**Tutorials: Monday, December 1, only.**
Includes all tutorials, refreshment breaks, and printed/electronic download of tutorial handouts.

- ☐ Early Rate, Paid By October 29, $375
- ☐ Paid After October 29, $425
- ☐ None

**STEP 2: CONFERENCE REGISTRATION**

**Full Conference Registration: Tuesday–Thursday, December 2-4**
(Please Check Appropriate Category)

<table>
<thead>
<tr>
<th>ION Member</th>
<th>Non-Member</th>
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<tr>
<td>Paid By October 29</td>
<td>Paid After October 29</td>
</tr>
<tr>
<td>$1030* ☐</td>
<td>$1180* ☐</td>
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**Student Rate/Full-time Enrolled in Classes**
Full-time graduate or undergraduate enrolled in classes. (Does not include Thursday awards luncheon or proceedings; but these items may be purchased separately below.)

Must email copy of student I.D. to registration@ion.org

**Single Day Registration**
Includes Sessions and meal on that day only.
Does not include proceedings. These may be purchased separately below.

- ☐ Tuesday, December 2
- ☐ Wednesday, December 3
- ☐ Thursday, December 4
- ☐ None

$600 ☐

**STEP 3: DISCOUNT FOR HOTEL STAY: Save $200 on your registration fees by staying at the Seaport Boston Hotel**

Hotel Confirmation # Required:

☐ Discount ($200)

**STEP 4: TICKETS/PROCEEDINGS FOR PARTIAL REGISTRANTS AND GUESTS (Optional)**

| Luncheon, Tuesday, December 2 | $70 ☐ |
| Luncheon, Wednesday, December 3 | $70 ☐ |
| Luncheon, Thursday, December 4 | $70 ☐ |
| Electronic Proceedings, member rate | $115 ☐ |
| Electronic Proceedings, non-member rate | $145 ☐ |
| Electronic Proceedings, student rate (student I.D. required) | $85 ☐ |

**ION Annual Membership Dues** – Purchase a membership now and qualify for member – rate registration.

Inside the U.S. | $75 ☐ |
International, mailing address outside the U.S. | $95 ☐

**STEP 5: TOTAL**

**Registation Information (Please Type or Print)**

Name: ____________________________
Company: ____________________________
Mailing Address: ____________________________
City: ____________________________ State: ____________________________ Country: ____________________________ Zip/Postal Code: ____________________________
Phone: ____________________________ Fax: ____________________________ E-mail: ____________________________

**Dietary Restrictions:**
☐ Kosher*  ☐ Halal*  ☐ Vegetarian*  Other special needs? Please attach an explanation.

*Lunches will be served buffet style with vegetarian alternatives. No pork items will be served. Kosher meals must be ordered three weeks in advance.

**Method of Payment** – Must be received by the ION by October 29 to receive the early rate.

- ☐ Check for full amount enclosed – Please mail registration form with payment to the ION, 8551 Rixlew Lane, Suite 360, Manassas, VA 20109, USA. Make checks payable to the ION. (U.S. dollars drawn on U.S. bank only)
- ☐ I would like to pay by credit card – If paying by credit card, you may send your registration form by fax, Dedicated fax #: 703-366-2724, or mail. Do not mail a duplicate form if form has been faxed.

Circle One: Visa / MasterCard / American Express

Account #: ____________________________ Exp. Date (required): ____________________________ Security Code: ____________________________

Signature of cardholder: ____________________________

Print Name of Cardholder: ____________________________

**Cancellation/Refund Policy:**
All cancellations/substitutions must(57,76),(974,803)