IEEE Information Theory Society Newsletter

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Lloyd Welch Named 2003 Shannon Award Winner

Tom Fuja

Lloyd Welch was announced as the recipient of the 2003 Claude E. Shannon Award at the conclusion of the banquet held at the International Symposium on Information Theory on July 4, 2002 at the Olympic Museum in Lausanne, Switzerland.

Lloyd Welch, 2003 Shannon Award recipient.

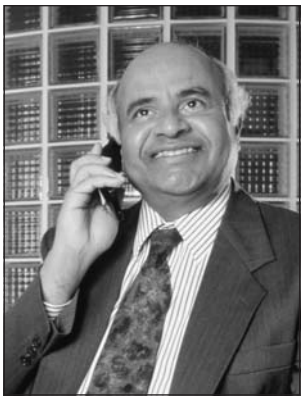
Dr. Welch is professor emeritus in the Electrical Engineering Department at the University of Southern California. His research career has spanned more than forty years and has had a profound impact on digital communications, coding theory, and signal processing. The "Baum-Welch algorithm" for detecting and predicting the behavior of hidden Markov models has found widespread use in a variety of disciplines - most noticeably as one of the "engines" that powers the turbo decoding of parallel concatenated codes. Dr. Welch has also established fundamental bounds on the cross-correlation values of a set of signals (the "Welch Bound") as well as the tightest known upper bound on the rate of an error control code (the "JPL bound", of which Welch is a co-author).

The Shannon Award is the highest honor bestowed by the IEEE Information Theory Society. It is given for "consistent and profound contributions to the field of information theory." Dr. Welch will be the 23rd recipient of the award, which was initiated with the selection of Claude Shannon himself in 1973.

As the 2003 Shannon Award recipient, Dr. Welch will present the Shannon Lecture at the 2003 International Symposium on Information Theory, to be held June 29 - July 4 in Yokohama, Japan.

Vijay K. Bhargava Awarded the 2002 Graduate Teaching Award

Professor Vijay K. Bhargava, a long time member and former president of the IEEE Information Theory Society, was awarded the 2002 IEEE Graduate Teaching Award at the 2002 International Symposium on Information Theory (ISIT), held June 30-July 5 in Lausanne, Switzerland. Bhargava was cited "*For excellence in graduate teaching, curriculum development, and inspirational research guidance of graduate students in the area of wireless communications*."



Vijay K. Bhargava

Born in India in 1948, Bhargava earned B.Sc., M.Sc., and Ph.D. degrees at Queen's University, Kingston, Canada. He credits his Ph.D. examiner, Professor Ian F. Blake of the University of Toronto for mentorship and for introducing him to another one of his mentors, Gus Solomon, in 1981. Professor Bhargava joined the University of Victoria in 1984, and helped develop and nurture the graduate program, including regulations and curricula, of the newly established Department of Electrical and Computer Engineering. During Bhargava's 28-year career, he has supervised 17 Ph.D. theses and 35 M.S. theses. Seven of his graduate students are now faculty members at Canadian and US universities. Several have gone on to become researchers and leaders in industry and

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From the Editor

Lance C. Pérez

This issue of the IEEE Information Theory Society Newsletter is replete with announcements of awards given to members of the Information Theory Society. This includes the second year in a row in which a Society member has been awarded the IEEE Graduate Teaching Award. Please read the President's Column for some insightful commentary on this two year streak.

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
December 2002	October 11, 2002
March 2003	January 15, 2003

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

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Sincerely,
Lance C. Pérez

IEEE

Information Theory Society Newsletter

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Vijay K. Bhargava Awarded the 2002 Graduate Teaching Award

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government agencies. He enjoys being with students, and takes genuine interest in their program and in creating an outstanding learning environment.

A Fellow of the IEEE, the Royal Society of Canada, the Canadian Academy of Engineering, and the Engineering Institute of Canada, Dr. Bhargava has received numerous awards, including the IEEE's Haradan Pratt Award, RAB Larry K. Wilson Transnational Award, and Canada McNaughton Gold Medal, as well as the Science council of BC Gold Medal and the EIC John B. Sterling Medal. A Fellow of the British Columbia Advanced System Institute, he is also a Distinguished Speaker for the IEEE Communications Society and the IEEE Information Theory Society. He has served the IEEE in a number of roles, and this year is a board-nominated candidate for the Office of IEEE President-Elect.

Raymond Findlay, President of the IEEE, was present at the ISIT Awards Luncheon to make the Award. Established in 1990, the IEEE Graduate Teaching Award honors inspirational teaching of graduate students in electrical and electronics engineering and related disciplines. It is sponsored by the IEEE Foundation and consists of a bronze medal, certificate and honorarium.

Muriel Médard Wins Kirchmayer Award

Muriel Médard was presented with the IEEE Leon K. Kirchmayer Prize Paper Award at the awards luncheon held at the 2002 International Symposium on Information Theory on July 2, 2002 in Lausanne, Switzerland.

The Kirchmayer Prize is presented by the IEEE Board of Directors for the most outstanding paper by an author under 30 years of age at the date of submission, published anywhere in any IEEE publication between 1 January and 31 December of the preceeding year. Dr. Médard received her award for the paper, "The Effect Upon Channel Capacity in Wireless Communications of Perfect and Imperfect Knowledge of the Channel," published in the May 2000 issue of IEEE Transactions on Information Theory.

Muriel Médard, winner of the IEEE Kirchmayer Prize.

Muriel Médard is an Assistant Professor in the Department of Electrical Engineering and Computer Science at the Massachussetts Institute of Technology, and she is affiliated with the Laboratory for Information and Decision Systems (LIDS). Her research interests include high-speed access networks, the wireless/optical interface, and wideband wireless channels.

Dr. Médard was presented her award in Lausanne by IEEE President Raymond Findlay.

2002 Prize Paper Award Announced

Tom Fuja

The recipients of the 2002 Information Theory Society Paper Award were announced at the awards luncheon held July 4, 2002, in conjunction with the International Symposium on Information Theory in Lausanne, Switzerland.

The 2002 Paper Award will be shared by two sets of authors for two different papers:

- "The Capacity of Low-Density Parity Check Codes Under Message-Passing Decoding," by Thomas Richardson and Rudiger Urbanke.
- "Improved Low-Density Parity-Check Codes Using Irregular Graphs," by Michael Luby, Michael Mitzenmacher, M. Amin Shokrollahi, and Daniel Spielman.

Both papers appeared in the February 2001 issue of IEEE Transactions on Information Theory - a "Special Issue on Codes and Graphs and Iterative Decoding."

The Information Theory Society Paper Award is given annually for an outstanding publication in the fields of interest to the Society appearing anywhere during the preceding two calendar years. The presentation of the award will be made at the 2003 International Symposium on Information Theory, to be held June 29-July 4 in Yokohama, Japan.

