CONFERENCE AND WORKING GROUP UPDATES: THE EUROPEAN FREQUENCY AND TIME FORUM

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Abstract

The European Frequency and Time Forum (EFTF) is an international conference and exhibition, providing information on recent advances and trends of scientific research and industrial developments in the fields of Frequency and Time. EFTF was inaugurated in 1987, by the action of French and Swiss researchers, as a meeting and discussion point for the European PTTI community, but the Forum soon attracted participants from all over the world. The average number of participants is between 250 and 300, with researchers coming from 20-25 countries: The number of papers (invited, presented, posters) rounds to 100-130. The wide spectrum of contributions compels the use of two sessions in parallel; the duration is of three days, usually in March. The venue is alternatively in France (Besançon) and Switzerland (Neuchâtel), but in recent years some events were held alternately in other European countries.

1 INTRODUCTION

EFTF Forum started ten years ago by the initiative of French and Swiss researchers, active in the Frequency and Time field, in two nearby regions of the two countries. Indeed, going back in time to the past centuries, clockmaking activities were widespread in a French region, west of Jura mountains, the Franche-Comptée, and in a Swiss region, around Neufchâtel, in the east side of the same chain. Among the promoters were Prof. R. Besson, the designer of the BVA crystal resonator, and Dr. P. Kartaschoff, of the Swiss PTT administration, and designer, in the early sixties, of the largest cesium tube frequency standard ever made, with an interaction length of over 4 m.

In the next section some details are given about the organization and the venues. News concerning the number of participants, the distribution of papers, and the running of the sessions will be covered in the third section, while in the last an attempt is made to find out the guidelines of development in PTTI matters that can be obtained merely by inspection of the papers submitted in the past ten years at the European Forum on Frequency and Time.

2 THE FORUM

The Forum is organized by an Executive Committee, formed by well known French and Swiss experts in the field: A. Audoin, R. Besson, M. Ecabert, J.J. Gagnepain, P. Kartashoff, and B. Schlueter.

The Executive Committee is assisted by an international Scientific Committee, formed by a large number of experts coming from all over the world. The Scientific Committee meets twice per year, during the Forum and in the fall of the year in order select the papers and to appoint some invited speakers. Papers are solicited by a standard call for papers, sent usually in May.

Each venue of the Forum is supported, from a financial point of view, from local and scientific organizations of the guest country.

The venue were held in the towns listed in Table I.

Table I - EFTF Venues

1st	1987	Besançon	France
2nd	1988	Neuchâtel	Switzerland
3rd	1989	Besançon	France
4th	1990	Neuchâtel	Switzerland
5th	1991	Besançon	France
6th	1992	Noordwijk	The Netherlands-ESA
7th	1993	Neuchâtel	Switzerland
8th	1994	Weihenstephan	Germany
9th	1995	Besançon	France
10th	1996	Brighton	UK
11th	1997	Neuchâtel	Switzerland

3 CONTRIBUTIONS PRESENTED AT THE FORUM

On the average at the annual venue are presented about from 80 to 100 papers, with a maximum observed in 1993 of 121; in that year the attendees were 334, coming from 24 countries. An average of 250-300 people attended the meetings in the last few years.

Usually the invited papers are 5 to 8, the oral presentations around 70, and the posters about 30-40, as can be deduced from Table II.

Table II - Papers Presented to EFTF

	atomic	resonators	posters	total
1987	22	40	–	66
1988	42	32	–	74
1989	29	38	–	67
1990	46	31	32	77
1991	27	27	16	64
1992	39	24	25	88
1993	37	39	45	121
1994	33	25	33	91
1995	33	21	47	103
1996	27	42	38	107

Table II commands some remarks. Under the heading *atomic* are considered papers dealing with atomic frequency standards, metrological matters, time scale formation, synchronization, and dissemination or space uses requiring the utmost accuracy.

Under the heading *resonators* are considered also the materials, measurement techniques on quartz, new materials for oscillators, sensors, and SAW devices. The posters are roughly divided in equal parts between the two headings with the same rule for the oral presentations; over the period 1987-1996, 333 papers can be classified as *atomic* and 339 as *resonators*.

It is worth to note that in Europe, and mostly in France, there is active a strong community of researchers working on piezoelectric materials and devices.

The strong diversification of the interest of the attendees between the two aforesaid "headings" and their parity in number compels the adoption of parallel sessions for a large part of the Meeting.

4 TRENDS OF THE PTTI RESEARCH

The study of some 900 papers over a span of 10 years offers the unique possibility to delineate some trends in the PTTI research. This study is presented in another paper at this PTTI Meeting[1], but nevertheless some features can be pointed out considering the papers presented at the Forum. A couple of disclaimers are in order: since the field of interest of the authors concentrated under the heading *atomic*, no attempt will be made to trace trends in the *resonators* area, which anyway seems stable. The second is based on the careful control by part of the Scientific Committee of the quality and balance of the program offered; the trends are indeed originated by the "offer" of the papers, but these trends are possibly filtered in order to give a balanced view with a good appeal for the audience.

