

**IEEE
Information Theory
Society Newsletter**

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 Historian's Column date appear.

Today let us engage in some “reverse” history; what is reverse history? One possible interpretation is that we position ourselves somewhere far in the unknown future and look at the present as historical past. I’ll take this interpretation and imagine looking

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However, there is no guarantee that these prospects will prove right. Even if the article charge is paid from a government contract or grant, it may be too optimistic to think that researchers in every country will be supported by their government or institution at all times. We should think about other possibilities as well.

Open access does not necessarily mean that peer review is bypassed. Peer review is medium independent and no more difficult for online journals than for printed journals. In the near future, I believe open archives will be of great importance as online publications become dominant. Our Society is planning to establish an Information Theory subcategory in the arXiv.org e-Print archive. The experience brought by this archive will hopefully give us a

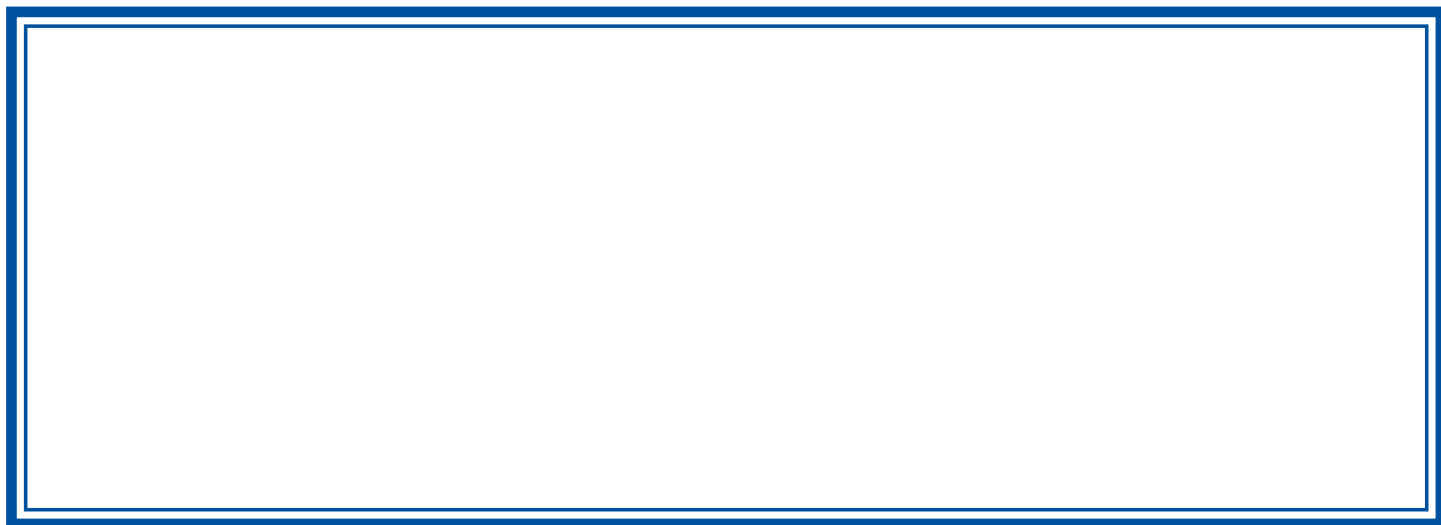
hint in outlining our future business model. The American Physical Society is said to have a system highly appreciated by researchers that consists of a combination of an open archive, Physics e-Print, and a non-open access journal, The Physical Review. The American Physical Society's success indicates that its combined system may be a model to follow in the near future.

At any rate, our Society also needs to make adequate preparations for the future. Information Theory is not unrelated to the issues of open access. In fact, answers to the question about the best way to control the information flow are deeply linked with Information Theory and Cryptology. I hope our Society will contribute greatly in solving the future challenges of the IEEE.

