IEEE Information Theory Society Newsletter

President's Column

Tom Fuja

I'm afraid that I must spend this "President's Column" discussing that most prosaic of all subjects – money. As I briefly mentioned in my March column, these are very difficult financial times for our society; indeed, it would not be an exaggeration to say that our continued existence is in danger. So I will use this column to explain the situation – how it came about, how we are addressing it, and what the future may hold.

In late 2000, our parent organization, the Institute of Electrical and Electronics Engineers (IEEE), found itself in financial distress. The downturn in the stock market left the IEEE with insufficient income to cover its expenses, and so to make up the resulting deficit it turned to the only organizational units within IEEE that carry a substantial reserve – the technical societies. The Information Theory Society was assessed a "tax" of $164,900 in mid-2001 as its contribution towards making up the IEEE deficit.

Tom Fuja

But it didn't end there. The IEEE suffered another year of deficits in 2001, and as a result our Society was assessed another "tax" in April 2002 – this time to the tune of $360,400. (To put these amounts in perspective, keep in mind that the total net worth of the Information Theory Society at the end of 2001 – after the first "hit" but before the second – was only $1.2 million.)

The obvious question: Why was IEEE relying on a booming stock market to pay its bills? The simple answer is "Poor fiscal management." A slightly more subtle answer – or at least the answer preferred by the powers-that-be at IEEE – would be "Infrastructure." During the mid-to-late 1990's, a substantial new computing infrastructure was put in place at IEEE Corpo-

rate; this new infrastructure included the IEEE Xplore interface to on-line publications as well as a substantially-expanded web presence that includes career development tools and e-mail aliases for members. According to IEEE management, the cost of this new infrastructure was hidden from the membership by the booming stock market, and it is only now that we, the beneficiaries of this infrastructure, are being asked to pay our "fair share".

And what a share it is. Under the new financial model approved by the IEEE Board of Directors in late 2001, we can look forward to diminished income and increasing bills from IEEE Corporate. Specifically, the new financial model mandates that, from now on:

- The first 5% of all investment income on Society reserves will go to IEEE Corporate – not to the Society.

- IEEE Corporate will get a 25% share of all income derived from intellectual property (IP) packages – e.g., the IEEE/IEE Electronic Library (IEL), the All-Society Periodicals Package (ASPP), etc. Note that these packages represent the largest single component of our Society's income.

- A new stand-alone "infrastructure tax" will become part of our yearly budget; as a data point, the anticipated infrastructure tax for 2003 is $134,600.

These changes in how IEEE does business are having a devastating effect on our Society budget. In the "first iteration" of the 2003 Information Theory Society budget – still being studied and re-worked as this column is
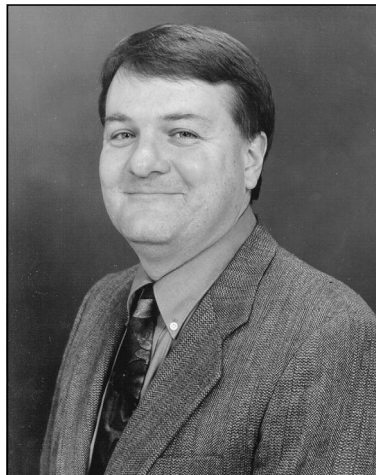
From the Editor

Lance C. Pérez

In this issue of the *IEEE Information Theory Society Newsletter,* particular effort has been made to include the dates and announcements of all the IT Symposia and Workshops that have been approved by the IT Board of Governors. Though the information on a 2004 conference may be limited, I hope that IT members will find this notification useful.

I would like to ask that IT society members once again peruse the March 2002 Newsletter article on the Newsletter digital library and to check their personal collections for any missing issues they might have.

Please help make the Newsletter as interesting and informative as possible by offering suggestions and contributing news. The deadlines for the next few issues are as follows:

Issue	Deadline
September 2002	July 16, 2002
December 2002	October 11, 2002

Electronic submission, especially in ascii and Word formats, is encouraged.

I may be reached at the following address:

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Lance C. Pérez

Sincerely,
Lance C. Pérez

IEEE

Information Theory Society Newsletter

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President's Column

written in mid-April – we are showing an anticipated deficit of $300,200. A couple more years of this and we will simply run out of money. And then… what?

Our Society has a pretty simple financial structure. We have one major source of income – the money paid by libraries to buy our *Transactions*, either alone or as part of an IEEE package. (Individual membership fees – even newly raised from $15/year to $30/year – represent a pretty small part of the income picture, and they certainly do not cover the cost of producing and delivering a member's *Transactions*.) Similarly, our major expense is the production of those same *Transactions*. Unlike many other societies, we do not seek to make big surpluses on our meetings; the registration fees are kept low (compared to, say, ComSoc meetings) and we provide travel subsidies to allow many young members to attend. Ultimately, our meetings are usually a "wash" financially – i.e., they break even or show a small surplus. The other sources of income that some of the larger societies employ – such as advertising in magazines or journals or rental of display space at meetings – will simply not generate significant income for a society our size.

So we're left with a big hole in our budget and not many ways to fill the hole. To illustrate this, suppose we were to attempt to fill that looming $300,200 deficit for 2003 by taking some drastic steps. Suppose we were to:

- cut our 2003 Transactions page count from 3150 to 2000 pages;
- increase our membership fee from $30 to $50;
- increase our Transactions individual non-member subscription price - i.e., the price paid by (approximately) 530 libraries that do not subscribe to an IEEE package – from $520 to $620.

If we were to take these drastic steps – *and I am not proposing we do so* – we would still have a projected deficit of about $156,000.

So what's left to do? Prudence suggests three things:

- We must, in concert with other IEEE societies, demand that IEEE Corporate take serious – indeed, drastic – cost-cutting measures. If the fees being charged to the societies reflect genuine spending levels at IEEE Corporate, then they are living way beyond *our* means. I am pleased that the technical societies are coming together to demand

greater financial accounting from IEEE; for instance, an independent audit of IEEE's financial position requested by the societies will take place this summer and will (presumably) help us to identify potential savings.

- We must take some concrete steps to put our own society's financial house in order. Whatever happens with regard to cost cutting at IEEE, there will almost certainly be *some* increased costs (relative to the "old days" of 1999) passed onto the societies, and if we are to remain part of IEEE we will have to find a way to pay that bill. How can we do this? Once again, we only have a few "buttons" we can push. Membership dues may have to increase modestly. (Our membership dues are $30/year, but it is estimated that it costs $70/year to produce and deliver an issue of our *Transactions* to a member; so right now each member gets a $40/year "subsidy" from our library sales.) We may have to ask our ISIT organizers to budget for a "structural" surplus, as most societies do. (So rather than being pleased with a providential surplus of $10K, we may have to ask organizers to budget for a planned surplus of $50K.)

- Finally, in anticipation of the possibility that IEEE does *not* act responsibly, we should begin to think – as a last resort – about how the information theory community should organize itself in a "post-IEEE" future. Ideas have been floated – ideas such as the formation of a non-profit "Friends of Information Theory" foundation, which could solicit donations and carry out some of the functions currently carried out by the Information Theory Society – but without incurring charges from IEEE; such an organization could provide a "bridge" to a post-IEEE future. It is daunting – and depressing – to contemplate such an undertaking, but, if nothing changes at IEEE, then three years of $300K/year deficits will put us out of business by 2006.

As these events unfold, I would encourage you to make your views on these subjects known to your elected representatives on the IEEE Board of Directors. It is the Board of Directors that sets IEEE policy, and its members are both technically based ("Division Directors") and geographically based ("Region Directors"). A complete list of the IEEE Board of Directors can be found at http://www.ieee.org/organizations/corporate/bod.html.

Letters to the Editor

Dear Editor:

Jim Massey's obituary in the *IT Newsletter* was a wonderful tribute to Peter Elias. Peter was a true gentleman, and I would like to add one more instance of his invaluable role in helping young researchers get started. I was an Assistant Professor at MIT from 1969-71 in the IT group and had a number of very helpful, supportive discussions with Peter during this time. During one of them, he gave me a copy of Shannon's then little known 1949 paper on cryptography. I had developed a passing interest in cryptography the year before, when I was at IBM Watson Research Center — the time and place for the birth of IBM's work in the area. But, it was only when Peter gave me this paper and I saw that cryptography was really a branch of Information Theory that I felt that maybe I could make a contribution.

Peter had a generosity of spirit that is impossible to describe in a letter. Suffice it to say that I felt a deep sense of loss on hearing of his death and an equal sense of uplift in remembering him through Jim Massey's tribute. Who knows what channel exists between here and the afterworld? But, if there is even a small capacity to it, I hope Peter is decoding (and has the right key, since of course it is cryptographically protected as well) and can sense how many of us are remembering how much we owe him.

Martin Hellman
Professor Emeritus of EE
Stanford University
hellman@stanford.edu

Vijay K. Bhargava Elected to the Canadian Academy of Engineering

Vijay K. Bhargava has been elected to the Canadian Academy of Engineering. Members of the academy are elected on the basis of their distinguished service and contribution to society, to the country and to the profession.

