

ADVANCE PROGRAM

**THIRTY-FOURTH ANNUAL
PRECISE TIME AND TIME INTERVAL (PTTI)
SYSTEMS AND APPLICATIONS MEETING**



December 3 — 5, 2002

**34 Years of Progress
1969 — 2002**

**Hyatt Regency Hotel
Reston Town Center, Reston, Virginia**

**REGISTRATION CARD
THIRTY-FOURTH ANNUAL
PRECISE TIME AND TIME INTERVAL
SYSTEMS AND APPLICATIONS**

DECEMBER 3 — 5, 2002

NAME _____

AGENCY _____

ADDRESS _____
Street

_____ City State and Country

PHONE _____ FAX _____

E-MAIL _____

Registration fee - **\$275**; \$250 if postmarked on or before November 8, 2002. Covers entry to all sessions, one copy of the Proceedings on CD-ROM and all meal functions.

Student/Retiree fee - \$50.00. Must be fully retired or a full-time student to qualify for the reduced registration fee. Covers entry to the sessions and exhibits only.

- | | |
|--|--|
| <input type="checkbox"/> Speaker | <input type="checkbox"/> Session Chairman |
| <input type="checkbox"/> Exhibitor — attending sessions
(Full registration fee applies) | <input type="checkbox"/> Exhibitor — registration included
in exhibitor's package |

Tutorial (\$200)	No. _____	\$ _____
Proceedings (see page viii for cost)	No. _____	\$ _____
Reception Tickets (\$30 each)	No. _____	\$ _____
Lunch Tickets (\$25 each)	No. _____	\$ _____

- Purchasing Proceedings only; will not attend meeting.
- Total Amount enclosed \$ _____
- Will pay on-site

Make checks payable to **Treasurer, PTTI**

Credit card payment is only accepted when registering on-line. This option ends on November 1, 2002: <http://tycho.usno.navy.mil/ptti.html>

Questions?
Contact Ms. Jardine at 202-762-1414 or jardine.nicolette@usno.navy.mil
Mail this card to the address on page iv.

Exhibitors: To obtain exhibitor badges, please e-mail your list of names to Ms. Nicolette Jardine no later than **Friday, November 22, 2002**. Badges can be picked up at the registration desk on Monday evening and Tuesday morning.

Monday, December 2, 2002

0800 — 1300 Exhibition setup of booth for Exhibitors
0800 — 0900 Tutorial Breakfast
0900 — 1630 Tutorials
1300 — 1700 Exhibitor Set-Up
1700 — 1830 Icebreaker — Exhibits Area
1830 — 2100 Exhibitor Set-Up
1900 — 2100 Registration — Grand Ballroom Foyer*
1900 — 2100 Committee on GPS and GLONASS Time Transfer Standards

Tuesday, December 3, 2002

0700 — 0800 Speakers' Breakfast
0700 — 1600 Speakers' Room
0700 — 0800 Attendees' Breakfast — Pre-Function Area
0700 — 1600 Registration — Grand Ballroom Foyer*
0800 — 0835 Opening Session
0800 — 1700 Technical Exhibits
0835 — 0945 Session I
0945 — 1005 Intermission — Exhibits Area
1005 — 1145 Session II
1145 — 1315 Attendees' Lunch
1315 — 1455 Session III
1455 — 1515 Intermission — Exhibit Area
1515 — 1655 Session IV
1800 — 1930 Reception

Wednesday, December 4, 2002

0700 — 0800 Speakers' Breakfast
0700 — 1600 Speakers' Room
0700 — 0800 Attendees' Breakfast — Pre-Function Area
0700 — 1600 Registration — Grand Ballroom Foyer*
0800 — 1700 Technical Exhibits
0800 — 0940 Session V
0940 — 1000 Intermission
1000 — 1130 Session VI
1130 — 1300 Attendees' Lunch
1300 — 1440 Session VII
1440 — 1500 Intermission — Exhibits Area
1500 — 1720 Session VIII
1730 — 1830 Joint Executive and Advisory Board Meeting
1800 — 2000 Special Event

Thursday, December 5, 2002

0700 — 0800 Speakers' Breakfast
0700 — 1600 Speakers' Room
0700 — 0800 Attendees' Breakfast — Pre-Function Area
0700 — 1430 Registration — Grand Ballroom Foyer*
0800 — 1000 Session IX
0920 — 0940 Intermission
1000 — 1320 Session X
1130 — 1305 Attendees' Lunch
1320 — 1420 Session XI
1420 — 1440 Intermission
1440 — 1630 Session XI (continued)
1630 — 1650 General Discussion
1650 Close of Meeting

*Registration for the PTTI Meeting is available each day.
Exhibits are open Tuesday and Wednesday only.