We let p_n denote the n^{th} prime number ($p_1 = 2$, $p_2 = 3$, $p_3 = 5$, etc.), and $\pi(x)$ is the number of primes $\leq x$, for any positive real number x . Note that $\pi(p_n) = n$. The "Prime Number Theorem" of 1896 states that $\pi(x) \sim x/\log x$ as $x \rightarrow \infty$, where "log" is the natural logarithm. In particular, $\lim_{x \rightarrow \infty} \frac{\pi(x)}{x} = 0$, and $\lim_{n \rightarrow \infty} p_n = \infty$.

1. Prove that the ratio $\frac{n}{\pi(n)}$, for $n \geq 2$, takes every integer value > 1 at least once.
2. Let $\{s_n\} = \{n + \pi(n)\}$ and let $\{t_n\} = \{n + p_n - 1\}$, for all $n \geq 1$. Prove that the union of the sequences $\{s_n\}$ and $\{t_n\}$ is the set of all the positive integers, while the intersec-

The above photograph shows Claude Elwood Shannon with his wife



IEEE Information Theory Society Board of Governors Meeting

Hotel des Grands Hommes

Paris, France

March 31, 2003

A G M

: John Anderson, Joseph Boutros, Paul Cotae, Vijay Bhargava, Tom Cover, Michelle Effros, Anthony Ephremides, Marc Fossorier, Tom Fuja, Andrea Goldsmith, Alex Grant, Aaron Gulliver, Joachim Hagenauer, Michael Honig, Hideki Imai, Torleiv Kløve, Ralf Koetter, Urbashi Mitra, Bixio Rimoldi, Shlomo Shamai, David Neuhoff, Alexander Vardy, Han Vinck. Raymond Yeung

1. The meeting was called to order at 8:15 PM by Society President Han Vinck. Those present were welcomed and introduced themselves. The Agenda was approved as distributed.
2. The minutes of the Board of Governors meeting held in Bangalore, India on October 21, 2002, were approved with amendments.
3. Society President Han Vinck thanked former President Tom Fuja for his efforts on behalf of the society during 2002. Aaron

i.e., the society should also strive to create in members a sense of belonging.

The following two motions were passed unanimously:

- (a) Membership dues will be \$60 for a p-membership (paper copies) and \$30 for an e-membership (electronic copies).
- (b) Symposium registration fees will be structured so that the amounts charged from highest to lowest are for IEEE non-members, IEEE members and IT Society members.

The President thanked the committee members for their efforts on behalf of the Society.

6. The Awards Committee Report was presented by Hideki Imai. The membership of the Awards Committee and the Joint IT/ComSoc Paper Award Committee were circulated. The Call for Nominations for the IT Society Paper Award will appear in the March Newsletter and is posted on the society website (ieeets.org). The deadline for nominations is May 2. The final list of nominees will be circulated to the BOG members by June 8. The Awards Committee will submit two papers to the Joint IT/ComSoc Paper Award Committee by April 15. The selection of the paper to receive the award will be made by May 15.
7. The Membership and Chapters Committee Report was discussed next. Membership is down 20% to 4095, while IEEE membership is down 18%, thus there is not a significant difference between the two. The first Best Chapter Award (2002) will be presented at ISIT 2003 in Yokohama. Steven McLaughlin is involved with IEEE research to develop a society membership survey which should help with member retention and providing better services to members.
8. The Newsletter Report by Editor Lance C. Pérez was considered next. The goal is to improve the technical content of the newsletter and in support of this, the membership is encouraged to submit articles for consideration. In addition, organizers of meetings of interest to members should send a picture along with a brief report to the editor. The newsletter archive is in place, it can be accessed at the same website as the Transactions (www.cparity.com/it/welcome/demo.html).
9. The Transactions Report by Editor-in-Chief Paul Siegel was distributed and discussed. The Transactions continues to have no backlog and to be mailed on time. An article for the March Newsletter has been prepared.

One new appointment to the Editorial Board was presented to the BOG for approval:

- (a) Source Coding: Tamas Linder replacing Ram Zamir, effective July 1, 2003.