Vijay Bhargava is a former president of the IEEE Information Theory Society and helped Ian Blake (with John Anderson and L. Lorne Campbell) organize ISIT'83 in St-Jovite, Québec, Can-

Vijay K. Bhargava

ada and again helped Ian Blake (with Mike Purseley) organize ISIT'95 in Whistler, B.C., Canada. In 1996, he teamed up with Suguru Arimoto and Hideki Imai to organize ISITA'96 in Victoria, B.C., Canada.

This year Vijay Bhargava is an IEEE Board of Director's nominated candidate for the office of IEEE President-Elec.

IEEE Review of the Information Theory Society

by Joachim Hagenauer, 2001 Information Theory Society President

The IEEE conducts a review of each society every five years. In 2001, during my presidency, it was the turn of our Society. I prepared a 30-page report about the state of the Union of Information Theorists. I further gave a Power Point presentation to the IEEE Review board at the IEEE TAP meeting in Mexico City in November 2001. If you wish to obtain a copy of this PPT presentation please send an email to Hagenauer@ei.tum.de.

The following is the written comment of the IEEE review board issued in December 2001:

Joachim
Hagenauer

The presentation of the report was made by the President of ITSOC Dr. Joachim Hagenauer. It was well organized and informative. Good discussion was held between members of the Society Review Committee and Dr. Hagenauer and President Elect Dr. Tom Fuja.

The Society appears to be very successful in maintaining its intense technical activities. The Society Review Committee wishes to commend it. The following are issues for consideration of ITSOC.

1. Overlaps with other entities: Although there is some overlap in the field of interest with other societies e.g.

Communication Society, Computer Society and others, there are joint activities such as co-sponsorships of conferences and joint awards. The President reported that there have been no problems and members of ITSOC often publish their work in the Transactions of other societies. This practice of cooperation is commendable and is worthy of passing on to other societies.

2. Term of office of the President: Currently the President serves a one-year term. The Society Review Committee would like to encourage ITSOC to consider extending this to two years for more effective service to their members as well as to be more consistent with most other societies.

3. Membership grades: The proportion of Senior Members could be increased by active encouragement and nomination as clearly there are many well qualified members who deserve to be recognized by their peers.

4. Membership fees: The planned increase for 2002 in the Society membership fees from $15 to $30/year may lead to a negative impact on the membership when coupled with the projected increase by IEEE for the basic membership.

5. Publications: The planned change from 6 to 12 issues/year of the IT Transactions would be beneficial. It may indirectly reduce the delay of 18-20 months in publishing the submitted papers.

Historian's Column

Anthony Ephremides

For about the last thirty five to forty years two annual conferences have kept affectionate company to the development of our field under the shadow of the "flagship" conference that we call the International Symposium of Information Theory. They are the Allterton Conference on Communication, Computing, and Control and the CISS, the Conference on Information Sciences and Systems. The first in the Fall and the second in the Spring of each year, they have faithfully kept the "spirit" of serious, intellectual work that is the hallmark of our field. Compared to our Symposium they are what chamber music is to an opera. They are small, low cost, more diverse in topic coverage, somewhat "elitist" in the best possible meaning of the word, and truly charming in their unpretentiousness and tenacity.

A. Ephremides

The Allerton Conference was founded by the stalwart "Mac" Van Valkenburg, perhaps the best-known Electrical Engineer worldwide. Although "Mac" is now gone, his spirit lives on. Those fortunate enough to have known this affable man, who seems to have invented almost everything of significance in the field of Electrical Engineering Education, remember his jolly, rotund figure, his courteous gentlemanly manner, and his humorous mood as well as his books, articles, and other professional contributions. "Mac" was at the University of Illinois in the early sixties before becoming department chair at Princeton University in the mid-sixties. He had the foresight to establish this conference as a focal point of theoretical information systems research before it became fashionable to clone and proliferate scientific meetings on all subjects worldwide. People joke nowadays that his labeling of the inaugural Allerton Conference as the **first** Allerton Conference was an audacious statement that implied there might be a … "second" one. Well, the uninterrupted flow of consecutive annual repetitions is leading this year to the fortieth Allerton Conference. In more than one way, the Allerton Conference has passed the test of time. In 1997, the 35th anniversary of the founding of the Conference, a time capsule was buried in the grounds of Allerton Park, the charming venue of the conference, to be opened in 2032, that is after another thirty five years (please note that five years have already passed). The time-capsule ceremony itself was testimony to the enduring value of the conference and paid tribute to "Mac's" vision and to the sustained efforts of the many faculty members at the University of Illinois, who have shouldered the load of running the conference every year as the Autumn leaves start turning and the summer fades away. In fact, with remarkable consistency, the first day of the conference has been a balmy, warm, sunny day, the second day has been a stormy and rainy day, and the third day has been a blustery, chilly day that heralds the coming winter.

The only "dark" spot of the conference is the quality of the meals dished out by the kitchen facilities of the Allerton Park mansion. The elegant surroundings of the mansion are seriously out of tune with the Cornish hen, broccoli, and potatoes that emerge at the dinner table.

When "Mac" moved to Princeton, he went ahead to create a "Spring" version of the Allerton Confernece. So the CISS was born in 1967. It had just about the same technical scope and flavor as the Allerton Conference and was hosted at Princeton by the Electrical Engineering Department every year until 1975, when it started alternating between Princeton (in even-numbered years) and Baltimore at Johns Hopkins University (in odd-numbered years). Although so similar to the Allerton Conference, the CISS developed its

own character and became more than just a seasonal complement to its elder sister. The faculty of the Department of Electrical Engineering at Princeton University, just as their colleagues at the University of Illinois, shouldered the responsibility of organizing the conference and, later on, shared this undertaking with the faculty at Johns Hopkins. A unique sense of continuity was evident this year as the co-chairs of the CISS were Bede Liu and Stu Schwartz who were involved in the inaugural CISS in 1967 as well.

The consistent and sustained volunteerism that has underlined the organization of these two conference, pretty much by the same group of people over the years, is a fine example of how some of our colleagues contribute the equivalent of large sums of money to our profession through their dedicated service for long hours in a variety of ways. This spirit of volunteerism is one of the proud hallmarks of our Society.

Eventually, "Mac" left Princeton and returned to the University of Illinois where he spent the rest of his life (professional and otherwise). His multifaceted legacy includes these two symposia that have punctuated the careers of many members of our society and of their students. The Information Theory Society Board of Governors has used either of the two conferences (or both) as the venues of its meetings and many society members have been regular patrons of both.

I have had the fortune of attending both conferences numerous times. Their existence has overlapped almost entirely with my career so far. Memories related to them are legion and almost always pleasant and nostalgic. Rudi Kalman, delivering a "blistering" lecture at Princeton, the wine-and-cheese parties at the Allerton House, the pre-conference receptions at the homes of some of our colleagues, the "baptizing" of graduate students who delivered their first technical talk at one of these conferences, the camaraderie and the fellowship among many of us throughout the last three-plus decades, are all part of the rich tradition of these two meetings. From "Mac" to Bill Perkins and Joe Cruz, from John Thomas to Bede Liu and Stu Schwartz, from Bob McEliece to Bruce Hajek and Dilip Sarwate, from Ken Steiglitz to Vince Poor and Sergio Verdu, from P. Kumar and Tamer Basar to R. Srikant and Dick Blahut, from Brad Dickinson and Howard Weinert to Jack Rugh and Gerard Meyer, and many others, whose names I am carelessly omitting, we owe a debt of gratitude for their familiar presence at the meetings as well as for their behind-the-scenes selfless work that has ensured and sustained the uninterrupted marking of our calendars with the words "Allerton Conference" and "CISS".

Maybe I could "sneak" this column in a "conceptual" time capsule for both meetings!

2002 Information Theory Workshop Announcement

by Tom Fuja

The IEEE Information Theory Society will hold its first-ever meeting in India when it convenes the 2002 Information Theory Workshop (ITW '02) October 20-25 in Bangalore.