TABLE OF CONTENTS

Schedule	Inside Front Cover
Objectives	iii
Meeting Information	iv
Registration	iv
Registration Card	Front of Book
Cancellation Policy	iv
PTTI Web Site	iv
PTTI 2002 Tutorials (Reserve Early)	v
Special Event — Invited Speaker and Refreshments	v
Questions	v
Registration Desk Hours	v
Hotel Reservations	vi
Hotel Reservation Card (Reserve Early)	Back of Book
Transportation	vi
Parking	vii
Directions	vii
Messages	vii
Speakers' Room	vii
Presented Papers	vii
Temperature	vii
35th Annual PTTI Meeting	vii
Exhibits Information	viii
List of Potential Exhibitors	viii
Proceedings	viii
Executive Committee	ix
Meeting Officers	x
Awards Committee	xi
Advisory Board	xii
Session Chairs	xiii
Agenda	xiv

OBJECTIVES

The objectives of the PTTI Systems and Applications Meeting are to:

- Disseminate and coordinate PTTI information at the user level,
 - Review present and future PTTI requirements,
 - Inform Government engineers, technicians, and Managers of precise time and frequency technology and its problems,
 - Provide an opportunity for an active exchange of new technology associated with PTTI.
-

This year, the PTTI addresses:

- Precise Time and Frequency Applications in Industry
- GPS, GLONASS, and Two-Way Satellite Time Transfer
- Precise Time and Frequency Algorithms and Analysis
- Satellite Time Transfer Plans, Improvements, and Advancements (GPS, Galileo, GNSS)
- What's New in Time and Frequency Standards Laboratories, Activities and Updates
- Technology Advancements in Precise Time and Frequency Measurement Systems
- Vendor Presentations
- Calibration Methods
- Future of Industry in Timing

WELCOME TO PTTI 2002

MEETING INFORMATION

Registration

Please send the PTTI registration form to:

Ms. Nicolette Jardine
U.S. Naval Observatory
ATTN: PTTI Registration
3450 Massachusetts Avenue, NW
Washington, DC 20392-5420
USA
202-762-1414, Fax: 202-762-1511
jardine.nicolette@usno.navy.mil

The registration fee is \$275.00. Note: If payment is received postmarked before November 8, 2002, the cost is \$250.00.

The full registration fee includes entry to all the sessions, the exhibits area, a copy of the Proceedings on CD-ROM, the Ice Breaker, the Welcoming Reception, breakfast and lunch each day, and a special event on Wednesday evening. Guest tickets are \$30.00 for the reception and \$25.00 for lunch.

The registration fee for students and full-time retirees is \$50.00 and includes entry to the scientific sessions and exhibits area only. It does not include a copy of the Proceedings, entry to lunch, the reception, or the Wednesday evening special event.

Please make checks payable to: **Treasurer, PTTI**. Credit cards are only accepted on-line for pre-registration. All attendees, including presenters and exhibitors, must register and receive a badge that must be worn for admission to all sessions and functions. Attendee badges are not transferable.

Visitor badges for the **exhibits area only** may be obtained at the registration desk. The exhibits area is open to everyone.

Cancellation Policy

All requests for cancellation must be received in writing before November 8, 2002. On or after November 11, 2002 there is a \$140.00 cancellation fee. Refunds are not given for “no shows”; however, substitutions are allowed.

PTTI Web Site

Access the PTTI web site at: <http://tycho.usno.navy.mil/ptti.html>

PTTI 2002 on-line registration is also available via the PTTI web site:
<http://tycho.usno.navy.mil/pttiregform.html>

Please remember, to take advantage of the reduced registration fee, payment must be postmarked by November 8, 2002.

PTTI 2002 Tutorials

The tutorial takes place prior to PTTI 2002 on Monday, December 2, 2002. For detailed information, please contact Dr. Lara Schmidt via e-mail at schmidt.lara@usno.navy.mil or call 719-567-4479. The fee for the all-day session is \$200. Breakfast and lunch are included. Please register using the attached "Registration Card" or on-line at the PTTI web site: <http://tycho.usno.navy.mil/ptti/ptti2002/Tutorials.html>

0900 - 1030	Clocks Cesium Clocks - Mike Garvey (Datum) Rubidium Clocks - Bill Riley Patum) Hydrogen Masers - Paul Koppang (USNO)
1030 - 1045	Intermission
1045 - 1145	Clock Statistics - David Howe (NIST)
1145 - 1315	Lunch
1315 - 1415	Timescales - Tom Parker (NIST)
1415 - 1515	UTC - Felicitas Arias (BIPM)
1515 - 1530	Intermission
1530 - 1630	GNSS Time Transfer - Bill Klepczynski (Consultant)

SPECIAL WEDNESDAY EVENING EVENT

Guest speaker, Dr. Steven Dick of the U.S. Naval Observatory, will present "Sky and Ocean Joined: The U.S. Naval Observatory, 1830 - 2000." Dr. Dick has a BS in astrophysics, MS and PhD in history and philosophy from Indiana University. He is a well-known expert in astrobiology and its cultural applications, and is the author of eight books on these subjects. He has been at the U.S. Naval Observatory as an astronomer and historian of science since 1979. He served on Vice President Gore's panel on the societal implications of possible life in the Mars rock. He is on a number of editorial science boards and award committees.

A light supper will be served at 1800 with the presentation to begin at 1830.