This is only the third time in the 40-year history of the award that it is being given to two papers with two different sets of authors. The first such occurrence took place in 1974, when two papers describing an algorithm for computing the capacity of an arbitrary DMC were so awarded - one paper by Richard Blahut, the other by Suguru Arimoto. The second "dual award" took place in 1978, when two papers pioneering public key cryptosystems were honored - one by Whitfield Diffie and Martin Hellman, the other by Ronald Rivest, Adi Shamir, and Leonard Adleman.

New ComSoc/ITSoc Joint Paper Award Established

Tom Fuja

The IEEE Communications Society and Information Theory Society Joint Paper Award has been established by the two IEEE societies to recognize outstanding published work in research areas of common interest appearing in one of the societies' publications.

The 2001 Joint Paper Award was the first given by the two organizations. It was presented to two papers:

- "Linear Multiuser Receivers: Effective Interference, Effective Bandwidth, and User Capacity." by David Tse and Stephen Hanly. It appeared in the March 1999 issue of the *IEEE Transactions on Information Theory*.
- "Iterative (Turbo) Soft Interference Cancellation and Decoding for Coded CDMA," by Xiaodong Wei and H. Vincent Poor. This paper appeared in the July 1999 issue of the *IEEE Transactions on Information Theory*.

The Wei/Poor award was presented at the International Conference on Communications (ICC) in New York, April 28 -May 2, 2002. The Tse/Hanly paper was recognized at the International Symposium on Information Theory in Lausanne, Switzerland, June 30 - July 5, 2002.

The 2002 Joint Paper Award recipient has recently been named as well. The prize-winning paper is "Performance of Reduced-Rank Linear Interference Suppression," by Michael Honig and Weimin Xiao. It appeared in the July 2001 issue of the *IEEE Transactions on Information Theory*; and the award will be presented to the authors at ICC '03 in Anchorage, Alaska.

The ComSoc/ITSoc Joint Paper Award is selected by a committee drawn from each of the two participating societies; the 2003 award will be given to a paper appearing in one of the sponsors' publications sometime in 2002. To nominate a paper, you are encouraged to send your recommendation(s) to the IT Society First Vice-President, who chairs the IT Society's Awards Committee. In 2003, the First Vice-President will be Prof. Hideki Imai, who can be reached at imai@iis.u-tokyo.ac.jp.

Norman C. Beaulieu Elected to the Royal Society of Canada

Dr. Norman C. Beaulieu of the University of Alberta was elected Fellow of the Royal Society of Canada. Fellowship in the Royal Society of Canada is considered Canada's most prestigious academic accolade to which scholars and scientists aspire. "These distinguished individuals have accomplished work of truly outstanding quality," said Howard Alper, President of the Royal Society of Canada. "They add enormous value to the extraordinary resource of talent and experience that constitutes the Society."

The citation for the award describes Dr. Beaulieu as "a scientific leader in the analysis and modelling of wireless communications systems. He has discovered ingenious mathematical solutions and models for a wide range of digital communications components and applications . International researchers have widely used his methods, models and results."

Norman C. Beaulieu

Norm Beaulieu is a Professor in the Department of Electrical and Computer Engineering at the University of Alberta, Edmonton, Canada, where he is iCORE Research Chair and Canada Research Chair in Broadband Wireless Communications. Dr. Beaulieu is a Fellow of the IEEE, Editor-in-Chief of the *IEEE Transactions on Communications* and President of the Canadian Society of Information Theory.

Historian's Column

A. Ephremides

As a practicing historian, I have personally confirmed what is taught in History 101, namely that, when the dust settles and the passage of time dampens the emotions of the time, a critical assessment and correct interpretation of events becomes possible. With this observation in mind, I feel comfortable revisiting one of the most momentous events in our Society's history: the first IEEE-USSR workshop on Information Theory that took place in Moscow from December 14 to December 20, 1975. Twenty-seven years later, which in our age is equivalent to twenty seven centuries, it may be possible to report on it objectively and draw a few valid conclusions.

The alert readers of this column must have noticed that in the past I have made passing references to this workshop and skirted around the difficult relations between our society and its Soviet-era counterpart, the Institute for Problems of Information Transmission. Now, the time has come to replay the tape fully.

First, the bare facts. The workshop took place as the first joint scientific event between the two organizations after a long year of negotiations that included the cancellation of a workshop that was originally planned for August 1975 and that culminated in a frantic exchange of cables between the Sovi-

ets and Dave Forney, who at the time was in charge of the workshop arrangements and, who, regrettably, chose in the end not to be part of the delegation to Moscow, despite his valiant efforts to make it happen. The main "sticky" issue was the inclusion of Adrian Segall, an Israeli citizen, in our delegation. The issuance of a visa to him was perceived by the Soviet side as a loss in a battle of wills. Intense political maneuvering and diplomatic beating around the bush eventually led to the concurrence of the decision makers in Moscow (whoever they may have been) to grant Adrian a visa. The cable that settled the dispute arrived on December 1, 1975 (less than two weeks before the workshop) and caused a memo by Dave Forney to the delegates that included the word "whoopee" as a cry of joy.

A. Ephremides

The delegation consisted of fifteen members of our Society, ten of whom were supported by the National Science Foundation, and the other five by their own grants or institutions. It included Toby Berger, Bob Boorstyn, R. Bucy, David Cohn, Tom Cover, Lee Davisson, Anthony Ephremides, Bob Gray, Dale Harris (a member of the Department of Physiology of the Harvard School of Medicine), T. Huang, Fred Jelinek, Tom Kailath (who was President of our Society that year), Bob Kennedy, Adrian Segall, and Ed Van der Meulen. As you can see some of the members of the delegation are now retired, but most are still very active in our profession.

The Soviet side included a multitude of scientists. From the giants like Dobrushin, Pinsker, Yaglom, Stratonovich, to many colleagues who are now in our midst, like Tsybakov, Zigangirov, Koshelev, Bassalygo, Zyablov, Shtarkov, it also included a general, as well as a major, of the KGB. The latter's involvement was covert. The Foreign Department of the Academy of Sciences of the USSR was allegedly a division of the KGB. We could not help, though, but sense the KGB affiliation of the person who stood up at the welcoming banquet and addressed us in a most confident, self-assured, domineering tone that had slight sinister undertones.

We were all supposed to use flight 44 of Pan American (remember that airline?) that was leaving New York's JFK airport at 6:00 PM on December 13, 1975. To get to New York I was booked on National Airlines (remember that one?), which went on strike just before the departure date. I ended up using Braniff Airlines, and Allegheny for the return (remember those, too?). Our flight was uneventful, half-empty, and made a stop in Copenhagen, where Ed Van der Meulen joined our group. Our arrival in Moscow, originally scheduled for 1:05 PM on December 14, was delayed. We landed under dark overcast skies shortly after 4 PM. The vast plains that surrounded Seremetjevo airport had a solid snow cover.

A large Russian contingent met us at the airport and escorted us in a bus trip to the Ukraine hotel. After a painfully slow check-in (that included the legendary punching by one of our hosts of an inebriated Russian citizen who milled in our group trying to buy chewing gum), we were hoisted to a restaurant that was warm and cozy, though tightly packed, and that provided for our seating in a cramped manner around a table that was literally covered by an unbelievable cornucopia of delicious offerings. Lots of grade A caviar, vodka, champagne, heart-warming soups, and endless choices of condiments and dishes. It felt more like being in the Court of Louis XIV than in the heart of a People's Republic.