The workshop's program will be a mixture of invited sessions, contributed talks, and plenary lectures. The invited sessions and their organizers are as follows:

- Shannon theory
  Organizers: Vinod Sharma and Sergio Verdu

- Source coding
  Organizers: Michelle Effros and Anamitra Makur

- Channel coding and modulation
  Organizers: Dan Costello and Bhaskar Ramamurthy

- Space-time coding and processing
  Organizers: Babak Hassibi and Nambi Seshadri

- Cryptography
  Organizers: C. Veni Madhavan and James Massey

- Information theory and statistics
  Organizers: Vivek Borkar and Imre Csiszar

- Communication networks
 *Organizers: Tony Ephremides and Anurag Kumar*

The plenary speakers for ITW '02 will be G. David Forney and Thomas Kailath. Finally, there will be a pair of contributed sessions and a "Recent Results" session. People interested in attending are encouraged to see the details at http://ece.iisc.ernet.in/ieee-itw2002/

GOLOMB'S PUZZLE COLUMN™

Placing Pentominoes on Boards

Solomon W. Golomb

The twelve pentominoes are the figures made of five edge-adjacent squares of equal size:

T U V W X Y Z F I L N P
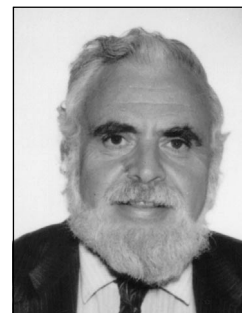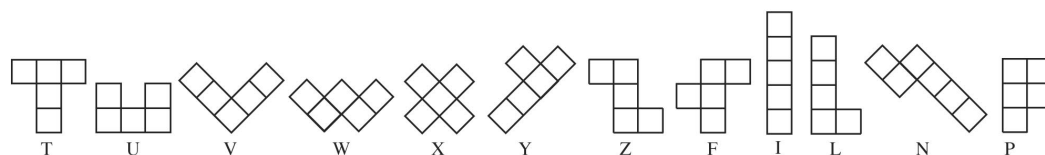
1. Your first assignment is to find all the distinct locations on a 5 × 7 board (distinct relative to the group of rotations and reflections of the 5 × 7 rectangle) where each one of the twelve pentominoes can be placed so that the rest of the 5 × 7 rectangle can be tiled with ten "right trominoes" ( ).

(A pentomino can be rotated and reflected at will, but its placement on the 5 × 7 board must match the grid lines.) We only care about distinct locations for the pentomino, and not about possible rearrangements of the ten right trominoes. Here is one solution for the P-pentomino:
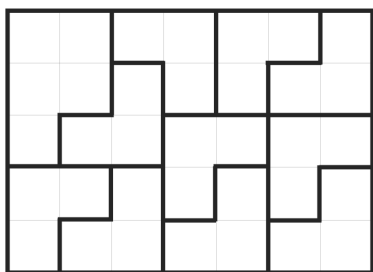
There are at least three different locations for each pentomino, and as many as eight (in the cases of the P and Y). See how many you can find. (I have a total of 50. Can you improve on this?)

While this is largely trial and error, there are some guiding principles which greatly reduce the number of locations that need to be tried.

2. As shown in my book *Polyominoes* (in Figure 16), it is possible to place five pentominoes on the 8 × 8 board in such a way that none of the other seven pentominoes will fit, e.g.
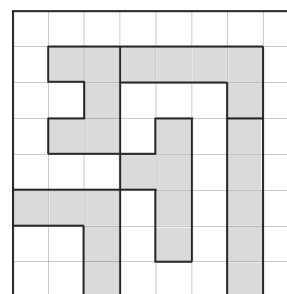
On the 7 × 7 board, it is possible to place four pentominoes (following the grid lines) in such a way that none of the other eight pentominoes will fit. In particular, the I, L, and V pentominoes can be used with any one of the other nine pentominoes to prevent any of the remaining pentominoes from fitting on the board. Find an example for each of these nine cases. Finally, there is a set of four pentominoes which includes neither the I nor the V which can be placed on the 7 × 7 board to preclude the placement of any additional pentominoes. Can you find an example of this configuration?

It is quite common that there is more than one way to place the same four pentominoes on the 7 × 7 board to keep all the others off. You are asked to find only one placement for each set of four pentominoes, for a total of ten configurations. Among the 495 four-element subsets of the twelve pentominoes, this indicates that ten of them can be used to keep the remaining pentominoes off the 7 × 7 board. Is there an eleventh subset with this property? Or a twelfth?

3. The five pentominoes shown above (I, L, U, V, Y) can be rearranged in several ways and still succeed in preventing any of the other seven pentominoes from being placed on the 8 × 8 board. Find a *different* subset containing five of the twelve pentominoes which can be placed on the 8 × 8 board so as to exclude the remaining seven. (It may overlap, but not coincide, with the previous five-pentomino subset.)

IEEE Information Theory Society Annual Meeting
Cairns International Hotel, Cairns, Australia
Wednesday September 5, 2001
Marc Fossorier and Aaron Gulliver

Attendees: John Anderson, Joseph Boutros, Iain Collings, Dan Costello, Tom Cover, Anthony Ephremides, Jamie Evans, Marc Fossorier, Thomas E. Fuja, Alex Grant, Joachim Hagenauer, Michael Honig, Robert Morelos-Zaragoza, Christian Schlegel, Paul H. Siegel, Han Vinck, Stephen B. Wicker

1. The meeting was called to order at 8:30 AM by Society President Joachim Hagenauer. The members of the Board were welcomed. The Agenda was approved as distributed.

2. The minutes of the previous meeting held in Washington, DC, on June 24, 2001, were approved as distributed.

3. Society President Joachim Hagenauer acknowledged that the recent ISIT'01 in Washington, DC was a very good conference. He then stated that the elections for the paper award and the Society officers were finished. The elections for the 2002 Board of Governors were on track: 13 candidates for six slots are running. He mentioned that the Newsletters were back on track with the March 2001 issue out.

The President then updated the Board about the alarming financial situation of the IEEE which was previously discussed during the last meeting. He read a letter signed by many IEEE Society presidents (including ours), to be sent to IEEE. In this letter, the IEEE Society presidents ask for an investigation of the expenses made by IEEE Technical Activity Board (TAB) which result in an $8.7 M. increase for infrastructure costs in 2001 (or a 400% increase over the current expenses). If IEEE implements the corresponding financial model, many societies, including ours, would lose all their reserves in a few years. Consequently, it was requested in this letter that the IEEE Board of Directors engage an independent financial consultant to look at IEEE expenses.

This letter was unanimously supported by the Board. However, Tony Ephremides noted that the IEEE may not respond to this letter (as they did to the letter our President sent individually eight months ago). He also warned about the delay for the consultant's report to be finalized.

It was finally mentioned that some societies have threatened to separate from the IEEE. In view of this series of events, the next IEEE TAB meeting in November is going to be decisive. Both Joachim Hagenauer and Tom Fuja will represent our Society.

4.1. Marc Fossorier gave an overview of the current financial status of the Society. On July 31, 2001, the net worth of the Society was $1,394,600 with $913,430 in long term investments and $383,710 in cash.

Based on the current financial model developed by IEEE, the 2001 infrastructure charge to be withdrawn from our Society reserves by IEEE is expected to be an additional $350,000 (so $515,000 for 2000 and 2001 combined). In addition to this infrastructure charge, the new financial model developed by IEEE includes a reduction of the IEEE membership returns to Societies, a decrease in distribution of revenues from conference proceeding purchases and other publications in ASPP and Book Broker programs to Societies, and importantly, the capturing by IEEE of the first 6% of the interests on long term investments. It was questioned whether the recent membership increases passed by the Board would suffice to compensate for these losses.

The books of the 2000 IEEE International Symposium on Information Theory, Sorrento, Italy are closed. The conference had a surplus of $15,000 (subject to conversion rate). The final report of the 2000 IEEE International Conference on Personal Wireless Communications, Hyderad, India was submitted on time. While the Society had no financial involvement with this conference, a check of $8,173 was made to our Society which served as technical co-sponsor.

4.2. The President formed an ad hoc committee to interface with IEEE on financial matters. This committee is composed of Marc Fossorier, Han Vinck and Steve Wicker.

5. Aaron Gulliver reported that negotiations for the redesign of the website are in progress.

6. Lance Pérez prepared the Newsletter Editor's Report. It was confirmed that the Newsletters were getting back on track.

A motion to spend $5,000 to make the Newsletters available to the digital library was approved by the Board. Robert McEliece has offered a nearly complete collection of Newsletters from 1954 to present. These Newsletters should therefore be accessible soon for the Society members.

7.1. The Transactions Report was given by Paul Siegel. He mentioned that the transition from Alex Vardy went smoothly, with the same editorial assistant. The September issue was on track for a timely publication as well as the November issue, in which a retrospective article about Claude Shannon authored by Robert Gallager will appear.

It was reminded that from January 2002, the monthly publication of the Transactions starts. The paper award announcement should appear in this January issue.

The special issue dedicated to Aaron Wyner is also on track for 2002.

7.2. The Board discussed whether one of the 12 issues each year should be a special issue, and decided to have no such commitment at this time.

The question of whether colors should be introduced in the Transactions was raised. Since it will be costly and in view of the current financial status of the Society, it was judged not possible at this time.

The number of pages in each Transactions issue is a multiple of four. It was suggested that the extra pages be used, as available, to include information useful to Transactions readers, such as ISIT Calls for Papers. There were no objections to this proposal.

Paul Siegel proposed to investigate the cost of editorship as priority.

8. Nothing new was reported regarding Electronic Publications.

9. There was no report from the ad hoc committee on Education.

10. Tom Fuja presented the results of the questionnaire of ISIT'01. The purpose of this questionnaire was to provide feedback to the Board of Governors on how effectively the various Society activities are being carried out. A total of 63 people out of the 656 attendees of ISIT'01 filled this questionnaire, 61 of them being members of the Society. It was decided to publish the results of this questionnaire in one of the future Newsletters. In summary, the Transactions content was judged very good but the review process too long. The Newsletters received good support, with no consensus to move to a magazine format. 35 answers agreed that an 18-month schedule for ISIT's was more suitable. There was no push for more workshops. The technical level of ISIT was judged satisfactory, with no general backing for a publication of full length papers. Also, tutorials at ISIT received support. The Society website was recognized as useful and many used it. The Society membership fees were estimated too low, while that of IEEE too high.