Registration Desk Hours

Monday, December 2	1900 - 2100
Tuesday, December 3	0700 - 1600
Wednesday, December 4	0700 - 1600
Thursday, December 5	0700 - 1430

Questions

Please contact the following people for information on matters concerning:

Technical:	Dr. Joe White 202-767-5111, joe.white@nrl.navy.mil
Exhibits:	Mr. Gary Geil 949-489-7644
General:	Mrs. Shelia Faulkner 703-532-6411, bopenyan@aol.com
Registration:	Ms. Nikki Jardine 202-762-1414, jardine.nicolette@usno.navy.mil

Hotel Reservations

Mail or fax the hotel reservation card (found in the back of the book) to:

The Hyatt Regency Hotel at Reston Town Center
ATTN: PTTI 2002 Meeting Room Block
1800 Presidents Street
Reston Town Center
Reston, Virginia 20190
703-709-1234, Fax: 703-925-8295

When reservations are made, **mention PTTI 2002 to receive the group sleeping room rate.** The PTTI rate is available from November 28 through December 8, 2002. Check-in time is 1500 and check-out time is Noon. Rooms are held until 1600 (4:00 p.m. EST if not guaranteed for late arrival by a credit card or one night's deposit). **The block of reserved rooms will be released November 8, so reserve early.** If rooms are available after that date, reservations will be accepted at the group rate. If you leave before your scheduled departure date without informing the Hyatt Regency, you will be charged an early departure fee. Reston Town Center offers a wide range of restaurants and shops within easy walking distance.

Transportation

United Airlines

United Airlines has been chosen as the official carrier for PTTI 2002 and is pleased to offer the best available airfares and schedules that fit your travel needs.

To obtain the best fares or schedule information, please call United's Meeting Desk at 1-800-521-4041 and refer to the Meeting Plus ID code 556XF. The fares are available from November 29 through December 7, 2002.

An additional 5% discount is available if you book and purchase a ticket at least 60 days in advance of the contracted travel dates. This increases the discount to 5% plus 5% off the lowest applicable fare or 10% plus 5% off the unrestricted coach fare. You or your travel agent should call without delay, as seats may be limited.

Rental Car

Avis has been chosen as the official car rental company for PTTI 2002. To receive a reduced rate, call 1-800-331-1600 to book your reservation and give the Avis Meeting Sales Agent the Avis Worldwide Discount (AWD) number for PTTI 2002 - J628452. Special meeting rates are available from November 26 through December 5, 2002.

Airport Shuttle

Hotel shuttle service is available from Dulles Airport.

Parking

Self-parking is complementary for overnight guests. Valet parking is \$8.00 for day, \$16.00 for overnight, including unlimited in-and-out privileges.

Directions Washington National Airport & Washington, DC - Follow signs to I-66 West. (Be alert to late afternoon HOV restrictions.) From I-66 West, take Exit 67, Dulles Airport Toll Road and follow it to Exit 12, Reston Parkway. Turn right and continue 1/4 mile to second stop light. Hotel is on the left.

Baltimore/New York - Follow I-95 South to Washington, DC Beltway, then exit right (west) onto I-495. Follow I-495 across the Potomac River into Virginia and exit right onto Rt. 267, Dulles Toll Road. At Reston, use Exit 12, Reston Parkway, turn right and proceed to second stop light. Hotel is on the left.

Dulles International Airport - From the airport, take Dulles Access Road East toward Washington, DC. At Reston, take Exit 12, then left onto Reston Parkway and follow it north 1/4 mile to third stop light. Hotel is on the left.

Messages

Messages for PTTI attendees may be left through the hotel's telephone number, 703-709-1234.

Speakers' Room

Please check the PTTI Registration Desk or the hotel's Function Board for the location of the Speakers' Room. Session chairpersons should alert their session members to meet them in the Speakers' Room for the speakers' breakfast that is served each day. Presentation supplies are available during the day.

Presented Papers

Papers in electronic form (Word or TEK) must be submitted by e-mail or on diskette to Dr. Lee A. Breakiron, Editorial Chairman, (lab@kepler.usno.navy.mil) by December 3, 2002, unless prior arrangements have been made with him. If prior arrangements have not been made, the paper will not be published in the Proceedings. For paper style, see the Authors' Kit on the Web at: http://tycho.usno.navy.mil/ptti/ptti2002/author_kit.html

Temperature

The climate during December in the Reston area may be chilly. There is a possibility of rain or snow. A warm coat or raincoat is recommended.

Thirty-fifth Annual PTTI Meeting

The 35th Annual PTTI Meeting will be held at the Hilton San Diego Resort, San Diego, California, December 2 - 4, 2003.

Exhibit Information

The exhibit area is adjacent to the general session. For exhibit information, please contact:

Gary Gail
949-361-0212, Fax: 949-361-0312
gary@mainc.cc

Don Mitchell
707-495-6648

List of Potential Exhibitors for PTTI 2002

Agilent Technologies
Allen Osborne Associates, Incorporated
Arbiter Systems, Incorporated
Brandywine Communications
Datum, Incorporated
EG&G
Femtosecond Systems
Frequency Electronics, Incorporated
GPS World
Magellan Ashtech Products
Motorola
Oscilloquartz
Composants Quartz & Electronique
Quartzlock, U.K., Ltd.
Septentrio Satellite Navigation
SpectraDynamics, Incorporated
Spectrum Geophysical Instruments
Symmetricon, Incorporated
Syntonics, LLC
Temex Electronics
Timing Solutions, Incorporated
TimeTech, GmbH
TRAK Com
Trimble Navigation
TrueTime, Incorporated
Zyfer, Incorporated

Proceedings

The proceedings will be mailed in 2003. If you cannot attend, but wish to reserve a copy of the Proceedings, please return the Registration Card with a check for \$275.00 made payable to **Treasurer, PTTI**. Please note on the card that you are not attending. Your reserved copy will be sent to you. If you wish extra copies, they will also be available at \$135.00 each.