The appointment was approved unanimously.

Two new Associate Editor positions (Coding Techniques and Communications) were also approved. The current editorial load is approximately 2-2.5 papers/month/AE, but in these two areas the load is consistently heavier.

There have been author complaints of delays of 1-2 years due to delinquent AEs and reviewers. It was suggested that AEs who continually neglect their duties be relieved of their position. In addition, persons submitting papers should expect to be called on to provide reviews.

Ultimately, it is the responsibility of the AEs to find reviewers. The BOG requested that the EIC discuss this issue with the Editorial Board and report back to the BOG.

The Board commended the EIC for his thorough report and excellent leadership of the Transactions.

10. The reports on Symposia and Workshops was presented by Committee Chair, Bixio Rimoldi. He noted that there are as yet

: John Anderson, Daniel Costello, Thomas Cover,
Michelle Effros, Tony Ephremides, Ivan Fair, Tom Fuja, Marc
Fossorier, Joachim Hagenauer, Chris Heegard, Hideki Imai,

coherent multiple-antenna channel", IEEE Transactions on Information Theory, vol. 48, no. 1 pp. 359 - 383, February 2002.

- Vladimir I. Levenshtein, "Efficient reconstruction of sequences," IEEE Transactions on Information Theory, vol. 47, no. 1, pp. 2-22, Jan. 2001.
- S. Verdu, "Spectral efficiency in the wideband regime," IEEE Transactions on Information Theory, special issue in memory of A. Wyner, on "Shannon theory: perspective, trends and applications", vol. 48, no. 6, pp. 1319-1343, June 2002.

According to the bylaws, the Board shall vote for the nominees by ballot, conducted by the Society President or designee, at the first Board Meeting following June 1st of the award year. The President informed the Board that several member of the Board could not attend the meeting due to visa problems. The Board voted unanimously to delay the vote and conduct an email ballot by August 1.

The Board voted unanimously to revisit the Bylaws with respect to voting for the IT Paper Award at the BOG meeting.

In an email ballot conducted in August 2003, the Board has selected the following paper for the IT Paper Award: Lizhong Zheng and David N. C. Tse, "Communication on the Grassmann manifold: A geometric approach to the noncoherent multiple-antenna channel", IEEE Trans. Info. Theory, vol. IT-48, pp. 359 - 383, February 2002.

5. The membership report was presented by Steven McLaughlin. He reported that the Society membership has dropped by 10% since last year (at the same time of the year). Since IEEE has seen a similar drop in its membership, it was suggested that this is the reason for the Society's drop. Steven also reported that the Society was participating in an IEEE wide questionnaire dealing with some membership issues.

Steven also noted that the Society chapter luncheon would be held on Thursday and invited any interested Board members to attend.

The Board requested that Steven report more details on the 10% drop in Society membership at the next Board meeting. Steven reported that there were 100 ISIT attendees who were not IT Society members and suggested contacting them regarding membership.

The Board requested that Steven, in cooperation with Michelle Effros, present a proposal at the next meeting addressing membership issues including ideas and suggestion for increasing Society membership.

6. The treasurer's report prepared by Marc Fossorier was distributed and discussed. The net worth (defined as total assets - deferred income) of the Society was \$541K.

It was noted that the finance figures for 2003 were not available from IEEE. The Board requested that Marc report the finances to the Board when the detailed figures are available.

7. There was nothing to report with respect to the IT Society Newsletter.

8. There was nothing to report with respect to the IT Society Website.

9. Matters related to Symposia and Workshops

- (a) The President reported on a request by IEEE-SA section to

CD/DVDs or should just give it away to all members. Two proposals arose from these discussions. The first is for the Society to update, produce and sell these CD/DVDs to interested parties. The second proposal, presented by Chris Heegard, is to give them free to all members and sell to others. Chris also requested that the CDs be updated with the papers published after 1998. It was noted that this will add to the benefits of IT Society membership and can be used as an incentive to encourage people to join the Society.