Tom Cover raised the ambiguity about the rule of multiple submissions by a single author and suggested that it should not apply to advisors with different students. Dan Costello noted that the 12-month schedule of ISIT's should also help resolve this issue.

11. Society President, Joachim Hagenauer, presented the results of the Officer Elections:

(a) The 2002 President is Tom Fuja.

(b) The 2002 First Vice President is Han Vinck.

(c) The 2002 Second Vice President is Hideki Imai.

12. Stephen Wicker presented the Report on Symposia and Workshops. He confirmed that the 2002 Information Theory Workshop in Nepal was cancelled because of the current situation in this country.

12.1. A report on ISIT 2001 was made by Tom Fuja. There were 656 attendees and 350 papers. With respect to previous symposia, the reduction in number of papers was more important than the decrease in attendees, which was somehow expected by moving from an 18 to a 12 month schedule. A small surplus ($10,000-$15,000) is expected. He noted however that this surplus did not take into account the travel grants for European students which were supposedly covered by the ISIT'00 surplus. He mentioned that the organizers were very positive about some of the services provided by IEEE Conference Services (such as the banquet price), but more reserved about others (hotel rooms were quite expensive). Finally, he mentioned that the ISIT'01 website had been updated with the one-page summaries missing in the proceedings and at least a hundred photos.

12.2. Alex Grant presented the report for ITW 2001. There were 97 attendees (including 28 students) for 43 invited papers and 14 recent results presentations (out of 30 submissions). About one third of the participants were from Australia, closely followed by the USA. Participants from 12 other countries composed the last third of the attendees. A surplus of $2,500 is expected.

Dan Costello reminded the Board of the guidelines for workshop organizers which suggest a greater percentage of accepted papers for recent results, since these allow many participants without invited papers to attend the workshop. Alex Grant mentioned that the organizers were not aware of this policy (which has been forgotten over the years), and decided to give recent result speakers as much time as invited speakers rather than having people coming to Australia to deliver a five minute presentation.

12.3. It was reported that the organization of ISIT 2002 was going well. The Society loan was transferred in August to the conference account.

12.4. A proposal for a replacement workshop in 2002 was made by Tom Fuja. The location is Bangalore, India, a country where an increasing interest in information theory has been noticed. This workshop will be held in Fall 2002 with Tom Fuja as general co-chair, Prakash Narayan as technical program co-chair, Han Vinck as international committee co-chair. Each position will be completed with a local organizer. Vijay Bhargava will help with the local arrangements and Marc Fossorier will serve as treasurer. The Board approved this proposal and a loan of $5,000.

12.5. Joachim Hagenauer reported on ITG 2002 in Berlin. He mentioned that the organization was going well and that all invited speakers had accepted to come.

12.6. Robert Morelos-Zaragoza reported on the organization of ISIT 2003. He mentioned that an executive committee meeting had just been held in Tokyo on September 3 and updated the Board about the outcomes of this meeting. It was noted that the $550 registration fee was a little high (under the assumption that lunchs were not included) but on the

other hand, the average accommodation price was surprisingly low. The paper submission deadline has been scheduled to September 15, 2002.

12.7. Dan Costello presented a detailed proposal for ISIT 2004 to be held June 27 to July 2, 2004. The location is the Marriott hotel in downtown Chicago where an entire floor has been reserved for the symposium. The general co-chairs are Dan Costello and Bruce Hajek, the program co-chairs are Frank Kschischang and David Tse, the treasurer is Dilip Sarwate, the international liaison co-chairs are Raymond Yeung and Johannes Huber, and local arrangements will be handled by Mike Honig and Randall Berry. The registration fee was set to $450 and the 2004 hotel rate at $205, including tax (which corresponds to $155 at the current rate). The proposal was approved unanimously by the Board, along with a loan of $20,000.

12.8. A proposal for a 2003 Workshop in Paris, France was made by Joseph Boutros. The venue is the University of La Sorbonne and the accommodations will be made at the Novotel Hotel as well as nearby hotels in districts 1 to 6 in Paris. The date is April 2003. The general co-chairs are Joseph Boutros and Aaron Gulliver, the program co-chairs are Vahid Tarokh and Ezio Biglieri, the co-treasurers are Jean-Claude Bic and Danielle Childz, and the local organizers are Gerard Cohen and Gilles Zemor. Eight sessions to be held from Monday to Friday were proposed. This proposal was approved unanimously by the Board.

12.9. A proposal for ISIT 2005 in Adelaide, Australia was made by Alex Grant. This proposal was welcomed by the Board.

13. Han Vinck presented the Report from the Ad-hoc Committee on Membership Issues and the Membership and Chapters Committee. He mentioned that the Affiliate Membership Program has been set up and the information is now available on the Society website. This program is important as it allows participants to become IT Society members without first being an IEEE member.

14. Joachim Hagenauer led a discussion about publishing guidelines for ISIT organizers regarding the acceptance and rejection of submitted papers. Tony Ephremides stated that it is not a good idea to publish these, and mentioned that the higher rejection rate for ISIT'01 (40%) compared to that of other years (25%, 30% and 25% for the three last ISIT's, respectively) should not justify such guidelines. This opinion was shared by several Board members.

15. The Awards Subcommittee report was presented by Tom Fuja.

15.1. Joachim Hagenauer announced that Toby Berger was the 2002 Shannon Award recipient.

15.2. Tom Fuja announced that the first COMSOC/IT Joint Paper Award was shared by Xiadong Wang and Vincent Poor for their paper entitled "Iterative (Turbo) Soft Interference Cancellation and Decoding for Coded CDMA," which was published in the Transactions on Communications, vol. 47, no. 7, pp. 1046-1061, July 1999, and by David Tse and Stephen Hanly for their paper entitled "Linear Multiuser Receivers: Effective Interference, Effective Bandwidth and User Capacity," which was published in the Transactions on Information Theory, vol. 45, no. 2, pp. 641-657, March 1999.

The naming of this award was discussed, but it was decided not to pursue this idea until a later date.

15.3. Tom Fuja announced that the IT Society Paper Award was awarded to Emre Telatar for his paper "Capacity of Multi-Antenna Gaussian Channels," which appeared in the European Transactions on Telecommunications, vol. 10, no. 6, pp. 585-596.

The Board also discussed the formulation of the acknowledgement of Gerard Foschini's work in the wording of the award.

16. Joachim Hagenauer presented possible options for changes in the terms of office for officers of the IT Society. Our current practice for the officers is a five-year service period with one year as Second Vice-President, one year as First Vice-President, one year as President, one year as First Past-President and finally one year as Second Past-President. He pointed out that the main drawback of this system is the fact that only the President deals with the central IEEE (Technical Activity Board, Board of Directors) and consequently, due to almost no prior experience in doing so, it is difficult for him to control IEEE decisions or find time for initiatives and proposals. He also mentioned that many societies have a President who serves two years and pointed out that due to the recent changes in bylaws, the First Vice-President now has very limited duties. He recognized however that the five years of service mean attending 15 BoG meetings, four TAB meetings and possibly other committee meetings. Consequently it is difficult to ask people to serve longer. Based on these remarks, he suggested several models in which a two year presidency term is served in conjunction with a total service of five years as an officer.

Several Board members acknowledged that a one year presidency term is very short to learn the duties of the position. John Anderson mentioned that not only the President, but also other Society representatives could go to IEEE TAB meetings. Tom Fuja suggested that not only the President, but also the First Vice-President attend all IEEE meetings.

17. Joachim Hagenauer presented the five-year Society review he prepared for IEEE to the Board, and mentioned that Paul Siegel will prepare the Transactions review.

18. The next board meeting will take place in March 2002, in Princeton, USA. Tom Fuja, on behalf of the Board, thanked Joachim Hagenauer for serving as 2001 IT Society President.

19. The meeting was adjourned at 12:20 PM.

GOLOMB 'S PUZZLE COLUMN™

Some Combinatorial Questions — Solutions

1. Q. "There are 15 balls on a billiard table, bearing the numbers from 1 to 15. Any one of these can be selected to be the first ball to go off the table; but thereafter, each subsequent ball must have a number consecutive (up or down by 1) with that of a ball already off the table. How many possible sequences are there for the order in which all 15 balls go off the table?"

A. There are $2^{14} = 16,384$ possible sequences. There are several ways to prove this.

Proof #1. Suppose the first ball to go off the table bears the number $k+1$, $0 \le k \le 14$. Of the remaining 14 balls, k are lower-numbered and 14-k are higher-numbered than the first ball. The length-14 sequences of L's (for "lower") and H's (for "higher") with k L's and 14-k H's are in one-to-one correspondence with the order in which the remaining balls can go off the table, since an L indicates that the highest remaining of the lower-numbered balls must go next; and an H indicates that the lowest remaining of the higher-numbered balls must go next. Thus, the total number of permitted sequences is $\sum_{k=0}^{14} \binom{14}{k} = 2^{14}$.