PTTI 2002 proceedings will be provided on a CD-ROM. For those wishing to have a hardcopy, a printed copy may be requested for an **additional \$75.00** at the time of registration.

EXECUTIVE COMMITTEE

DR. JOE D. WHITE, CHAIRMAN
U.S. Naval Research Laboratory

MR. RONALD L. BEARD
U.S. Naval Research Laboratory

DR. LEE A. BREAKIRON
U.S. Naval Observatory

LT. DAVID FOWLER
U.S. Coast Guard

DR. DENNIS D. MCCARTHY
U.S. Naval Observatory

CAPTAIN THOMAS R. RICE
U.S. Coast Guard

MR. RICHARD CAMP
Defense Information Systems Agency

DR. HOWARD SCHLOSSBERG
Deputy Assistant Secretary Air Force/AOR

VACANT, TO BE ANNOUNCED
Department of Defense

DR. ROBERT L. TJOELKER
NASA Jet Propulsion Laboratory

MS. FRANCINE M. VANNICOLA
U.S. Naval Observatory

PTTI 2002 MEETING OFFICERS

**GENERAL CHAIRMAN
DR. ANDY WU**

The Aerospace Corporation

TECHNICAL PROGRAM COMMITTEE CHAIRMAN

MR. JAY OAKS

U.S. Naval Research Laboratory

CO-CHAIRMAN

DR. LARA SCHMIDT

U.S. Naval Observatory

TECHNICAL PROGRAM COMMITTEE

DR. LEONARD S. CUTLER

Agilent Technologies

MR. PAUL F. KUHNLE

NASA Jet Propulsion Laboratory

DR. RICHARD L. SYDNOR

NASA Jet Propulsion Laboratory

MS. FRANCINE M. VANNICOLA

U.S. Naval Observatory

MR. S. CLARK WARDRIP

SFA, Incorporated

EDITORIAL COMMITTEE CHAIRMAN

DR. LEE A. BREAKIRON

U.S. Naval Observatory

EXHIBITS AND PUBLICITY CHAIRMAN

MR. GARY GEIL

Geil Marketing Associates

TECHNICAL ASSISTANCE

DR. HAROLD CHADSEY

U.S. Naval Observatory

MR. PAUL KUHNLE

NASA Jet Propulsion Laboratory

MEETING ARRANGEMENTS

MRS. SHEILA FAULKNER

SFA, Incorporated

SUPPORT ASSISTANCE

MS. NICOLETTE JARDINE

U.S. Naval Observatory

**DISTINGUISHED PTTI SERVICE AWARD
SELECTION COMMITTEE**

DR. JOE D. WHITE, CHAIRMAN
U.S. Naval Research Laboratory

DR. DENNIS S. MCCARTHY
U.S. Naval Observatory

DR. LEONARD S. CUTLER
Agilent Technologies

DR. WILLIAM J. KLEPCZYNSKI
Consultant

DR. RICHARD L. SYDNOR
NASA Jet Propulsion Laboratory

**RECIPIENTS OF THE
DISTINGUISHED PTTI SERVICE AWARD**

1994

DR. GERNOT M. R. WINKLER
U.S. Naval Observatory (Retired)

1995

DR. JAMES A. BARNES
National Institute of Standards and Technology (Retired)

1996

PROFESSOR SIGFRIDO M. LESCHIUTTA
Politecnico di Torino
and
Istituto Elettrotecnico Nazionale Galileo Ferraris

1997

PROFESSOR BERNARD RENÉ GUINOT
Honorary Astronomer
Paris Observatory

1998

DR. JACQUES VANIER
National Research Counsel (Retired)

1999

DR. LEONARD S. CUTLER
Agilent Technologies

2000

MR. ROGER EASTON
U.S. Naval Research Laboratory (Retired)

2001

DR. ROBERT F. C. VESSOT
Smithsonian Astrophysical Observatory (Retired)