The Board requested Steven to study the CD-DVD initiative issue and present a proposal to the Board at the next meeting in October.

11. The Board unanimously approved the Distinguished Service Award, which was discussed at the previous Board meeting in October 2002.

12. A report on the Transactions on Information Theory was distributed by Paul Siegel, the Editor-in-Chief.

It was reported that the Transactions continue to have no backlog and this policy would be lifted only in certain circumstances

The Board approved the following editorial appointments:

Communications - Babak Hassibi (CalTech) , new position, effective August 1, 2003.

Coding Techniques - Oyvind Ytrehus (University of Bergen), new position, effective July 1, 2003.

We are asked to reconstruct a set S of n distinct positive real numbers, given only the set T consisting of the $\binom{n}{k}$ sums of the k -element subsets of S . Let the elements of S be $a_1 < a_2 < a_3 < \dots < a_n$. Each a_i occurs in exactly $\binom{n-1}{k-1}$ of the k -element subsets of S . Hence, the sum, $a_1 + a_2 + \dots + a_n$, of all the elements of S can be obtained by summing all $\binom{n}{k}$ elements of T and then dividing by $\binom{n-1}{k-1}$.

If $n > k$, the *smallest* element of T is $a_1 + a_2 + \dots + a_k$, and the *next-smallest* element of T is $a_1 + a_2 + \dots + a_{k-1} + a_{k+1}$. Similarly, the *largest* element of T is $a_n + a_{n-1} + \dots + a_{n-k+1}$, and the *next-largest* element of T is $a_n + a_{n-1} + \dots + a_{n-k+2} + a_{n-k}$. The remaining elements of T are partially ordered by magnitude. This partial ordering can usefully be shown by a graph, where the nodes are the elements of T (increasing in numerical magnitude from left to right), and the edges are labeled with the difference of the magnitudes of the nodes they connect. The only distinct edge labels will be $\alpha = a_2 - a_1$, $\beta = a_3 - a_2$, $\gamma = a_4 - a_3$, etc. These facts, and the corresponding graphs, will be used to solve problems 1 to 4 as follows.

1. $n = 4$, $k = 2$, $T = \{24, 28, 30, 32, 34, 38\}$.

We know $a_1 + a_2 = 24$, $a_1 + a_3 = 28$, $a_2 + a_4 = 34$, $a_3 + a_4 = 38$, and $\beta = a_3 - a_2 = 4$. There are two possibilities, leading to two solutions. Either $a_2 + a_3 = 30$ and $a_1 + a_4 = 32$, or $a_2 + a_3 = 32$ and $a_1 + a_4 = 30$. In the former case $\alpha = 2$, $\gamma = 4$, while in the latter case $\alpha = 4$, $\gamma = 2$. In the former case, $a_3 + a_2 = 30$, $a_3 - a_2 = \beta = 4$, and $a_3 = 17$, giving $a_2 = 13$, $a_1 = 11$, and $a_4 = 21$. That is, a first solution is $S = \{11, 13, 17, 21\}$. In the latter case, $a_3 + a_2 = 32$, $a_3 - a_2 = \beta = 4$, and $a_3 = 18$, from which $a_2 = 14$, $a_1 = 10$, and $a_4 = 20$. That is, the second solution is $S = \{10, 14, 18, 20\}$.

2. $n = 5$, $k = 2$, $T = \{21, 26, 28, 29, 31, 34, 36, 37, 42, 44\}$. With $S = \{a_1, a_2, a_3, a_4, a_5\}$ with $a_1 < a_2 < a_3 < a_4 < a_5$, we have $a_1 + a_2 + a_3 + a_4 + a_5 = 328/4 = 82$