Proof #2. Video-tape the game, and when it ends, replay the tape in reverse, where balls reappear on an initially empty table. The first ball to reappear must be numbered either 1 or 15, a binary choice, which leaves 14 consecutively numbered balls off the table. The next ball to reappear must be either the highest or lowest numbered of these 14, again a binary choice. This leaves 13 consecutively numbered balls off the table. The binary choices continue until only one ball is off the table, which reappears (without alternative) to restore the original situation on the table. Thus there are 2^{14} possible sequences.

For additional discussion and other proofs, see "The Fifteen Billiard Balls –A Case Study in Combinatorial Problem Solving", S.W. Golomb, *Mathematics Magazine*, vol. 58, no. 3, May, 1985, 156-159.

2. Q. "If n points are placed independently and at random on the unit circle, what is the probability that they will all lie on a semicircle (i.e. within an arc of length π, starting anywhere on the unit circle)? Generalize to the case of all lying on an arc of length α, $0 \le \alpha \le \pi$. What happens if $\pi < \alpha < 2\pi$?"

A. For $0 \le \alpha \le \pi$, the probability is $n\left(\dfrac{\alpha}{2\pi}\right)^{n-1}$, so that for the semicircle case, the probability is $\dfrac{n}{2^{n-1}}$.

Proof. Consider each of the n points as starting an arc of length α as we proceed clockwise around the unit circle. For a given starting point P, each of the remaining random points have the independent probability of $\dfrac{\alpha}{2\pi}$ of lying on the arc starting at P, for a combined probability of $\left(\dfrac{\alpha}{2\pi}\right)^{n-1}$; and provided that α does not exceed π, "success" for the arc starting at P_i is disjoint from "success" for the arc starting at P_j, for all $i \ne j$. Thus the disjoint event probabilities add, for a total of $n\left(\dfrac{\alpha}{2\pi}\right)^{n-1}$.

The case $\pi < \alpha < 2\pi$ no longer guarantees disjoint events for the n starting points, but this situation can be handled by an "inclusion/exclusion" argument. This solution has been discovered independently and published on several occasions. If any reader submits a particularly clever form of the solution, or a good reference, it will appear in a future issue.

3. Q. "Every permutation on n symbols $\{\alpha_1, \alpha_2, \dots \alpha_n\}$ can be written as a product of disjoint cycles whose cycle lengths sum to n. Let L_n be the expected length of the longest cycle in a random permutation on n symbols, and let $\lim_{n\to\infty} \dfrac{L_n}{n} = \lambda$. Let $P_n^{(1)}$ be the probability that the first symbol, a_1, is on the longest cycle of a random permutation on n symbols.

   a. Prove that the limit λ exists.

   b. Express $\lim_{n\to\infty} P_n^{(1)}$ in terms of λ.

A. a. We will show that $\lambda_n = \dfrac{L_n}{n+1}$ is monotonically increasing as n increases; and since λ_n is clearly bounded from above (by 1), it must have a limit as $n \to \infty$. Since $\dfrac{L_n}{n} = \left(\dfrac{n+1}{n}\right)\dfrac{L_n}{n+1}$ and $\lim_{n\to\infty}\left(\dfrac{n+1}{n}\right) = 1$, $\lim_{n\to\infty}\dfrac{L_n}{n} = \lambda$.

Proof (that $\dfrac{L_n}{n+1}$ increases monotonically as n increases).

If we adjoin an $(n+1)^{st}$ element to a random permutation on n symbols, it will have $\dfrac{L_n}{n+1}$ chances of landing on the "expected longest cycle" of length L_n (by the linearity of *expectation*; but in fact it will do a bit better, because there is sometimes a tie for "longest cycle," and landing on any of these increases the longest cycle by 1. Thus, $L_{n+1} \geq L_n + \dfrac{L_n}{n+1}$, $(n+1)L_{n+1} \geq (n+2)L_n$, and $\dfrac{L_{n+1}}{n+2} \geq \dfrac{L_n}{n+1}$.

b. $\lim\limits_{n \to \infty} P_n^{(1)} = \lambda$, because $\lambda_n = \dfrac{L_n}{n}$ is the expected fraction of the elements $\{a_1, a_2, \ldots, a_n\}$ which will lie on the longest cycle, and any specific element, such as a a_1, has this probability. Whether $P_n^{(1)} = \lambda_n$ is complicated by the issue of "what happens if two or more cycles are tied for longest?" This issue disappears in the limit: $\lim\limits_{n \to \infty} P_n^{(1)} = \lim\limits_{n \to \infty} \lambda_n = \lambda$.

Note: This is treated in Chapter VII of *Shift Register Sequences* by S.W. Golomb, Holden-Day, Inc., 1967; Second Revised Edition, Aegean Park Press, 1982; and also in "On the number of permutations on n objects with greatest cycle length k", by S.W. Golomb and P. Gaal, *Advances in Applied Mathematics*, vol. 20, 1998, pp. 98-107. The constant $\lambda = 0.62432965$ was named "Golomb's Constant" by Donald Knuth.

4. Q. "If n black beads and $n + 1$ white beads are placed on a string, and the ends of the string are joined to form a necklace, how many cyclically distinct necklaces can result?"

A. The answer is the Catalan Number $C_n = \dfrac{1}{n+1}\dbinom{2n}{n}$.

Proof. Clearly there are ways to form strings with the 2n + 1 beads. All 2n + 1 cyclic permutations of the beads are distinct as strings (since there is no common factor >1 of n and 2n + 1 which could allow a periodic substructure) so the number of cyclically distinct necklaces is $\dfrac{1}{2n+1}\dbinom{2n+1}{n} = \dfrac{(2n+1)!}{(2n+1)n!(n+1)!} = \dfrac{1}{n+1}\dbinom{2n}{n} = C_n.$

Note. This argument was used by David Singmaster to prove that C_n must be an integer for all $n \geq 0$.

Distinguished Lecture in Hong Kong

By Raymond W. Yeung

On January 8, 2002, the Information Theory Chapter in Hong Kong hosted a Distinguished Lecture delivered by Vijay K. Bhargava. The lecture was entitled "From Marconi to Wireless Internet: An Information Theoretic Perspective." In the lecture, Vijay first brought back the historical memory of Guglielmo Marconi transmitting the first trans-Atlantic radio signal from Cornwall, England to Newfoundland, Canada, on December 12, 1901. He then gave an account of the contribution of information theory in modern communication systems, upon which the Wireless Internet is built. The lecture was attended by over 40 attendants, including students and professors in the local IT community. For those who have missed the lecture, a summary of the lecture and pictures of the event can be found at http://personal.ie.cuhk.edu.hk/~ithkc.

Vijay Bhargava, Khaled Letaief, and Li Ping (on the left) after a round of drinks.

New Books

Modulation & Coding for Wireless Communications

by Alister Burr. Prentice Hall, 2001, 384 pp., US$45.99, ISBN 0201-39857-5.

Contents: Introduction to Modulation and Coding; Principles of Linear Modulation; Modulation for Non-Linear Systems; Modem Design; Principles of FEC Coding; Cyclic Block Codes; Convolutional Codes; Coded Modulation; Modulation and Coding on Multipath Channels; OFDM; Turbo Codes.

Digital Communications, 2nd Ed.

by Ian Glover and Peter Grant. Prentice Hall, 2002, 752 pp., US$45.99, ISBN 0130-89399-4.

Contents: Digital Communications Overview; Signals and Systems Theory; Periodic and Transient Signals; Random Signals and Noise; Linear Systems; Sampling, Multiplexing, and PCM; Bandbased Transmission and Line Coding; Decision Theory; Optimum Filtering for Transmission and Reception; Information Theory and Source Coding; Error Control Coding; Bandpass Modulation of a Carrier Signal; System Noise and Communication Line Budgets; Communication Systems Simulations; Fixed Point Microwave Communications; Mobile and Cellar Radio; Video Transmission and Storage; Queuing Theory for Packet Networks; Network Topology and Protocols; Public Networks and the Integrated Services Digital Network (ISDN).

Communication Systems Engineering, 2nd Ed.

by John G. Proakis and Masoud Salehi. Prentice Hall, 2002, 886 pp., US$85.33, ISBN 0-13-061793-8.

Contents: Introduction; Frequency Domain Analysis of Signals and Systems; Analog Signal Transmission and Reception; Random Processes; Effect of Noise on Analog Communication Systems; Information Sources and Source Coding; Digital Transmission through the Additive White Gaussian Noise Channel; Digital Transmission through Bandlimited AWGN Channels; Channel Capacity and Coding; Wireless Communications.

Introduction to Digital Communications

by M.B. Pursley. Prentice Hall, 2002, US$95, ISBN 0-201-18493-1.