ADVISORY BOARD MEMBERS

MR. S. CLARK WARDRIP, CHAIRMAN
SFA, Incorporated

PROFESSOR CARROLL O. ALLEY
University of Maryland

DR. BRADFORD W. PARKINSON
Stanford University

MR. MARTIN B. BLOCH
Frequency Electronics, Incorporated

DR. VICTOR S. REINHARDT
Boeing Space Systems

MRS. MARY CHIU
Applied Physics Laboratory

MR. WILLIAM J. RILEY
Datum, Incorporated

DR. LEONARD S. CUTLER
Agilent Technologies

DR. HENRY ROBINSON
Duke University

MRS. SHEILA FAULKNER
SFA, Incorporated

MR. PASCAL ROCHAT
Temex Neuchâtel Time SA

MR. HUGO FRUEHAUF
Zyfer, Incorporated

MR. RONALD C. ROLOFF
Advanced Technology Resources

MR. GARY GEIL
Geil Marketing Associates

MR. GEORGE SHATON
Eagle Alliance

DR. WILLIAM J. KLEPCZYNSKI
Consultant

DR. SAMUEL STEIN
Timing Solutions Corporation

MR. PAUL F KUHNLE
NASA Jet Propulsion Laboratory

DR. RICHARD L. SYDNOR
NASA Jet Propulsion Laboratory

DR. ANDY WU
The Aerospace Corporation

PTTI 2002 SESSION CHAIRS

SESSION I — Vendor Presentations

MR. ALECK HOLCOMB
Defense Information Systems Agency

SESSION II — Satellite Time Transfer

MS. LISA NELSON
U.S. Naval Observatory

SESSION III — GPS Timing Performance

MR. STEVEN HUTSELL
Second Space Operations Squadron,
Schriever Air Force Base

SESSION IV — Galileo and GLONASS Status

DR. EDOARDO DETOMA
Alenia Spazio S.p.A.

SESSION V — Space Clock Technology

DR. JAMES CAMPARO
The Aerospace Corporation

SESSION VI — Panel Discussion:

The Future of Clock Technology for Space

DR. JOE WHITE
U.S. Naval Research Laboratory

SESSION VII — Precise Time Synchronization

MR. JAMES WRIGHT
L-3 Com/Patrick Air Force Base

SESSION VIII — Advancements in Time Technology

DR. JUDAH LEVINE
National Institute of Standards and Technology

SESSION IX — Two-Way Time Transfer

DR. WILLIAM KLEPCZYNSKI
Consultant

SESSION X — Standards Laboratories Reports

DR. FELICITAS ARIAS
Bureau International des Poids et Mesures

SESSION XI — Clock Modeling and Simulation

DR. KEN SENIOR
U.S. Naval Research Laboratory

**PTTI 2002
THIRTY-FOURTH ANNUAL
PRECISE TIME AND TIME INTERVAL (PTTI)
SYSTEMS AND APPLICATIONS MEETING**

TUESDAY, DECEMBER 3, 2002

- 0800 - 0805 OPENING**
Dr. Andy Wu, The Aerospace Corporation
- 0805 - 0815 OPENING REMARKS**
Captain D. W. Gillard, U.S. Naval Observatory
- 0815 - 0830 DISTINGUISHED PTTI SERVICE AWARD**
Presented by Dr. Joe White
U.S. Naval Research Laboratory
- 0830 - 0835 CALL TO SESSION**
Mr. Jay Oaks, U.S. Naval Research Laboratory
- SESSION I PTTI VENDOR PRESENTATIONS**
- 0835 - 0945 Chairman: Aleck Holcomb**
Defense Information Systems Agency
- 0945 - 1005 INTERMISSION**
- SESSION II SATELLITE TIME TRANSFER**
Chairman: Lisa Nelson
U.S. Naval Observatory
- 1005 - 1025 Paper 1: SATELLITE TIME TRANSFER: PAST**
AND PRESENT
Jay Oaks, U.S. Naval Research Laboratory
- 1025 - 1045 Paper 2: TAI TIME LINKS WITH GEODETIC**
RECEIVERS: A PROGRESS REPORT
G. Petit, Bureau International des Poids et Mesures

TUESDAY, DECEMBER 3, 2002

1045 - 1105 **Paper 3: ANALYSIS OF ONE YEAR OF ZERO-BASELINE GPS COMMON-VIEW TIME TRANSFER AND DIRECT MEASUREMENT USING TWO CO-LOCATED CLOCKS**
G. De Jong and E. Kroon, NMI Van Swinden Laboratorium, the Netherlands

1105 - 1125 **Paper 4: COMPARISON OF THE ONE-WAY AND COMMON-VIEW GPS MEASUREMENT USING A KNOWN FREQUENCY OFFSET**
M. Lombardi and A. Novick, National Institute of Standards and Technology

1125 - 1145 **Paper 5: COMBINING TIME TRANSFER MEASUREMENTS USING A KALMAN FILTER**
J. Davis, P. Harris, and M. Cox, National Physical Laboratory, United Kingdom

1145 - 1315 **LUNCH**

SESSION III **GPS TIMING PERFORMANCE**
Chairman: Steven Hutsell, Second Space Operations Squadron/Schriever Air Force Base

1315 - 1335 **Paper 6: ONE-WAY GPS TIME TRANSFER: 2002 PERFORMANCE**
S. Hutsell, 1Lt M. Forsyth, and Capt B. McFarland, Second Space Operations Squadron/ Schriever Air Force Base

1335 - 1355 **Paper 7: GLOBAL POSITIONING SYSTEM CONSTELLATION CLOCK PERFORMANCE**
J. Oaks and M. Largay, U.S. Naval Research Laboratory; W. Reid, SFA, Incorporated; and J. Buisson, AEI

1355 - 1415 **Paper 8: ENHANCEMENTS TO THE GPS BLOCK IIR TIME KEEPING SYSTEM**
J. Petzinger, R. Reith, and T. Dass, International Telephone and Telegraph

1415 - 1435 **Paper 9: INCREASED TIMING PERFORMANCE FROM GPS BLOCK IIR**
W. Marquis, Lockheed Martin Space Systems