From nodes 35 to 41, $\alpha + \gamma = 6$. From nodes 48 to 58, $\gamma + \epsilon = 10$. From nodes 45 to 49, $-\alpha + \epsilon = 4$. (This is a dependent set of 3 equations, so we do not yet have a unique solution.) The third-smallest element of T , 37, is either $a_1 + a_4$ or $a_2 + a_3$, so either $\gamma = 2$ or $\alpha = 2$. The third-largest element of T , 54, is either $a_3 + a_6$ or $a_4 + a_5$, so either $\gamma = 4$ or $\epsilon = 4$. From the last two statements, there are three possibilities: i) $\gamma = 2, \epsilon = 4$; ii) $\alpha = 2, \gamma = 4$; iii) $\alpha = 2, \epsilon = 4$. Since $\gamma + \epsilon = 10$ we rule out i). Since $-\alpha + \epsilon = 4$ we rule out iii). That leaves only ii), with $\alpha + \gamma = 2 + 4 = 6$. We can now uniquely fill in the entire graph.

= 748311. 0536047110. 907510. 954601073288450100928049. 047511. 03801070732. 3884501070

Knowing which two elements of S were summed to obtain each element of T , we have 15 consistent linear equations in only 6 unknowns. One easy way to solve this system: $a_3 - a_2 = \beta = 3, a_3 + a_2 = 37$, hence $a_3 = 20, a_2 = 17$, and $a_1 = 32 - 17 = 15$. Also a

= a

A working group and a workshop on Information Recording were held from Monday, March 22, to Friday, March 26, at the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) located at Rutgers University, Piscataway, New Jersey. Both events were organized by Paul Siegel (UCSD), Emina Soljanin (Bell Laboratories), Adriaan van Wijngaarden (Bell Laboratories) and Bane Vasic (University of Arizona at Tucson), and were part of a series of workshops being organized under the auspices of the "DIMACS 2001-2004 Special Focus on Computational Information Theory and Coding", which is a program funded by the National Science Foundation.

The focus of the working group and the workshop was on advances in information recording. This field has witnessed tremendous increases in recording densities and data rates in man-made record-

CALL FOR PAPERS

2004 IEEE Information Theory Workshop

Marriott River Walk, San Antonio, Texas

October 10-14, 2004
Marriott River Walk

For more information, visit our website at
<http://www.itw2004.org>



Call for Papers

9th International OFDM-Workshop 2004 (InOWo'04)

15.-16. September 2004
Hotel Hilton, Dresden, Germany

The 9th International OFDM-Workshop (InOWo'04) will be held for the first time in Dresden, Germany, from Wednesday, 15. September through Thursday, 16. September 2004. The Workshop provides an opportunity for researchers interested in all aspects of the OFDM transmission technique to meet and discuss their results or their research work. In addition to the two day conference a half-day tutorial on various aspects of the OFDM transmission technique is planned for the 14. September 2004. Paper submissions for technical sessions may cover all aspects of multi-carrier transmission including the following areas (but not limited to):



The Forty-Second Annual Allerton Conference on Communication, Control, and Computing will be held from Wednesday, September 29 through Friday, October 1, 2004, at the Allerton House, the conference center of the University of Illinois. Allerton House is located twenty-six miles southwest of the Urbana-Champaign campus of the University, in a wooded area on the Sangamon River. It is part of the fifteen-hundred acre Robert Allerton Park, a complex of natural and man-made beauty designated as a National natural landmark. The Allerton Park has twenty miles of well-maintained trails and a living gallery of formal gardens, studded with sculptures collected from around the world.

Papers presenting original research are solicited in the areas of communication systems, communication and computer networks, detection and estimation theory, information theory, error control coding, source coding and data compression, queueing networks, control systems, robust and nonlinear control, adaptive control, optimization, dynamic games, large scale systems, robotics and automation, manufacturing systems, discrete event systems, intelligent control, multivariable control, computer vision based control, learning theory, neural networks, VLSI architectures for communications and signal processing, and automated highway systems. Also solicited are organized sessions for the Conference; prospective organizers should discuss their plans with the Conference co-chairs before sending a formal proposal.