Contents: Introduction; Probability and Random Variables/Review and Notation; Introduction to Random Processes; Linear Filtering of Random Processes; Frequency-Domain Analysis of Random Processes in Linear

Systems; Baseband Transmission of Binary Data; Coherent Communications; Noncoherent Communications; Intersymbol Interference; Spread-Spectrum Communication Systems. Appendix A: The Hamming Codes. Appendix B: The Reed Solomon Codes.

Digital Communications, 2nd Ed.

by Bernard Sklar. Prentice Hall, 2001, 1104 pp., US$89, ISBN 0-13-084788-7.

Contents: Signals and Spectra; Formatting and Baseband Modulatino; Baseband Demodulation/Detection; Bandpass Modulation and Demodulation/Detection; Communications Link Analysis; Channel Coding: Part1; Channel Coding: Part II; Channel Coding: Part III; Modulation and Coding Trade-offs; Synchronization (Maurice A. King, Jr.); Multiplexing and Multiple Access; Spread Spectrum Techniques; Source Coding (Fredric J. Harris); Encryption and Decryption; Fading Channel.

Probability and Random Processes with Applications to Signal Processing, 3rd Ed.

by Henry Stark and John W. Wood. Prentice Hall, 2002, 600 pp., US$99.67, ISBN 0-13-020071-9.

Contents: Introduction to Probability; Random Variables; Functions of Random Variables; Averages; Vector Random Variables; Estimation and Detection Theory I; Random Sequences; Random Processes; Mean-Square Calculus; Stationary Processes and Sequences; Estimation Theory II.

Wireless Communications, 2nd Ed.

by Theodore Rappaport. Prentice Hall, 2002, US$89, ISBN 0-13-042232-0.

Contents: Introduction to Wireless Communications; Modern Wireless Systems and Third Generation 3G Technologies; Propagation Path Loss; Fading and Multipath Propagation; Modulation Techniques for Wireless Communications; Diversity, Coding, and Equalization; Speech Coding for Wireless Communications; Multiple Access; Wireless Networking; Wireless Standards.

Wireless Communications and Networks

by William Stallings. Prentice Hall, 2002, 592 pp., US$65, ISBN 0-13-040864-6.

Contents: Introduction; Transmission Fundamentals; Communication Networks; Protocols and the TCP/IP Suite; Antennas and Propagation; Signal Encoding Techniques; Spread Spectrum; Coding and Error Control; Satellite Com-

munications; Cellular Transmission Principles; Cordless Systems and Wireless Local Loop; Mobile IP and Wireless Access Protocol; Wireless LAN Technology; IEEE 802.11 Wireless LAN Standard; Bluetooth.

Linear Estimation

by Thomas Kailath, Ali H. Sayed, and Babak Hassibi. Prentice Hall, 2000, 854 pp., US$105, ISBN 0-13-022464-2.

Contents: Overview; Deterministic Least-Square Problems; Stochastic Least-Square Problems; The Innovation Process; State-Space Models; Innovations; Wiener-Kalman Theory in the Vector Space; The Kalman Filter; Smoothed Estimators; Fast Algorithms; Array Algorithms; Fast Array Algorithms; Asymptotic Behavior; Duality and Equivalence in Estimation and Control; Continuous-Time State-Space Estimation; A Scattering Theory Approach.

A First Course in Information Theory

by Raymond W. Yeung. Kluwer Academic/Plenum Publishers, 2002, 434 pp., US$125 (List Price), US$95 (6 copies or more for course adoption), ISBN 0-306-46791-7 (with CD-ROM).

Contents: Introduction; Information Measures; Zero-Error Data Compression; Weak Typicality; Strong Typicality; The I-Measures; Markov Structures; Channel Capacity; Rate Distortion Theory; The Blahut-Arimoto Algorithms; Single-Source Network Coding; Information Inequalities; Shannon-Type Inequalities; Beyond Shannon-Type Inequalities; Multi-Source Network Coding; Entropy and Groups.

JPEG2000: Image Compression, Fundamentals, Standards and Practice

by David S. Taubman and Michael W. Marcellin (with CD-ROM). Kluwer, 2001, 800 pp., US$125, ISBN 0-7923-7915-X.

Contents: Fundamental Concepts; The JPEG2000 Standard; Working with JPEG2000; Other Standards.

Average Case Analysis of Algorithms on Sequences

by Wojciech Szpankowski. Wiley, 2001, 584 pp., US$99.95, ISBN 0-471-24063-X.

Contents: Data Structures and Algorithms on Words; Probabilistic and Analytical Models; Inclusion-Exclusion Principle; The First and Second Moment Methods; Subadditive Ergodic Theorem and Large Deviations; Elements of Information Theory; Generating Functions; Complex Asymptotic Methods; Mellin Transform and Its Applications; Analytic Poissonization and Depoissonization.

Blind Equalization and Identification

by Zhi Ding and Ye (Geoffrey) Li. Marcel Dekker, 2001, 409 pp., US$165 (list price) US$69.75 (5 or more copies for classroom use), ISBN 0-8247-0479-7.

Contents: Introduction; Basic Concepts and Approaches; Single Input Single Output Blind Equalization Algorithms; Local Convergence Analysis of SISO Blind Equalizers; Linear Multichannel Blind Identification Based on Second Order Statistics; Frequency Domain Approach to Single User Channel Identification; Adaptive Multichannel Equalization; Selected Topics in Multichannel Equalization; Scanning the Literature.

Introduction to Algorithms, 2nd Ed.

by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. MIT Press, 2001, 1145 pp., US$49.95, ISBN 0-262-53196-8.

Contents: Foundations; Sorting and Order Statistics; Data Structures; Advanced Design and Analysis Techniques; Advanced Data Structures; Graph Algorithms; Selected Topics; Appendix: Mathematical Background.

Multiuser Detection in CDMA Mobile Terminals

by Piero Castoldi. Artech House, 2002, 250 pp., £61, ISBN 1-58053-330-2.

Contents: Introduction and CDMA Models; Single-User Detection; Linear Multiuser Detection; Structured vs.\ Unstructured Linear Detection and Interference Mitigation; Adaptive Linear Multiuser Detection; Performance of Linear Multiuser Detection; Non-Linear Multiuser Detection; Synchronization Techniques; Third Generation Mobile Radio System; The ASI-CNIT Communication System.

Electronic Payment Systems for E-Commerce, 2nd Ed.

by Donal O'Mahony, Michael Pierce, and Hitesh Tewari, Artech House, 2001, 368 pp., £52, ISBN 1-58053-268-3.

Contents: Motivation for Electronic Payment; Characteristics of Current Payment Systems; Cryptographic Techniques; Credit Card Based Systems; Account Transfers and Electronic Checks; Electronic Cash Payment Systems; Micropayment Systems; Prospects for the Future.

Advanced Theory of Signal Detection

by Iickho Song. Springer, 2002, 395 pp. 116 figs., 57 tabs, ISBN 3-540-43064-4.

Simulation and Software Radio for Mobile Communications,

by Hiroshi Harada and Ramjee Prasad. Artech House, 2002, 414 pp., £66, ISBN 1-58053-044-3.

Multipath Phenomena in Cellular Networks

by Nathan Blaunstein and Jorgen Bach Andersen. Artech House, 2002, 292 pp., £69, ISBN 1-58053-185-7.

Fundamentals of Network Security

by John E. Canavan. Artech House, 2001, 350pp., £51, ISBN 1-58053-176-8.

Principles of Communication: Systems, Modulation, and Noise, 5th Ed.

by Rodger E. Ziemer. Wiley, 2001, 752 pp., US$75.35, ISBN 0471392537.

Modulation, Detection and Coding

by Tommy Oberg. Wiley, 2001, 552 pp., US$43.95, ISBN 0471497665.

Data Communications and Networks: An Engineering Approach

by David Harle and James Irvine. Wiley, 2001, 300 pp., US$47.95, ISBN 0471808725.

Error Control Coding: From Theory to Practice

by Peter Sweeney. Wiley, 2002, 300 pp., US$47.95, ISBN 047084356X.

Mobile Communication Systems

by Krzystof Wesolowski. Wiley, 2001, 352 pp., US$71.95, ISBN 0471498378.

Wireless Network Evolution: 2G to 3G

by Vijay K. Garg. Prentice Hall, 2002, 600 pp., US$79, ISBN 0-13-028077-1.

Principles of Wireless Networks

by Kaveh Pahlavan and Prashant Krishnamurthy. Prentice Hall, 2002, 600 pp., US$105.33, ISBN 0-13-093003-2.

Handbook of Markov Decision Processes: Methods and Applications

edited by Eugene A. Feinberg and Adam Schwartz. Kluwer, 2002, 565 pp., US$175, ISBN 0792374592.

Design of Digital Video Coding Systems: A Complete Compressed Domain Approach

by Jie Chen, Ut-Va Kov, and K. J. Ray Liu. Marcel Dekker, 2001, 488 pp., US$165 (list price) US$59.75 (5 or more copies for classroom use), ISBN 0-8247-0656-0.