TUESDAY DECEMBER 3, 2002

- 1435 - 1455** **Paper 10: END-OF-LIFE INDICATORS FOR NIMA'S HIGH PERFORMANCE CESIUM FREQUENCY STANDARDS**
C. Brock and B. Tolman, University of Texas; and
R. Taylor, National Imaging and Mapping Agency
- 1455 - 1515** **INTERMISSION**
- SESSION IV** **GALILEO AND GLONASS STATUS**
Chairman: Edoardo Detoma
Alenia Spazio, Italy
- 1515 - 1535** **Paper 11: THE EXPERIMENTAL PRECISE TIMING STATION (E-PTS) FOR THE GALILEO SYSTEM TEST BED (PHASE V1): ARCHITECTURAL DESIGN ANDEXPERIMENTAL GOALS**
E. Detoma, M. Gotta, G. Graglia, and F. Martinino, Alenia Spazio, Italy; F. Cordara, L. Lorini, V. Pettit, and P. Tavella, Istituto Elettrotecnico Nazionale "G. Ferraris", Italy; and J. Hahn, ESAIESTEC
- 1535 - 1555** **Paper 12: CPT MASTER CLOCK EVALUATION FOR GALILEO**
F. Levi, A. Godone, and S. Micalizio, Istituto Elettrotecnico Nazionale "G. Ferraris", Italy; E. Detoma, P. Morsaniga, and R. Zanello, Alenia Spazio, Italy
- 1555 - 1615** **Paper 13: GLOBAL NAVIGATIONAL SATELLITE SYSTEM GLONASS: DEVELOPMENT AND USAGE IN THE 21ST CENTURY**
G. Polischuk(1), V. Kozlov(1), V. Ilitchov(2), A. Kozlov(3), V. Bartenev(3), V. Kossenko(3), N. Anphimov(4), S. Revnivkykh(4), S. Pisarev(5), A. Tyulyakov(5), B. Shebshaevitch(5), A. Basevitch(5), and Y. Vorokhovsky(6);
(1) Russian Aerospace Agency, (2) Russian Control System Agency, (3) The Academician Reshetnev's State Unitary Enterprise of Applied Mechanics, (4) Central Scientific - Research Institute of Mechanical Engineering, (5) Russian Institute of Radio Navigation and Time, (6) MORION, Incorporated

TUESDAY, DECEMBER 3, 2002

- 1615 - 1635** **Paper 14: THE DEVELOPMENT OF A PASSIVE HYDROGEN MASER CLOCK FOR GALILEO**
L. Mattioni and M. Belloni, Galileo Avionica, Italy
- 1635 - 1655** **Paper 15: THE CREATION OF DIFFERENTIAL CORRECTION SYSTEMS AND THE SYSTEMS OF GLOBAL NAVIGATION SATELLITE SYSTEM MONITORING**
G. Polishchuk, V. Kozlov, Y. Urlichich, V. Dvorkin, and V. Gvozdev, GLONASS
- 1800 - 1930** **RECEPTION**

WEDNESDAY, DECEMBER 4, 2002

- SESSION V** **SPACE CLOCK TECHNOLOGY**
Chairman: James Camparo
The Aerospace Corporation
- 0800 - 0820** **Paper 16: GPS SPACE CLOCK TECHNOLOGY**
R. Beard, U.S. Naval Research Laboratory
- 0820 - 0840** **Paper 17: GALILEO SPACE CLOCK TECHNOLOGY**
P. Rochat, Temex Neuchâtel Time SA
- 0840 - 0900** **Paper 18: GPS CLOCKS IN SPACE: CURRENT PERFORMANCE AND PLANS FOR THE FUTURE**
T. Dass, G. Freed, J. Petzinger, and J. Rajan, ITT Industries; T. Lynch and J. Vaccaro, PerkinElmer
- 0900 - 0920** **Paper 19: RESPONSE OF A GEOSYNCHRONOUS SPACECRAFT'S CRYSTAL OSCILLATOR TO SOLAR FLARES: RESULTS OF A "SPACE EXPERIMENT"**
J. Camparo, The Aerospace Corporation

WEDNESDAY, DECEMBER 4, 2002

0920 - 0940 **Paper 20: TIMEKEEPING AND TIME
DISSEMINATION IN A DISTRIBUTED SPACE-
BASED CLOCK ENSEMBLE**
S. Francis, Zeta Corporation; B. Ramsey and
S. Stein, Timing Solutions Corporation; J. Leitner and
M. Moreau, Goddard Space Flight Center; R. Nelson,
Satellite Engineering Research Corporation;
T. Bartholomew, Northrop Grumman TASC;
A. Gifford, National Institute of Standards and
Technology

0940 - 1000 **INTERMISSION**

SESSION VI **PANEL DISCUSSION**

1000 - 1130 **THE FUTURE OF CLOCK TECHNOLOGY FOR
SPACE**
Chairman: Joe White
U.S. Naval Research Laboratory

1130 - 1300 **LUNCH**

SESSION VII **PRECISE TIME SYNCHRONIZATION**
Chairman: James Wright
L-3 Com/Patrick Air Force Base