And then the "toasts" started. This is a Russian tradition that permits the "toasters" to engage in elaborate and lengthy toasts that usually provide for the opportunity of subtly delivering veiled messages. This was my first exposure to covert channels!

The feast was over at about 2 AM (i.e., 10 AM the next day, our time). We were whisked back to the Ukraine, sleepless, sleepy, exhausted, and, as possible as that may be, excited. Our hosts had given us on typewritten carbon copy paper the program for the workshop. To Tom Cover's surprise, he was scheduled for the kick-off lecture the next morning. Unable to fit a reasonable rest in the frantic schedule, he chose to spend what was left of the night on a couch in the lobby mentally preparing his talk and contemplating his predicament.

The workshop got off to a glorious start in a full hall with a series of warm welcomes and followed by a brilliant talk by Tom (who subsequently collapsed in his room for a long and well deserved rest). The conduct of the workshop included translation, sentence-by-sentence, of every talk in real time. As the timing of the pauses by the speaker to allow the translator to intervene varied considerably from just a few words to quite a few sentences, it became clear to me how the choice of the pausing moments could be used to convey additional information and thus, in another stroke of illumination, I understood the notion of a broadcast channel.

The full-week duration of the workshop was punctuated by tours of the city, sumptuous meals, banquet-style, every night, and culminated in a day-long excursion on Saturday, December 19 to Zagorsk, a beautiful village in the outskirts of Moscow with rich medieval history and featuring the tomb of the legendary Tsar Boris Godunov. That day exemplified what Russian winter is like. It was dark and overcast with thick snow cover and temperatures hovering around 0° F. In the middle of the day, we had a heart-warming meal in a country restaurant booked exclusively for our group. Again, we had lengthy toast exchanges replete with subliminal messages, gift exchanges, and emotional farewells.

The next day we were escorted to the airport for our departure. It was a sunny day with tiny crystals sparking in the frigid air. Tom Kailath, suffering from a form of lumbago, had to be escorted up the steps of the ladder to enter the airplane. He had just presided over a formal signing ceremony where the agreement on cooperation between our Society and the In-

stitute was officially sealed. It looked almost like a Brezhnev-Nixon summit "detente" ceremony. The members of our group unused to such levels of formality, were marveling in the heavy aplomb. The week that had gone by was overflowing with impressions, emotions, eye-opening experiences, and newly found facts and images. After all, it was not that common in those days to get behind the Iron Curtain. We experienced first hand the warm hospitality that has always been a basic trait of the Russian culture; but we also experienced some of the ugly practices of the Soviet regime. One day upon returning in my hotel room I found the contents of my unlocked suitcase ramsacked. Nothing was missing but it was clear that a thorough search had taken place. When three Jewish members of our delegation requested to visit a synagogue, a mini-struggle of maneuvers ensured to make it possible. When consent of the authorities was secured, the three colleagues hailed a taxi that was by the hotel's entrance. The driver was given only the name of the street, yet, even though no words were exchanged, he deposited them in front of the synagogue, as if he had been told ahead of time. The feeling of being watched could not be shaken.

The return trip was not smooth. A long delay in Copenhagen caused us to arrive in New York past midnight. The luggage took an additional hour to appear on the carousel. We had all missed our connections and we were booked to spend what was left of the night in a nearby motel, the seediness of which made us long for the Ukraine hotel in Moscow. Eventually, we made it home and resumed our daily lives.

This landmark event set in motion a journey along a rocky and perilous path for the relations between the Society and its Soviet counterpart. There were numerous BOG meetings that lasted into the wee hours of the morning in which these relations were being discussed. The planned immediate sequel to this workshop was a reciprocal workshop in the US. It eventually took place in a mansion along the Hudson River in New York, north of the City. Subsequent contacts were always strained and fraught with suspicion from both sides. A brilliant move by the Swedes, who negotiated a separate agreement with the Academy of Sciences in the USSR for bilateral relations, provided a convenient escape route for both sides. Instead of having to deal with the thorny questions of prestige, "face", etc., that were marring the direct US-USSR contacts, all Information Theorists who wanted to collaborate across the Iron Curtain would now go to the Swedish-USSR workshops that started in Granna, Sweden in 1985 and alternated bi-annually between a location in Sweden and one in the USSR until the last of those events took place in January of 1991 in Moscow. After that, the cataclysmic evolution of the Soviet regime eliminated the basis for the earlier difficulties. From then on, the biggest problem for our colleagues in Russia was the financial squeeze that forced a massive exodus to the west.

As we often say at the end of such a story, the rest is History!

President's Column

Tom Fuja

I just returned home from the 2002 IEEE International Symposium on Information Theory (ISIT) in Lausanne, so this column will be a collection of news items and observations triggered by that wonderful event. ISIT '02 co-chairs Bixio Rimoldi and Jim Massey put on an outstanding conference – a strong technical program in a beautiful venue with smoothly run logistics. They and their colleagues – especially technical co-chairs Emre Telatar and Amos Lapidoth and local arrangements czar Ruediger Urbanke – earned the gratitude of all those who attended.

Tom Fuja

ISIT – Venues

Shortly before I began this column, one of my Notre Dame colleagues was reading the various announcements of IT Society meetings posted on the bulletin board outside my door – Lausanne and Bangalore in '02, Paris, Yokohama, and Hong Kong in '03 – and asked me, "Does the Information Theory Society ever have meetings in places that *aren't* great?"

Well, we try not to. Sampling from the list of ISIT and workshop venues from the last dozen years – Budapest, San Antonio, Trondheim, Whistler, Killarney, Ulm, Kruger Park, Cambridge, Sorrento, Washington, Cairns, and now Lausanne – it's clear that the meetings of the Information Theory Society reflect the worldwide composition of the IT community. As one of the most international of all IEEE societies, we have (literally) a world to choose from. When you can spend the week looking over Lake Geneva to the French Alps, why spend it in Orlando?

On the horizon: ISIT '04 in Chicago and ISIT '05 in Adelaide, Australia. If you're interested in organizing an ISIT or Workshop, please contact the Society's conference coordinator, Steve McLaughlin (swm@ece.gatech.edu).

ISIT – Timing

As indicated in my March column, the question of ISIT timing – how often to schedule them – is on the "front burner" of the IT Society Board of Governors. Should we continue with the yearly symposium schedule that began with the 2001 Washington DC meeting? Or should we return to the "rate-2/3" schedule that had been in place for decades before?