Confirmed is the traditional interest in the European labs on cesium devices; on the average 10 papers per year are dealing with this kind of standard, in its three approaches: the classic one with magnetic state selection (on the average 6 papers/year), with optical selection (from 1990), and with the cooled fountain (more recently). The first paper on the latter very interesting approach was presented by Clairon et al., in 1991.[2] As regards the other standard frequency sources, hydrogen masers are under study; meanwhile the rubidium-cell peak of interest was in the first nineties, and it is now declining, but optically pumped Rb masers were proposed, mainly by China. The interest in lasers, as frequency and length standard seems to increase in

the very last years. Regarding comparison methods, Omega, VLF, and Loran-C disappeared after 1990 and the interest on GPS was particularly strong in 1990-1993; the system being now a well known standard, only special applications are reported. The two-way method, after an upsurge in 1990, now is extensively studied, with 20 some papers in 5 years. Considering other topics belonging to precise Time and Frequency activities, three are worth mentioning:

- studies on time scale formation and algorithms, with 5-6 contributions per year since 1991,
- research on frequency synthesis and on the electronic circuits (multipliers, distribution amplifiers, dividers, etc.) to be designed if we really are interested to the path leading to a stability of 10^{-18},
- applications requiring utmost accuracies,
- digital telecommunication as time and frequency dissemination systems,
- clock noise modelization/statistics, and
- traceability issues.

5 FUTURE EFTF VENUES

In 1995 an agreement was reached for joint meetings between EFTF and the IEEE International Frequency Control Symposium (FCS). The first of these joint meetings is planned for April 1999, in Besançon, France; the second will take place in 2003 somewhere on or near the East Coast of the United States. The intention of the EFTF and the IEEE/FCS is that these two venues be a test of the concept of joint conferences.

Torino, November 1996

6 REFERENCES

[1] F. Cordara, A. De Marchi, M. Serafino, and S. Leschiutta 1997, these Proceedings.

[2] A. Clairon, *et al.* 1991, *"A laser cooled cesium atomic fountain: towards a high performance clock,"* Proceedings of the 5th European Frequency and Time Forum (EFTF), March 1991, Besançon, France, pp. 228-236.

STATUS REPORT ON RADIONAVIGATION SYSTEMS AND THE INSTITUE OF NAVIGATION

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Abstract

Due to emerging technology, primarily the Global Positioning System (GPS), the systems used for navigation, as well as for the transfer of PTTI, are undergoing rapid change. The latest status for the continued deployment of systems such as TRANSIT (NNSS), LORAN-C, and OMEGA are reported. A synopsis of the Institute of Navigation GPS Conference, particularly as it relates to timing applications, is presented.

FEDERAL RADIONAVIGATION PLAN

Purpose

Statement to set forth policy and plans for Federally provided radionavigation systems

Individual System Plans

GPS: Operated by DoD and managed by the Interagency GPS Executive Board

Standard Positioning Service (SPS) will be available to all users on a continuous, worldwide basis, for the foreseeable future free of any direct user charge