1300 - 1320 **Paper 21: IEEE-1588 STANDARD FOR A
PRECISION CLOCK SYNCHRONIZATION
PROTOCOL FOR NETWORKED MEASUREMENT
AND CONTROL SYSTEMS**
J. Eidson, Agilent Laboratories; M. Fischer, Fischer
Consulting; and J. White, U.S. Naval Research
Laboratory

1320 - 1340 **Paper 22: DISN TIMING AND SYNCHRONIZATION
MODERNIZATION PROGRAM (DTSMP)**
A. Holcomb, Defense information Systems Agency

1340 - 1400 **Paper 23: TIME OF DAY MANAGEMENT FOR
SATELLITE COMMUNICATIONS**
R. Evans, U.S. Naval Research Laboratory

WEDNESDAY, DECEMBER 4, 2002

- 1400 - 1420** **Paper 24: PSynUTC - EVALUATION OF A HIGH PRECISION TIME SYNCHRONIZATION PROTOTYPE SYSTEM FOR ETHERNET LANS**
R. Höller, U. Schmid, and G. Gridling, Vienna University of Technology, Austria; N. Kerö, Oregano Systems, Austria; and M. Horauer, Technikum Vienna, Austria
- 1420 - 1440** **Paper 25: DISTRIBUTION OF TIME SERVICES OVER NETWORKS IN A MULTI -NETWORK ENVIRONMENT**
G. Shaton, Eagle Alliance
- 1440 - 1500** **INTERMISSION**
- SESSION VIII** **ADVANCEMENTS IN TIME TECHNOLOGY**
Chairman: Judah Levine
National Institute of Standards and Technology
- 1500 - 1520** **Paper 26: EPHEMERIS DETERMINATION USING A CONNECTED ELEMENT INTERFEROMETER**
D. Morrison, RINCON Research; S. Pogorelc, Northrop Grumman TASC; T. Celano, Timing Solutions Corporation; and A. Gfford, National Institute of Standards and Technology
- 1520 - 1640** **Paper 27: DUAL-BAND CARRIER-PHASE DISCIPLINING RUBIDIUM CLOCK**
S. Chen, H. Peng, and C. Liao, Chunghwa Telecom Company
- 1540 - 1600** **Paper 28: PRECISE TIME TRANSFER TO UTC USING THE NASA REAL TIME GLOBAL GPS DIFFERENTIAL (GDGPS) CORRECTION SYSTEM**
E. Powers, U.S. Naval Observatory; R. Muelerschoen, Jet Propulsion Laboratory, California Institute of Technology
- 1600 - 1620** **Paper 29: STABILITY AND ERROR ANALYSIS FOR ABSOLUTELY CALIBRATED GEODETIC GPS RECEIVERS**
J. Plumb and K. Larson, University of Colorado; J. White and R. Beard, U.S. Naval Research Laboratory; E. Powers, U.S. Naval Observatory

WEDNESDAY, DECEMBER 4, 2002

- 1620 - 1640** **Paper 30: LIMITATIONS OF GPS RECEIVER CALIBRATIONS**
P. Landis, SFA Incorporated; J. White, U.S. Naval Research Laboratory
- 1640 - 1700** **Paper 31: DESIGN CONCEPT FOR MICROWAVE INTERROGATION STRUCTURE IN PARCS**
J. Dick and W. Klipstein, Jet Propulsion Laboratory; T. Heavner and S. Jefferts, National Institute of Standards and Technology
- 1700 - 1720** **Paper 32: CRYSTAL OSCILLATOR CHARACTERIZATION FACILITY AT THE AEROSPACE CORPORATION**
S. Karuza, M. Rolenz, A. Moulthrop, A. Young, and V. Hunt, The Aerospace Corporation
- 1800 - 2000** **SPECIAL EVENT**

THURSDAY, DECEMBER 5, 2002

- SESSION IX** **TWO-WAY TIME TRANSFER**
Chairman: William Klepczynski
Consultant
- 0800 - 0820** **Paper 33: TWO-WAY TIME TRANSFER TO AIRBORNE PLATFORMS USING COMMERCIAL SATELLITE MODEMS**
T. Celano, Timing Solutions Corporation; S. Francis, Zeta Associates; J. Warriner, Timing Solutions Corporation; A. Gifford, National Institute of Standards and Technology; and P. Howe, U.S. Air Force Research Laboratory
- 0820 - 0840** **Paper 34: ANALYSIS OF ONE YEAR OF GPS AND TWO-WAY TIME TRANSFER RESULTS BETWEEN PTB, NPL, AND VSL**
G. de Jong and E. Kroon, NMI Van Swinderen Laboratorium, the Netherlands
- 0840 - 0900** **Paper 35: INVESTIGATION OF INSTABILITIES IN TWO-WAY TIME TRANSFER**
T. Parker and V. Zhang, National Institute of Standards and Technology; A. McKinley, L. Nelson, J. Rohde, and D. Matsakis, U.S. Naval Observatory

THURSDAY, DECEMBER 5, 2002

0900 — 0920 **Paper 36: EVALUATION AND IMPROVEMENTS IN THE CALIBRATION OF A TWSTFT STATION USING SATSIM**
G. de Jong and R. van Bemmelen, NMi Van Swinden Laboratorium, the Netherlands