The Board took up this question at its meeting on June 30, just prior to the opening of the Lausanne ISIT. While there was no consensus whether or not we should return to the

less-frequent scheduling, there was a consensus that rigidly holding the meeting in late June/early July every year is not a good idea. For too many potentially attractive venues – e.g., the American south, Australia, etc. – late June/early July is simply not a good time to schedule a meeting. (As an alternative, some members of the Board mentioned the model of the International Conference on Communications, or ICC – a yearly conference that typically convenes sometime in a three-month window from April to June.) In addition, there was agreement that we should avoid if possible having a submission deadline for the *next* ISIT only 3-4 months after the close of the *previous* ISIT; with electronic submissions and other efficiency-enhancing practices, we should be able to have the submission deadline "only" 6-7 months prior to the start of the Symposium, which (in most years, depending on the scheduling of the symposia) would give our community a little "breathing room" between deadlines.

So, given there was no consensus, we did what boards do best – we set up an *ad hoc* committee to study the issue. The charge of the committee was to formulate a couple of "candidate" proposals taking into account the issues that the board *did* agree on. This issue will be revisited at the October 2002 Board meeting.

One final note: While there was no formal vote on this issue, a "straw vote" among Board members indicated most leaning towards a yearly symposium, assuming some flexibility could be built into the actual scheduling. In contrast, the (admittedly unscientific) paper poll taken among ISIT attendees showed most of those responding preferring the two-ISITs-every-three-years format. If you have an opinion on this issue, I would invite you to send it to me at tfuja@nd.edu.

IT – The Next Generation

I guess it is my deep-and-undeniable passage into middle age that made me so aware of the many young researchers at the Lausanne ISIT. Of the 729 attendees, 234 (32%) were students, and many more were recent graduates and new assistant professors. Certainly it is indicative of the life and vibrancy of information theory as a technical discipline that so many young researchers are choosing to spend their time and effort working on our problems.

I also thought it was great that – for the *second* year in a row – the IEEE Graduate Teaching Award was presented to a member of our community at an ISIT. This is an IEEE-wide Technical Field Award for "inspirational teaching of graduate students." The 2001 award was given to Princeton's Vince Poor at the Washington ISIT, while in Lausanne the 2002 award went to Vijay Bhargava of the University of Victoria. Both are longstanding members of our community, having published much of what is on their vitae in our *Transactions* and having served the IT Society in many capacities, including president – Poor in 1990 and Bhargava in 2000.

Both Vince and Vijay were modest about their selection for the Graduate Teaching Award. In the resulting Newsletter article, Vince talked about the importance of giving graduate students independence: "My experience has been that students are more productive in the long run if given enough time and freedom to find their own way through research issues." Vince also indicated his belief that graduate teaching "… is not so much one of imparting knowledge to another person as it is one of learning alongside another person." Characteristically, Vijay was a little more *vibrant* in his take on the honor: "I received this award for drinking beer with my graduate students," he claimed. "And I shall spend the honorarium the same way."

Their reactions reminded me of the time when I was a brand-new assistant professor and hosted a much-accomplished IT researcher as he visited the University of Maryland, where I worked at the time. I confessed to the visiting luminary that, while I was reasonably confident about my abilities in most of the areas required of faculty members, I wasn't at all sure about my ability to supervise grad students. His reaction was blunt: "For a lot of students, it almost doesn't matter what you do," he told me. "Good students will accomplish a lot no matter how bad you are as an advisor, and poor students won't do much no matter how much you help them."

Vince and Vijay similarly downplay the significance of their own roles in training and "mentoring" the next generation of information theorists. But we as a Society have benefited tremendously from their efforts and similar efforts by hundreds of professors and research supervisors over the last fifty years. The youthful enthusiasm of the Information Theory Society, on display in Lausanne, bodes well for the next fifty years.

And Finally, a Word About Finances

I have received a lot of feedback about my "President's Column" describing the Society's uncertain financial status in the June Newsletter. Thank you to all who spoke to me in Lausanne or wrote e-mails with your suggestions and opinions.

The situation is marginally better than what I described in June, but still alarming. IEEE Corporate has made some cost reductions that have reduced somewhat the "infrastructure charge" to each society. However, the 26% "tax" on our intellectual property income – our main source of income – remains, as does the re-direction of the first 5% in investment income from the societies to IEEE Corporate. IEEE President Raymond Findlay was at the IT Society Board of Governors meeting in Lausanne, as was the IEEE Director from Region 8, Levent Onural; our grave concern about the direction IEEE finances are taking was communicated to them in unambiguous terms. In addition, an ad hoc committee of the Board of Governors was established to investigate the feasibility of an Information Theory Society outside the IEEE umbrella. While such a move remains a last resort – one that I, personally, hope we do not have to pursue – it is only prudent to understand what our options are.

I will keep you informed on what develops.

GOLOMB'S PUZZLE COLUMN™

On a Problem of Richard Epstein

Solomon W. Golomb

I received the following letter from Bulgaria, dated 6 April, 2002:

Dear Prof. Golomb:

Recently, I attended a lecture by Dr. Richard Epstein here at the University of Sofia.

Seeking a number-theoretic problem for my master's thesis, Dr. Epstein kindly offered the hypothesis that "there is a closed [i.e. *finite*] set of numbers n such that the last digit(s) of n^2 is (are) the number n itself."

He gave the following examples:

n	n^2
5	**25**
6	**36**
25	6**25**
76	57**76**
376	141,**376**
625	390,**625**

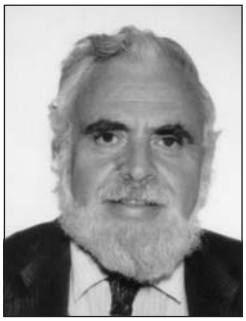
(ignoring the trivial $n = 1$).

Object: prove that no other examples exist.

Dr. Epstein suggested that if I should become stuck, I write to you for helpful hints. I am stuck. So would appreciate much your insights on this matter.

Sincerely,

Georghe Costello



One of the "hints" I sent him was that the hypothesis might be false. Here are some specific questions.

1. Are there more examples than the six listed? If so, exhibit the next one.

2. What is the general procedure for finding additional examples? (There is a Main Theorem for this.)

3. Is the "complete list" finite or infinite?

We generalize the problem from base 10 to base b as follows:

Let E_b be the "Epstein set" of positive integers $n > 1$ for which n^2 "ends in n" when both are written in base b.

4. Show that for prime values of b, E_b is empty.

5. Show that if $b = 2p$, where $p > 2$ is prime, then E_b contains p and $p + 1$.

6. For the case in problem 5., show how the complete solution for E_b parallels the special case when $b = 10$.

Japanese Chapter Awarded the First "IT Chapter Award"

IEEE Information Theory Society Chapter Meeting

Palais Beaulieu, Lausanne, Switzerland, Monday July 1, 2002

Marc Fossorier

Attendees: Vijay Bhargava, Martin Bossert, Gerard Cohen, Marc Fossorier, Thomas Fuja, Alex Grant, Tom Hoeholdt, Bahram Honary, Hideki Imai, Jong-Seon No, Greg Pottie, Valdemar Rocha, Edward van der Meulen, Han Vinck, Hirosuke Yamamoto, Raymond Yeung, Ram Zamir.