Special Issue of the IEEE Transactions on Information Theory on Space-Time Transmission, Reception, Coding and Signal Design

The IEEE Transactions on Information Theory is pleased to announce a special issue on the broad topic of space-time modulation, coding, signal design and its applications. Original theoretical and practical treatments of this emerging area are solicited. Tutorial papers that summarize a research sub-area and highlight outstanding research problems will also be considered.

It has been long known that multiple antennas can be used at a transmitter or receiver to boost system performance either through beamforming (line-of-sight environment) or diversity (fading environment). Recent information-theoretic and coding advances have renewed interest in the use of multiple-antennas because it is now known that wireless system capacity can be greatly improved without extra power or bandwidth, especially in a fading environment. Many so called space-time or multiple-input multiple-output (MIMO) techniques have emerged as candidates for realizing this high system capacity, and some of these techniques have recently been incorporated into third-generation cellular standards.

Further enriching the area are recent results showing that large gains in a multi-user environment are possible when the transmitter knows the channel, renewing interest in co-ordinated precoding ("dirty-paper" methods) for known interference. The general area of space-time or MIMO signal design and coding is still very young and there are many connected topics that invite research:

- MIMO Shannon theory, capacity, and random matrix theory
- Known-channel (at receiver) methods, orthogonal codes, linear codes, trellis codes
- Unknown-channel methods, differential methods
- Multi-user MIMO information theory
- Multi-user MIMO coding (OFDM, CDMA, TDMA, "dirty paper")
- Matrix signal design
- Complexity/performance tradeoffs in space-time coding and processing
- Channel estimation, tracking, and equalization
- High-rate and layered methods
- Turbo and iterative techniques

Prospective authors should follow the regular guidelines of the Transactions except that electronic copies (Postscript or pdf files) should be submitted to Kathy Cwikla, Lucent Technologies, kc@lucent.com. In case electronic copies are not available, hard copies should be sent to Kathy at 600 Mountain Avenue, Rm. 2C-364, Murray Hill, NJ 07974.

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SCHEDULE

Deadline for submission: October 30, 2002
Final selection of papers to be published: May 2003
Publication: October 2003

FORTIETH ANNUAL ALLERTON CONFERENCE

ON COMMUNICATION, CONTROL, AND COMPUTING

October 2 – 4, 2002

The Fortieth Annual Allerton Conference on Communication, Control, and Computing will be held from Wednesday, October 2 through Friday, October 4, 2002, 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, information theory and error-correcting codes, source coding and data compression, multiple-access communications, 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.

This year the plenary lecture will be delivered by *Professor Umesh Vazirani* of the University of California, Berkeley. It is scheduled for Friday, October 5, and is entitled *"Quantum Algorithms and Complexity – An Information Theory Perspective."*

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 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.

Three copies of the manuscript should be mailed to 40*th Annual Allerton Conference, Coordinated Science Laboratory, University of Illinois, 1308 West Main Street, Urbana, Illinois 61801-2307, USA*, in time to be received by **July 5, 2002.** Submissions by e-mail or fax **will not** be accepted.

Submissions should specify the name, e-mail address, and postal address of the author who is to receive all subsequent correspondence. Authors will be notified of acceptance via e-mail by August 9, 2002, at which time they will also be sent detailed instructions for the preparation of their papers for the Proceedings. Electronic and camera-ready versions of accepted papers will be due the last day of the Conference.

Conference Co-Chairs: Petros G. Voulgaris and R. Srikant

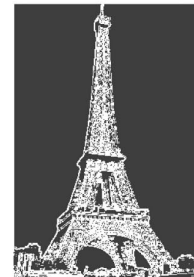Email: *allerton@csl.uiuc.edu*   URL: http://www.comm.csl.uiuc.edu/allerton

COORDINATED SCIENCE LABORATORY AND THE DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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CALL FOR PAPERS

2003 IEEE Information Theory Workshop

La Sorbonne, Paris, France
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Giuseppe Caire
Anne Canteaut
Jean-Yves Chouinard
Antoine Chouly
David Forney
Marc Fossorier
Thomas Fuja
Costas Georghiades
Joachim Hagenauer
Nicolas Sendrier
Shlomo Shamai
Paul Siegel
Patrick Solé
Giorgio Taricco
Rüdiger Urbanke
Mahesh Varanasi
Alexander Vardy
Sergio Verdú
Sandrine Vialle
Emanuele Viterbo

Finance:
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Michel Bon

Local Arrangements:
Gérard Cohen
Gilles Zémor

Web and Publicity:
Marie Baquero
Philippe Ciblat

Secretariat:
Laurence Berlandier
Danielle Childz
Anne Dupré

The 2003 IEEE Information Theory Workshop (ITW'2003) will be held at Louis Liard amphitheater, La Sorbonne University, Paris, France, from Sunday, March 30, through Friday, April 4, 2003. Invited papers and unpublished contributions in the following areas are solicited:

Algebraic geometry codes	Graph codes and iterative decoding
Code division multiple access	Joint source-channel coding
Coding for multiple antennas	Lattice theory and applications
Cryptography and cryptanalysis	Soft decision decoding algorithms

Important Dates
- Paper submission deadline: October 30, 2002
- Notification of acceptance: December 15, 2002
- Camera-ready papers due: January 31, 2003

All accepted and invited papers will be allowed twenty minutes for presentation. Four pages per paper will be printed in the workshop proceedings in double-column format. Authors are encouraged to submit electronic versions of their manuscript by following the guidelines on the workshop web site. For those unable to submit electronically, *two copies* of the paper should be mailed to

Mrs Danielle Childz
ITW'2003 Paper Submission
ENST/Comelec
46 Rue Barrault, 75013 Paris, France

Detailed information on the technical program, final submission paper style, social events, accomodations and travel arrangements are available at the workshop web site

http://itw2003.enst.fr

Inquiries on general matters related to the workshop should be addressed to

Prof. Joseph Boutros
Communications and Electronics Department
Ecole Nationale Supérieure des Télécommunications
46 Rue Barrault, 75013 Paris, France
Email: **itw2003@enst.fr**
Phone: +33 1 4581 7678
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Announcement and Call for Papers

2002 IEEE Information Theory Workshop
Bangalore, India, October 20-25, 2002.

General Co-Chairs

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Treasurer

Marc Fossorier
University of Hawaii
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Workshop Announcement

The 2002 IEEE Information Theory Workshop will be held at the Windsor Manor Sheraton Hotel, Bangalore, India. The workshop will begin on Sunday, October 20, 2002 and end on Friday, October 25, 2002.

Program Information

Invited Papers and Plenaries

There will be seven half-day sessions featuring invited speakers; these sessions will be organized around the seven topics listed below.

- Communication networks
- Channel coding and modulation
- Shannon theory
- Information theory and statistics
- Space-time coding and processing
- Source coding
- Cryptography

There will also be plenary talks by G. David Forney and Thomas Kailath.

Contributed Papers

There will be slots for approximately fifteen contributed papers in addition to the invited papers described above; therefore, papers presenting new results in the above areas are solicited. The submission deadline is May 1, 2002. Any submissions that cannot be accommodated as a contributed paper will be considered as a "recent result" (see below) unless the authors indicate otherwise.

Recent Results Sessions

Papers presenting recent results on any topic of interest to the information theory community are solicited. One-page summaries of these papers will be published in the workshop proceedings, provided they are submitted by July 1, 2002; however, on-site recent result contributions will also be accepted.

Further Inquiries

Further information including submission guidelines and contact information will be available at the ITW 2002 website:

http://www.iisc.ernet.in/ieee-itw2002

CALL FOR PAPERS

ISITA2002
2002 International Symposium on Information Theory and Its Applications
October 7-11, 2002
Xi'an International Conference Center, Xi'an, the People's Republic of China

2002 International Symposium on Information Theory and Its Applications (ISITA 2002) will be held at Xi'an International Conference Center, Xi'an, the People's Republic of China on October 7-11, 2002. This symposium is organized by the Institute of Information Theory and Its Applications and Institute of Artificial Intelligence and Robotics, Xi'an Jiaotong University. Xi'an, the capital of the Silk-road, is situated in the heart of China. It is a city full of historic sights represented by the Artistic Reproduction of the Battle Formation in Qin Dynasty.

ISITA2002 will be held with the technical co-sponsorship of the IEEE Information Theory Society and the Institution of Electronics, Information and Communication Engineers (IEICE)

The Symposium will include regular technical sessions, plenary sessions and special sessions.

The objective of ISITA is to provide a forum for researchers and technologists to present new ideas and contributions related to information theory and its applications.

The topics of interest include but not are limited to the following:

Error Control Coding	Coded Modulation	Communication Systems
Optical Communications	Detection and Estimation	Mobile Communications
Spread Spectrum Systems	Pattern Recognition	Signal Processing
Speech/Image Processing	Source Coding	Shannon Theory
Data Networks	Stochastic Processes	Distributed Information Networks
Neural Networks	Data Security	Cryptography
Chaos and Fractals	VLSI Communications	

ISITA 2002 will be held in conjunction with International Symposium on Nonlinear Theory and its Applications (NOLTA2002). Crossfertilization of both fields is strongly encouraged.