0920 — 0940 **INTERMISSION**

0940 - 1000 **Paper 37: SYSTEMATIC EFFECTS IN SBAS (WAAS) TIME TRANSFER**
W. Klepczynski, Consultant

SESSION X **STANDARDS LABORATORIES REPORTS**
Chairman: Felicitas Arias
Bureau International des Poids et Mesures

1000 - 1015 **Paper 38: UNCERTAINTIES OF TIME LINKS USED FOR TAI**
J. Azoubib and W. Lewandowski, Bureau International des Poids et Mesures

1015 - 1030 **Paper 39: TIME AND FREQUENCY ACTIVITIES AT THE NATIONAL PHYSICAL LABORATORY**
P. Whibberley and J. Davis, National Physical Laboratory, United Kingdom

1030 - 1045 **Paper 40: CURRENT ACTIVITIES OF THE NATIONAL STANDARD TIME AND FREQUENCY LABORATORY OF THE TELECOMMUNICATION LABORATORIES, CHT TELECOM CO., LTD.**
C. Liao, P. Chang, and S. Chen, Chunghwa Telecom Company, Taiwan

1045 - 1100 **Paper 41: RECENT IMPROVEMENTS IN TIMEKEEPING AT THE U.S. NAVAL OBSERVATORY**
D. Matsakis, U.S. Naval Observatory

1100 - 1115 **Paper 42: RECENT TIME AND FREQUENCY ACTIVITIES AT PTB**
D. Piester, R Hetzel, and A. Bauch, Physikalisch Technische Bundesanstalt, Germany

1115 - 1130 **Paper 43: RECENT ACTIVITIES IN THE FIELD OF TIME AND FREQUENCY IN POLAND**
J. Nawrocki, Astrogeodynamical Observatory and Central Office of Measures, Poland

THURSDAY, DECEMBER 5, 2002

1130 - 1305 LUNCH

1305 - 1320 Paper 44: RECENT ACTIVITIES AND DEVELOPMENTS AT THE COMMUNICATIONS RESEARCH LABORATORY
M. Hosokawa, Communications Research Laboratory, Japan

SESSION XI CLOCK MODELING AND SIMULATION
Chairman: Ken Senior
U.S. Naval Research Laboratory

1320 - 1340 Paper 45: FRACTIONAL DIFFERENCE PREWHITENING IN ATOMIC CLOCK MODELING
L. Schmidt, L. Breakiron, and C. Ekstrom, U.S. Naval Observatory

1340 - 1400 Paper 46: FFT-BASED METHODS FOR SIMULATING FLICKER FM
C. Greenhall, Jet Propulsion Laboratory

1400 - 1420 Paper 47: ESTIMATION OF TIME DOMAIN FREQUENCY STABILITY BASED ON PHASE NOISE MEASUREMENT
R. Chang, H. Peng, S. Lin, and C. Liao, Chunghwa Telecom, Taiwan

1420 - 1440 INTERMISSION

1440 - 1500 Paper 48: HILBERT SPECTRUM FOR TIME DOMAIN MEASUREMENT DATA AND ITS APPLICATION
H. Peng and R. Chang, Chunghwa Telecom, Taiwan; and F. Chang, National Taiwan University, Taiwan

1500 - 1520 Paper 49: KALMAN FILTER TIME SCALES FOR CESIUM CLOCKS AND HYDROGEN MASERS
L. Breakiron, U.S. Naval Observatory

1520 - 1540 Paper 50: THE DEVELOPMENT OF A UTC-UTC(k) CLOCK PREDICTOR
J. Davis, P. Harris, M. Cox, and P. Whibberly National Physical Laboratory, United Kingdom

1540 - 1600 Paper 51: AN OPTIMAL FIR FILTERING ALGORITHM FOR A TIME ERROR MODEL OF A PRECISE CLOCK
Y Shmaliy and O. Ibarra-Manzano, Guanajuato University, Mexico

THURSDAY, DECEMBER 5, 2002

- 1600 — 1620** **Paper 52: THE CHIP-SCALE ATOMIC CLOCK - COHERENT POPULATION TRAPPING VS. CONVENTIONAL INTERROGATION**
R. Lutwak, D. Emmons, W. Riley, and R. Garvey,
Datum-Timing, Test & Measurement
- 1610 — 1630** **Paper 53: AN AUTOMATIC FIT METHOD OF INTENSITY COEFFICIENT OF NOISE**
X. Li and Y. Bian, National Time Service Center,
China
- 1630 — 1650** **GENERAL DISCUSSION**
Joe White, U.S. Naval Research Laboratory
- 1650** **CLOSE OF MEETING**

HOTEL RESERVATION CARD

Please mail in an appropriate envelope or fax to:

The Hyatt Regency Hotel
(PTTI 2002 Meeting Room Block)
Reston Town Center
Reston, Virginia 20190
703-709-1234, Fax: 703-925-8295

Name _____

Company _____

Address _____

City _____

State _____

Country _____

Postal Code _____

Phone Number _____

Arrival Date _____

Departure Date _____

Number in Party _____

Non-Smoking Smoking

American Express Diners Club Discover Master Card Visa

Card Number _____

Expiration Date _____