The meeting was called to order at 1:00 PM by Chair Hideki Imai. Society President Thomas Fuja thanked Hideki Imai for organizing this meeting, and all chapter representatives for their efforts which greatly contribute to the international representation of Information Theory, and are very important to the Society. Each representative was asked to provide a short description of their chapter activities, as well as to discuss and comment on the connection between the chapter, the IT Society and IEEE.

Greg Pottie (UCLA, USA) indicated his intentions to start a new chapter in Los Angeles, USA, motivated by the closeness of UCLA, USC, Caltech and JPL. He plans the chapter to host an annual university/industry workshop as well as four regular meetings.

Jeong-Seon No (Seoul National University, Korea) represented the Seoul chapter, which started six years ago. It hosts three half day workshops composed of four papers and one tutorial a year. These workshops have 40 to 50 attendees, more than half being graduate students.

Ram Zamir (Tel Aviv University, Israel) represented the Israel chapter. Every other year, one convention with a few IT sections is organized. This meeting has international atten-

dance. In 2001, a half day workshop on "space time codes" was organized with two outstanding plenary speakers: Vahid Tarokh and Rudiger Urbanke. Unfortunately, the political problems prevented this workshop from being held in 2002. Ram Zamir asked about the availability of funds for plenary speakers. Vijay Bhargava and Tom Fuja mentioned the IEEE Distinguished Speakers program which is available not only to the IT Society (up to USD 500), but also to the ComSoc (a minimum of three visits to have the airfare covered, while the chapter takes care of the accomodations).

Hirosuke Yamamoto (University of Tokyo, Japan) represented the Japan chapter, which has 350 members, who also belong to the Japanese societies SITA or IEICE. The chapter holds one technical meeting every other month, organized in conjunction with IEICE, and one conference every year in conjunction with SITA. The meetings and conference are supported by IEICE and SITA.

Raymond Yeung (The Chinese University of Hong Kong, HK) represented the newly created Hong Kong chapter, which currently has about 55 IT members and is still growing. Several distinguished speakers have been invited recently and several meetings have already been organized, with the preparation of the 2003 Information Theory Workshop as the main item. Raymond Yeung mentioned that in addition to the USD 1,000 provided by the IT Society to new chapters, the Hong Kong section also provided start up money.

Gerard Cohen (ENST Paris, France) represented the France chapter, which is composed of about 100 members, mostly from ENST Paris and Brest. The chapter is currently preparing the next "Turbo Codes" symposium and the 2003 Information Theory Workshop in Paris.

Vijay Bhargava (University of Victoria, Canada) shared his experience of creating the Montreal chapter in 1982, which that year received the best chapter award out of 12 chapters. He mentioned chapters should take the opportunity to invite people traveling through the city/country. He also committed himself to start a new joint IT/ComSoc chapter in Victoria.

Martin Bossert (University of Ulm, Germany) represented the German chapter, which has more than 200 members. The chapter was created in 1995 in order to attract ISIT to Germany (ISIT'97 in Ulm). It organizes two conferences in Germany every year. These conferences are well attended with international participation.

Valdemar Rocha (Federal University of Pernambuco, Brazil) represented the Brazil chapter, which started a year ago and now has about 40 members. It hosts one annual meeting on telecommunications, which has one IT section. The chapter can receive support from the Brazilian government for speakers who visit at least three places.

Edward van der Meulen (University of Leuven, Belgium) represented the Benelux chapter, which comprised Belgium, The Netherlands and Luxemburg. It was the first chapter started in Benelux, in 1989. It organizes section meetings twice a year as well as joint meetings with other groups. It cooperates with IEEE activities and national activities. It also hosts a two day meeting every year with printed proceedings, as well as a tutorial in January with emphasis on broader subjects, such as cryptography. This meeting receives the help of Philips and attracts more than 100 participants. The chapter also uses the IEEE Distinguished Speakers program in conjunction with the European Space Organization to invite outstanding visitors, such as Sergio Verdu or Ezio Biglieri. Edward van der Meulen suggested that the IT Society update the lists of its IEEE Distinguished Speakers.

Bahram Honary (Lancaster University, UK) represented the United Kingdom and Ireland chapter, which started in 2001. The chapter hosts an invited talk once a month, with the cost shared between IEEE and the organization. It has been very active with a constant increase in student participation. The chapter plans to start a national workshop and hosted the visit of Shu Lin last year. It also holds the Ambleside conference every other year, with international attendance.

Alex Grant (University of South Australia, Australia) represented the Australia chapter, which is three years old and has about 400 members. The main activities of the chapter have been the Australian workshop which started in Sydney in 2000 and is held every year, and the 2001 Information Theory Workshop in Cairns. The chapter works on the basis of "everyone knows everyone and works with everyone". Alex Grant mentioned that the chapter officers felt IEEE support was too rigid with respect to the section freedom in operating and their specific interests.

Tom Hoeholdt (Technical University of Denmark, Denmark) represented the Denmark chapter, which started two years ago, while the Danish section has been active for forty years. The IT chapter has currently 24 members (joint with Communications and Vehicular Technology). It held four meetings in 2001 and two so far in 2002.

This concluded the chapter presentations. No representatives from the Taipei and Spain chapters were present. The Taipei chapter has organized six workshops between 1999 and 2001, while the Spanish chapter has held several weekly research seminars. Han Vinck recalled that chapters are encouraged to report their activities to the IT Newsletter. Jeong-Seon No mentioned that it was the first time in his six year term he was meeting other chapter chairs and consequently found this first meeting very interesting. He wished to have a regular chapter chair meeting at each ISIT. Vijay Bhargava suggested it would be a good idea to start a chapter in San Diego where IT is well represented both in academia and industry. He reminded everyone that chapters only need two meetings a year to "stay alive".

The first "Best IT Chapter Award" was given to the Japan chapter, which will receive a USD 1,000 award. The selection was made based on activity reports prepared by each chapter and the chapter webpage.

The meeting was adjourned at 2:00 PM.

WORKSHOP REPORT:

Concepts in Information Theory, A Tribute to Jim Massey

Breisach, Germany, June 26-28, 2002

Han Vinck

The German Chapter on Information Theory organized the "Second European Asian Workshop on Concepts in Information Theory". The workshop location was Breisach, a beautiful medieval village on the shore of the river Rhine. Overlooking the Rhine valley, the 50 participants enjoyed the relaxing atmosphere created by the organizers. The main goal of the meeting was to stimulate clear presentations on the principles of Information Theory. The idea for organizing this meeting was born while attending a panel discussion at the ISIT in Sorrento, 2000. There, Jim Massey emphasized the importance of having clear conference presentations and journal papers. The 32 speakers tried to avoid unnecessary details as much as possible, which gave a special touch to the meeting. The meeting showed that it is indeed possible to reduce lectures to the basic ideas without losing precision. All presentations are included in the workshop proceedings (108 pages). These can be ordered from Birgit Rieth (rieth@exp-math.uni-essen.de). The social program included a guided tour through the city of Breisach and an excursion to the 3rd largest winery in the world (125 million litre capacity). For the scientific program and more details regarding the workshop, please have a look at http://www.exp-math.uni-essen.de/~vinck/call-june-2002.htm and http://www.exp-math.uni-essen.de/~meili/conferences/breisach/ for some pictures.