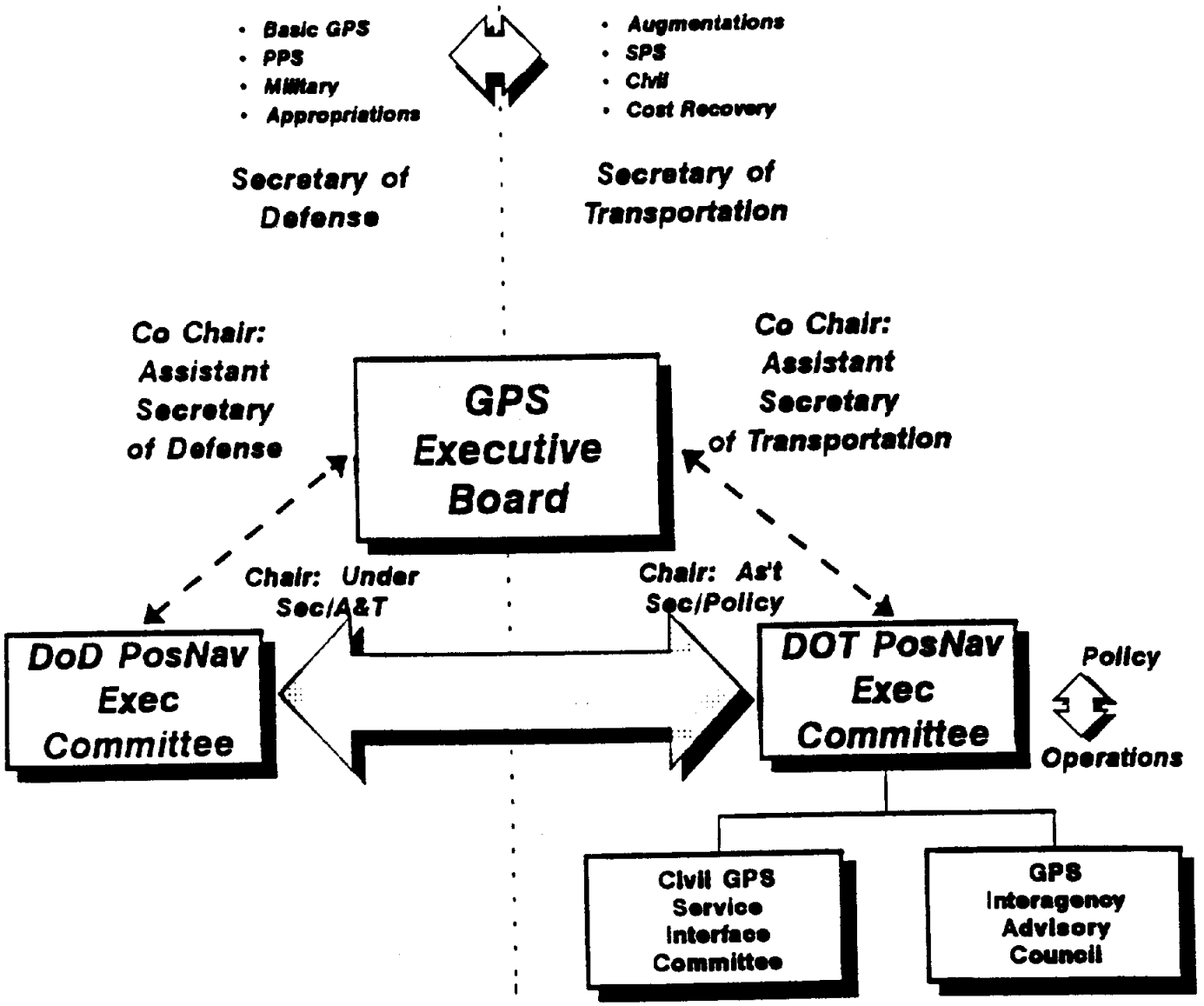
Precise Positioning Service (PPS), the most accurate service directly available from GPS without augmentations, is available to US and allied military and US Federal Government users

Augmentations to GPS: The US Government will not constrain the peaceful use of SPS-based differential GPS services as long as applicable US statutes and international agreements are adhered to.

Loran-C: The US plans to terminate Loran-C operations on December 31, 2000. DOT will prepare a report on Loran-C requirements in consultation with users and the Secretary of Commerce as required by USCG Authorization Act 1996

Omega: The US plans to terminate Omega operations on 30 September 1997

Transit: Ceases operation as a positioning and timing system on 31 December 1996



Joint DOD/DOT POS/NAV Management Structure

FEDERAL RADIONAVIGATION PLAN 1996 (available after 1 January 1997)

Sources

Volpe National Transportation Systems Center
Kendall Square, Cambridge, MA 02142-1093, USA

ATTN: Elizabeth Carpenter FAX 617-494-2628

USCG Navigation Information Service World Wide Website

http://www.navcen.uscg.mil/

National Technical Information Service
Springfield, VA 22161, USA

Phone (703) 487-4650 or (703) 487-4660

INSTITUTE OF NAVIGATION

Purpose

The Institute of Navigation is a non-profit professional society dedicated to the advancement of the art and science of navigation. It serves a diverse community including those interested in air, space, marine, and land navigation, and position determination. Although basically a national organization, its membership is worldwide, and it is affiliated with the International Association of the Institutes of Navigation.

Information

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UPCOMING MEETINGS—1997

January 14-16:

"Navigation and Positioning in the Information Age,"
Loews Santa Monica Beach Hotel, Santa Monica, California, USA

June 30 - July 2:

The 53rd Annual Meeting
Grand Hyatt, Albuquerque, New Mexico, USA

September 16-19:

ION GPS-97
Kansas City Convention Center, Kansas City, Missouri, USA

ION GPS-96

September 1996, Kansas City, Missouri, USA

Sessions:

A1:	Precision Approach	B1:	Aircraft Applications
A2:	New Product Descriptions	B2:	Land Applications
A3:	GPS & GLONASS Performance	B3:	Atmospheric Effects
A4:	Marine Application	B4:	Multipath
C1:	Wide Area Augmentation Systems (WAAS)	D1:	GNSS & WAAS Architectures
C2:	Kinematic Positioning & Ambiguity Resoultion	D2:	Surveying & Geodesy
C3:	Integrated Systems	D3:	Space Applications
C4:	Attitude Ddetermination	D4:	Student Session
E1:	GPS & GLONASS Application	F1:	Precise Positioning Using Reference Networks
E2:	Military Applications	F2:	Specialized Military Equipment Technology
E3:	Integrity		

Working Group: GLONASS/GPS Interoperability