For submission, an extended summary (500-1000 words) including title, topic, authors' names, affiliations and e-mail address are requested. Summary must be submitted electronically in PDF or postscript format. **ONLY ELECTRONIC SUBMISSIONS WILL BE ACCEPTED**. No hard copies will be accepted.

All summaries will be peer reviewed by the ISITA2002 Technical Program Committee. Authors are expected to present their paper at the Symposium. **AT LEAST ONE AUTHOR OF EACH PAPER MUST REGISTER FOR THE SYMPOSIUM FOR PAPERS TO BE INCLUDED IN THE PROGRAM**.

For further information please visit the symposium official web site,

http://ISITA2002.katayama.nuee.nagoya-u.ac.jp/

or e-mail to,

isita2002@katayama.nuee.nagoya-u.ac.jp

Important Dates:

Submission of 1-page summaries:	May 1 - **June 2**, 2002
(*ELECTRONIC SUBMISSIONS ONLY*)	
Deadline for special session proposal:	June 2, 2002
Notification of acceptance:	July 1, 2002
Deadline for 4-page camera-ready papers:	July 31, 2002
Deadline for author registration:	July 31, 2002

International Advisory Committee Chair
Hideki Imai (Tokyo Univ.)

Symposium General Chairs
Nanning Zheng (Xi'an Jiaotong Univ.), Shinsaku Mori (Nippon Inst. of Tech.), Akira Ogawa (Meijo Univ.)

7th International OFDM-Workshop

September 10th and 11th, 2002
Hamburg, Germany

Notification 2002

DearFriends,

The discussions focused on the next generation of mobile communication systems will increase the interest in flexible and adaptive transmission techniques. The OFDM modulation scheme offers these properties at a comparably low degree of computational complexity and has therefore gained a lot of attention during the last years.

As a platform for discussions and exchange among researcher active in this field we plan to continue the international workshop on communication systems related to multi-carrier communications techniques.

Today we would like to invite you to next year's event, the 7th International OFDM-Workshop in Hamburg, Germany on September 10th and 11th, 2002 at the Hotel Hafen Hamburg.

Information concerning InOWo'02 will be published in time on the workshop web site

http://ofdm.tu-harburg.de

Deadlines

Deadline for Extended Abstracts:	June 2nd, 2002
Notification of Acceptance:	July 5th, 2002
Camera-Ready Papers Due:	August 11th, 2002
Early Registration:	August 11th, 2002

I am looking forward to seeing you in Hamburg next year.

Sincerely yours,

Hermann Rohling

Conference Chair

Prof. Hermann Rohling
Department of Telecommunications
Technical University Hamburg-Harburg
Eißendorfer Straße 40
21073 Hamburg, Germany
Phone: +49 (040) 42878–3028

OFDM-Workshop Secretariat

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Yukitoshi Sanada

Publications:
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Publicity:
Toru Fujiwara
Masayuki Hattori
Atsuhiro Yamagishi
Nobukazu Doi
Shinichi Kawamura

First Call for Papers

2003 IEEE International Symposium on Information Theory

**Pacifico Yokohama, Yokohama, Japan
June 29 － July 4, 2003**

The 2003 IEEE International Symposium on Information Theory will be held at Pacifico Yokohama, Yokohama, Japan, (http://www.pacifico.co.jp/) from Sunday, June 29, through Friday, July 4, 2003.

Previously unpublished contributions to the following areas are solicited

- Coded modulation
- Coding theory and practice
- Communication complexity
- Communication systems
- Cryptology and data security
- Data compression
- Data networks
- Detection and estimation

- Information theory and statistics
- Multiuser detection
- Multiuser information theory
- Pattern recognition and learning
- Quantum information processing
- Shannon theory
- Signal processing
- Source coding

Papers will be reviewed on the basis of an extended abstract (not exceeding six pages) of sufficient detail to permit reasonable evaluation. The deadline for submission is **November 1, 2002**, with notification of decisions by **March 1, 2003**. In view of the large number of submissions expected, multiple submissions by the same author will receive especially stringent scrutiny. All accepted papers will be allowed twenty minutes for presentation, and one-page abstracts will be printed in the conference proceedings. Authors are strongly encouraged to submit electronic versions of their summaries in the form of PDF files by following the guidelines, which will be posted in **June on the TPC web pages** linked with the symposium web site. Anybody having trouble in submitting PDF files should make contact with

Dr. **Kazuhiko Yamaguchi**
ISIT 2003 Paper Submission
The University of Electro-Communications
Department of Information and Communication Engineering
Chofugaoka 1-5-1, Chofu-shi, Tokyo, 182-8585 JAPAN
Email: yama@ice.uec.ac.jp

Detailed information on the technical program, special events, accommodations, travel arrangements, excursions and applications for travel grants will be included in subsequent mailings, and will be posted at Symposium web site:

http://www.isit2003.org/

Inquiries on general matters related to the symposium should be addressed to

Ryuji Kohno, Professor, Division Head

Yokohama National University, Graduate School of Engineering
Division of Physics, Electrical and Computer Engineering
79-5 Tokiwadai, Hodogaya-ku, Yokohama, 240-8501 JAPAN
Email: isit2003@kohnolab.dnj.ynu.ac.jp
Tel:+81-45-339-4116, Fax(G4):+81-45-338-1157

Conference Calendar

DATE	CONFERENCE	LOCATION	CONTACT/INFORMATION	DUE DATE
June 23-27, 2002	**INFOCOM 2002**	New York Hilton New York, NY	Dr. Parviz Kermani IBM-Watson Research Center 30 Saw Mill River Road Hawthorne, NY 10532 (+1 914 784 7769 +1 914 784 6205 (Fax) parviz@us.ibm.com http://www.ieee-infocom.org/2002/	July 31, 2001
June 30- July 5, 2002	**2002 IEEE International Symposium on Information Theory**	Palais de Beaulieu, Lausanne, Switerland	Prof. Bixio Rimoldi Communication Systems Department Swiss Federal Institute of Technology CH-1015 Lausanne, Switzerland E-mail: isit02chair@epfl.ch Phone: +41 21 693 76 62 Fax: +41 21 693 43 12	Sept. 30, 2001
October 2-4, 2002	**40th Annual Allerton Conference**	Allerton House University of Illinois at Urbana-Champaign	Petros G. Voulgaris and R. Srikant 40th Annual Allerton Conference Coodrdinated Science Laboratory University of Illinois 1308 West Main Street email: allerton@csl.uiuc.edu Urbana, IL 61801-2307 http://www.comm.csl.uiuc.edu/allerton	July 5, 2002
October 7-11, 2002	**2002 International Symposium on Information Theory and Its Applications (ISITA 2002)**	Xi'an International Conference Center, Xi'an, PRC	Kouichi Yamazaki isita2002@katayama.nuee.nagoya-u.ac.jp http://ISITA2002.katayama.nuee.nagoya-u.ac.jp	June, 2, 2002
October 20-25, 2002	**2002 IEEE Information Theory Workshop**	Windsor Manor Sheraton Hotel Bangalore, India	See CFP in this issue.	July 1, 2002
November 18-22, 2002	**GLOBECOM 2002 - 2002 IEEE Global Telecommunications Conference**	Taipei International Conventional Center, Taipei, Taiwan	Mr. Douglas S. J. Hsiao 12, Lane 551 Min-Tsu Road Sec. 5, Yang-Mei, Taoyuan 326 TAIWAN +886 3 424 5210 +886 3 424 4168 (Fax) sjhsiao@chttl.com.tw	TBA
December 1-5, 2003	**GLOBECOM 2003**	San Francisco Marriott San Francisco, CA	Ms. Patricia Dyett IEEE Communications Society 305 E. 47th St., 9th Floor New York, NY 10017 +1 212 705 8999 (Fax) +1 212 705 8943 GLO2003C@comsoc.org	

Conference Calendar

DATE	CONFERENCE	LOCATION	CONTACT/INFORMATION	DUE DATE
March 31- April 4, 2003	**2003 IEEE Information Theory Workshop**	Louis Liard Room of La Sorbonne Paris, France	See CFP in this issue. http://www.comelec.enst.fr/ itw2003/index.html	October 30, 2002
May 18 – 21 2003	**2003 Canadian Workshop on Information Theory**	Waterloo, Ontario Canada	http://www.multicom.uwaterloo. ca/cwit2003	January 7, 2003
June 29 - July 4, 2003	**2003 IEEE Information Theory Symposium**	Pacifico Yokohama, Yokohama, Japan	See CFP in this issue. Prof. Ryuji Kohno Yokohama National University Graduate School of Engineering Division of Physics, Electrical and Computer Engineering 79-5 Tokiwadai, Hodogaya-ku Yokohama, 240-8501 JAPAN 45-339-4116 45-338-1157(fax) isit2003@kohnolab.dnj.ynu.ac.jp http://www.isit2003.org	Nov. 1, 2002
June 27 - July 2, 2004	**2004 IEEE Information Theory Symposium**	Chicago, Illinois, USA	http://www.comm.csl.uiuc.edu/ isit2004/	TBA

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