Han Vinck, Gerhard Kramer and Jossy Sayir paying their tribute to Jim Massey

The organizers chose to pay tribute in form of a song. A special thank you to Dick Blahut for motivating improvements to the final verse.

Ode to Lady I.T. (Music to "Cockles and Mussels")
Jossy Sayir and Gerhard Kramer

In Boston's gray harbor, that seeps of youth's ardor
He first laid his eyes on sweet Lady I.T.
She s'duced him with one glance, and kept him in Claude's trance
Crying Coding and Crypto's a-live a-live O!

CHORUS

A-live a-live O! A-live a-live O!
Crying Coding and Crypto's a-live, a-live O!

She was a dear mistress, let never his wrist rest
For in many a paper he chanted her praise
"Seven papers!" he preaches, but one hundred he reaches
Writing Coding and Crypto's a-live a-live O!

She soon conquered deep space, but elsewhere made slow pace
Could that be the end of sweet Lady I.T.?
But Jim wheeled her barrow, through bands broad and narrow
Crying Coding and Crypto's a-live a-live O!

She had him enraptured, and thought he'd been captured
When a fair Viking lady his passions set free
They crossed the wide ocean, yet she sanction'd his notion
To cry Coding & Crypto's a-live a-live O!

His canine assistant's with him every instant
He shares Jim's enthusiasm for Lady I.T.
He's at every conf'rence, and barks with great conf'dence
Meaning Coding and Crypto's a-live a-live O!

Now we've gathered on Rhine's shore, all eager to explore
The fund'mental concepts of Lady I.T.
We'll glean wisdom mellow, and join that old fellow
Crying Coding and Crypto's a-live a-live O!

IEEE Information Theory Society Board of Governors Meeting

Prospect House, Princeton University, March 22, 2002, 9:00 AM

Aaron Gulliver

Attendees: Thomas Cover, Michelle Effros, Tony Ephremides, Tom Fuja, Aaron Gulliver, Joachim Hagenauer, Hideki Imai, Ryuji Kohno, Steven McLaughlin, Urbashi Mitra, Vince Poor, Sergio Verdú, Han Vinck

The meeting was called to order at 9:00 AM by Society President Tom Fuja. The members of the Board were welcomed, and introduced themselves.

1. The Agenda was approved as distributed.
2. The minutes of the previous meeting in Cairns, Australia on September 5, 2001, were approved as distributed.
3. The President began his report with the following nominees:

IEEE Press Liaison	John Anderson
Secretary	Aaron Gulliver
Treasurer	Marc Fossorier

Their appointments were approved unanimously.

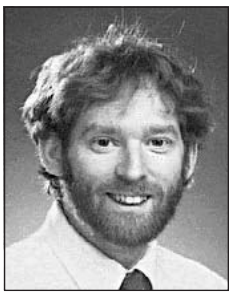
He announced that the Society is a Technical Co-sponsor of the new IEEE Transactions on Mobile Computing. A one page advertisement will be placed in the Transactions on Information Theory, and the Transactions on Mobile Computing will have a one page advertisement for the Transactions on Information Theory. The Society may nominate one Associate Editor for this new transactions.

He informed the Board that the Daniel Pearl who was killed in Pakistan was the son of Dr. Judea Pearl. A letter of condolence was sent to Dr. Pearl on behalf of the Society.

The President presented a report on the IEEE TAB meeting which was held in Phoenix, AZ in February. In 2000, IEEE had an ≈40M deficit, the stated reasons being new infrastructure and electronic publication/IT costs. A similar shortfall occurred in 2001. To make up the difference, the IEEE has made infrastructure charges against all IEEE units with reserves. For the IT Society, this is 164,900 for 2001, and 366,000 (projected) for 2002. The net worth of the Society at the end of 2001 was 1.2M, therefore at this rate of reduction, the Society will have no reserves in a very short time.

He stated that the Society should apply pressure on IEEE to reduce expenses. An audit demanded by Society Presidents was approved by the IEEE Board of Directors.

The new IEEE financial model was presented. This will fully distribute corporate infrastructure costs to all IEEE organizational units. The distribution of these charges was discussed, two methods were proposed, percentage of reserves, or charge according to infrastructure usage (which allows some degree of society control). Given the current financial state of the Society, expenditures and revenues must be carefully considered to ensure the future of the society. The Society President will contact other presidents to get their responses and perhaps coordinate efforts. He will also contact the Editor-in-Chief of the Transactions, Paul Siegel, regarding Editorial expenses. An ad-hoc committee on finances, consisting of Tom Fuja, Tony Ephremides, Marc Fossorier, Steven McLaughlin and Ryuji Kohno was established to consider ways to reduce society expenses and increase revenues.



Aaron Gulliver

Continued pressure on IEEE to control expenses was strongly supported. The Division Director, T. Fukuda, will be invited to explain the IEEE BOD actions to the IT BOG.

4. The treasurer's report prepared by Marc Fossorier was distributed and discussed. Serious concerns were raised about the financial health of the society. As of November 30, 2001, cash directly available was $166,970, long term investments were $913,430, loans receivable were $122,770 and fixed assets of $1,290 for a net worth of $1,204,460. A graph representing cash available and net worth on a monthly basis over the period 1996-2001 was presented. It was noted that money will have to be transferred from long term investments to cash in order to cover IEEE infrastructure charges.

   A summary of the financial status of recent and future workshops and symposia was also given.

5. A report was distributed by the Editor-in-Chief, Paul Siegel, on the Transactions on Information Theory. The five-year review of the transactions was discussed. It was noted that the Transactions has a high impact factor and is highly ranked among publications in Electrical Engineering.

   The transition to monthly publication has gone smoothly. There is no backlog of papers to be published. Beginning with the July 2001 issue, all issues have been mailed on time. The front cover has been redesigned to comply with the new IEEE identity standards.

   The following editor appointments were approved by the board:

   Coding Theory - Claude Carlet replacing Patrick Solé
   (effective March 1, 2002)
   Coding Theory - Khaled Abdel-Ghaffar replacing Jonathan Ashley
   (effective February 1, 2002)

Publications Editor - Kevin Quirk replacing Erik Agrell (effective July 1, 2002)
Book Reviews Editor - Sergio Verdú replacing Dick Blahut (effective March 1, 2002)

Special issues on Space-Time Transmission, Reception, Coding and Signal Design, and on Problems on Sequences: Information Theory and Computer Science Interface, were approved by the board. The board made the following suggestions for special issues:

(a) The list of guest editors should contain at least one regular editor.

(b) The number of papers by a single author in a given special issue should be limited.

Discussions are underway with Parity Computing to annually generate the Reference Index which is no longer published in the Transactions. This will be incorporated into the Digital Library, as decided by the board at an earlier meeting.

As is traditionally done, the Editorial Board will have a dinner meeting during the Symposium in Lausanne.