Plenary lecture: Professor Bernd Sturmfels of the University of California, Berkeley will deliver this year's plenary lecture. It is entitled "The Tropical Geometry of Statistics Models" and is scheduled for Friday, October 1, 2004.

Information for authors: Regular papers, suitable for presentation in twenty minutes, as well as short papers, suitable for presentation in ten minutes, are solicited. The purpose of the short paper

category is to encourage authors to present preliminary results of their work. Regular papers will be published in full (subject to a maximum length of ten 8.5" x 11" pages) in the Conference Proceedings, while short papers will be limited to two-page summaries in the Proceedings.

For reviewing purposes regular papers, a title and a five-to-ten page extended abstract, including references and sufficient detail to permit careful reviewing, are required. For short papers, a title and a three-to-five page summary are required. Manuscripts that are submitted as regular papers but cannot be accommodated in that category will be considered in the short paper category, unless the authors indicate otherwise.

Manuscripts must be submitted by Thursday, July 1, 2004 fol-A12.4444 TD-0.0001 Tc0.1303 Tw6(categorAindicat considaccifihur8.5



CALL FOR PAPERS

2005 IEEE International Symposium on Information Theory

Adelaide Convention Centre, Adelaide, Australia

September 4 - 9, 2005

ISIT 05
Adelaide

General Co-Chairs
Alex Grais
Rodney A. Kennedy
Program Committee

The 2005 IEEE International Symposium on Information Theory will be held at the Adelaide Convention Centre in Adelaide, Australia, from Sunday, September 4 through Friday September 9, 2005.

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Coded modulation

Coding theory and practice

Information theory and statistics

Multiuser detection

Stephen Harty (co-chair)
John B. Anderson
Gerardo Bion
David B. Thomas
Lutz Berntson

Ian F. Blake
Helmut Bölcskei
Giuseppe Caire
Gerard Cohen
Ilyse Dumer
Hesham El Gamal

September 4 - 9, 2005

September 4 - 9, 2005



June 27 - July 2, 2004	2004	()	Chicago Downtown Marriot Chicago, Illinois, USA	chair@isit2004.org http://www.isit2004.org	Dec. 1, 2003
June 20-24, 2004	2004	()	Paris, France	http://www.icc2004.org	Sept. 1, 2003
July 19-24, 2004	2004		Centre de Recherches Mathematiques Universite de Montreal Montreal, Canada	http://www.stanford.edu/group/ stochnetconf/	
September 15-16, 2004	04 -		Dresden, Germany	See CFP in this issue. http://ofdm.tu-harburg.de Prof. Herman Rohling, TU Hamburg-Harburg, Eissendorfer Str. 40, D-21073 Hamburg, Germany, ofdm@tu-harburg.de	April 30, 2004
September 29- October 1, 2004	42	,	Monticello, IL	See CFP in this issue. http://www.comm.csl.uiuc.edu/allerton	July 1, 2004
October 6-8, 2004	2004	- (4)	Viareggio, Italy	http://www.exp-math.uni-essen.de /~vinck/aew4/aew4.html	May 1, 2004
October 10-12, 2004	2004	(2004)	Parma, Italy	isita2004@sita.gr.jp http://www.sita.gr.jp/ISITA2004/new.htm	March 26, 2004
October 24-29, 2004	2004	()	San Antonio Marriot Riverwalk Hotel San Antonio, Texas, USA	See CFP in this issue. http://ee-wcl.tamu.edu/itw2004 Ms. Sonny Matous Electrical Engineering Department Texas A&M University Room 237 WERC	May 31, 2004
November 29- December 3, 2004	2004		Hyatt Regency Dallas at Reunion Hotel Dallas, Texas, USA	http://www.globecom2004.org	March 1, 2004
TBA (before ISIT 2005)	2005	()	New Zealand	TBA	TBA
September 4-9, 2005	2005		Adelaide Convention Center Adelaide, AUSTRALIA	See CFP in this issue. http://www.isit2005.org	January 30, 2005



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