6. Lance C. Pérez provided a report on the Newsletter. The newsletter is on schedule for the March issue. It was noted that announcements for conferences, symposia and workshops are printed as soon as they are approved, but this is sometimes too late for submissions.

7. Aaron Gulliver presented the report on the IT Society web site. The redesign of the web site is progressing well, and should be available for discussion at the Annual Meeting. The goal is a simpler structure for both members to navigate and the webmaster to update. The new look will retain the green colour found on the current website. Since 2000, file transfers have increased by a factor of 10 to 135 Mbytes/day. The number of `hits' is 135/day. The site has been visited from over 100 countries.

8. The awards committee report was presented by Han Vinck. Vince Poor, Shlomo Shamai and Douglas Stinson have been appointed to the committee. Upamanyu Madhow and Vahid Tarokh have been appointed to the Joint IT-ComSoc Paper Award Committee. Up to 2 winning papers will be selected by this committee by April 10.

   In light of the current financial state of the society, reduction of the prize amounts for the Paper Award and Shannon Award was considered by the board. The Society President will examine the prize amounts and report back to the board at the next meeting.

9.1. Tom Fuja reported on ISIT 2001 in Washington, DC. The books are now closed and a surplus of ≈10K is expected.

9.2. A report from Alex Grant on the Cairns Information Theory Workshop was discussed. The expected surplus is ≈10K AU, and the board voted in favor of returning this to the Australian Chapter to support Information Theory activities.

9.3. A letter from Jim Massey was discussed in regards to support for funds to allow those under financial hardship to attend ISIT 2002 to be held in Lausanne, Switzerland. The board felt that this was a symposium decision, and that it should not make decisions on how funds are spent during the event. This should be left up to the symposium organizers. Tom Fuja will send a reply to the symposium co-chairs, Bixio Rimoldi and Jim Massey.

9.4. A report on the workshop to be held in Bangalore, India in October 2002 was discussed. No problems have been encountered and preparations are progressing well.

9.5. A detailed status report on ISIT 2003 to be held in Yokohama was circulated by Hideki Imai and Ryuji Kohno. A detailed budget, hotel location and pricing, and the program structure were discussed.

9.6. A report on the progress of the 2003 Workshop in Paris was presented by Aaron Gulliver. The focus will be on channel coding and related topics. There was some discussion regarding the preliminary budget. A detailed budget will be presented at the Annual Meeting.

9.7. There was no report on ISIT 2004.

9.8. A proposal for a workshop in Hong Kong in 2003 was discussed. The board suggested that this have a non-coding focus so as to not overlap with the Paris workshop. A more detailed proposal was requested for the next board meeting.

   A workshop to be organized by Costas Georghiades in Texas in 2004 was also discussed. The board was supportive and would welcome a detailed proposal at the next board meeting.

10. Joachim Hagenauer presented the results of the five year review of the Scoiety by the IEEE. He noted that the feedback was very positive. The increase in the number of transactions issues was well received. There was some concern about the dramatic increase in membership fees. A two year term for the president was also recommended.

11. The change to a president term of more than one year was discussed. The current board setup requires a 5 year commitment from the elected 2nd vice-president as they progress though the officer positions. The board had mixed feelings about any changes, a multiyear presidency would provide more continuity, but could require a longer commitment and/or reduce the number of members in executive positions. An ad-hoc committee on the presidential term, consisting of Tom Fuja, Han Vinck, Hideki Imai, Joachim Hagenauer and Vijay Bhargava, will consider this issue and prepare a report for the board.

12. A request by Vahid Tarokh to create a new IT Society award for contributions to the promotion and support of Information Theory was discussed. This would be a means of recognizing service to the information theory community. There was significant support for such an award amongst the board members. The awards committee was tasked with

preparing a proposal which outlines the criteria for the award for the next BOG meeting.

13. IEEE Headquarters decision to not provide full membership support to residents of Burma, Cuba, Iran, Libya and Sudan was discussed (see http://www.ieeesanctions.org/). An explanation of the IEEE position will be requested.
14. Tom Fuja thanked Sergio Verdú for making arrangements for the Board Meeting. He announced that the Annual Meeting of the Society will be held at the Hotel Alpha-Palmiers in Lausanne, Switzerland on Sunday, June 30, beginning at 12:00 PM (noon).
15. The meeting was adjourned at 2:10 PM.

New Books (correction)

Advanced Theory of Signal Detection: Weak Signal Detection in Generalized Observations

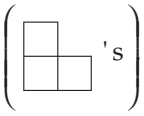
by Iickho Song, Jinsoo Bae, and Sun Yong Kim, Springer-Verlag, 2002, 395 pp., EUR99.95, ISBN 3-540-43064-4

http://www.springer.de

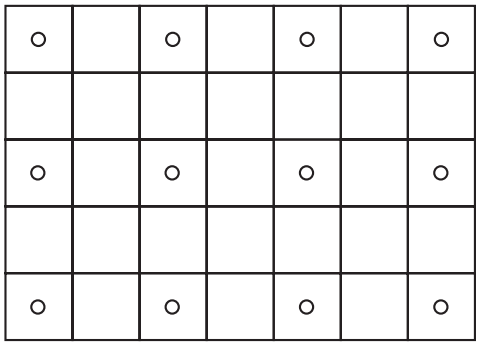
Contents: Preliminaries; Locally Optimum Detection of Signal; Signal Detection with Signs and Ranks; Detection in Weakly-Dependent Noise Model; Detection with Fuzzy Observations.

GOLOMB'S PUZZLE COLUMN™

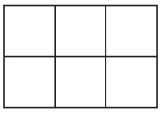
Placing Pentominoes on Boards — Solutions

1. The first task was to find the inequivalent placements of a pentomino on a 5 × 7 board such that the rest of the board can be tiled with ten "right trominoes"  's

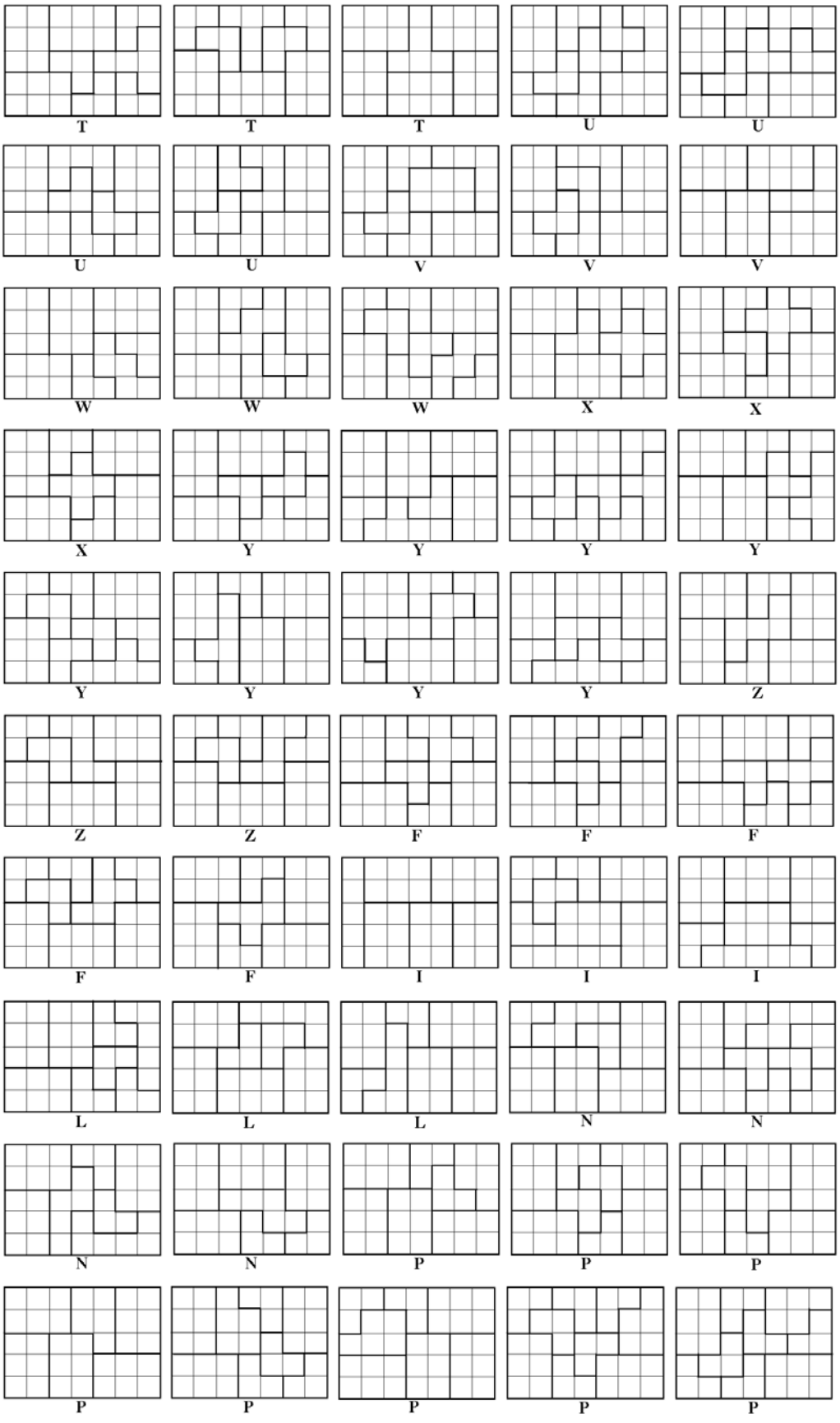
Note that a right tromino covers at most one of the twelve "dotted squares" on the 5 × 7 board. Hence



the pentomino must cover at least two of the dotted squares in order for the rest to be tiled by ten right trominoes. (Each pentomino can be placed to cover two of the dotted squares, but only the I and the V are able to cover three.)

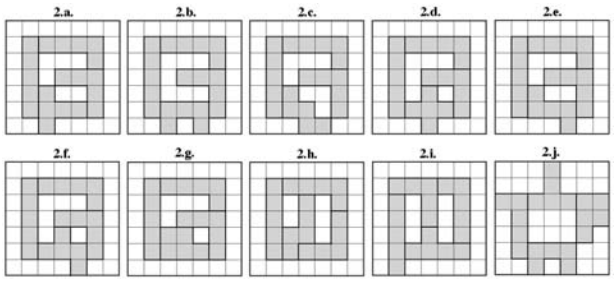
The 2×3 rectangle,  , can be tiled in two different ways by two right trominoes, so in the solutions which follow we leave this region undivided.

Here are the 50 solutions I have found. (There may be others that I missed.)

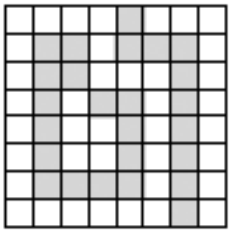

T T T U U
U U V V V
W W W X X
X Y Y Y Y
Y Y Y Y Z
Z Z F F F
F F I I I
L L L N N
N N P P P
P P P P P

2. The second task was to find four-piece subsets of the 12 pentominoes which can be placed on a 7 × 7 board so as to prevent any of the remaining pentominoes from fitting on the board. In solutions 2.a. through 2.i., we see how to use the I, L, and V pentominoes with each of the other nine, in turn, to achieve this goal. (Most of these examples are not unique for the 4-set involved. There are quite a few configurations which use I, L, V, and U, for examples). Finally, in 2.j., we see a very different kind of solution, using T, U, L, and P, while using neither I nor V. (This example was a joint effort with Scott Kim.) These four pieces can be used in any cyclic order around the edges of the 7 × 7 square to achieve the same result.

Did any reader find an eleventh subset that also works? Or a twelfth? Or a subset that didn't use the L-pentomino?



3. Here is a different set of five pentominoes placed to prevent any of the remaining seven from fitting on the 8 × 8 board.



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 coordinated 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

CALL FOR PAPERS

2003 IEEE Information Theory Workshop

La Sorbonne, Paris, France
March 30 – April 4, 2003

General Co-Chairs:
Joseph Boutros
Aaron Gulliver

Program Committee:
Ezio Biglieri (co-chair)
Vahid Tarokh (co-chair)
Fady Alajaji
Gérard Battail
Claude Berrou
Loïc Brunel
Giuseppe Caire
Anne Canteaut
Jean-Yves Chouinard
Antoine Chouly
David Forney
Marc Fossorier
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Secretariat:
Laurence Berlandier
Danielle Childz
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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

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Ecole Nationale Supérieure des Télécommunications
46 Rue Barrault, 75013 Paris, France
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Phone: +33 1 4581 7678
Fax: +33 1 4589 0020

ISIT 2003 Yokohama

IEEE INFORMATION THEORY SOCIETY

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. Details of Paper Submission will be announced on "Paper Submission" page, which will be posted on the Symposium web site (**http://www.isit2003.org/**) in July. Authors are strongly encouraged to submit electronic versions of their summaries in the form of Portable Document Format (PDF) files by following the guidelines described on that page. 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
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

The 2003 IEEE Workshop on
SIGNAL PROCESSING ADVANCES IN WIRELESS COMMUNICATIONS

June 15-18, 2003 - Rome, Italy

General Chair
Sergio Barbarossa
Univ. of Rome, "La Sapienza"
Infocom Dept., Via Eudossiana 18
00184 Roma, Italy
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Technical Committee Chair
Gaetano Scarano
Univ. of Rome "La Sapienza"

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T. Luo, McMaster, Canada
B. Ottersten, KTH, Sweden
N. Sidiropoulos, U. Minnesota, USA
A. Swami, ARL, USA
L. Tong, Cornell U., USA
M. Tsatsanis, Voyan, USA
A.J. van der Veen, Delft U., NL
G. Vasquez, UPC, Spain
G.T. Zhou, Georgia Tech, USA

Local Arrangements:
R. Fantozzi, ICA srl, Italy

Treasurer:
F. Gini, U. Pisa, Italy

Publications:
G. Scutari, U. Rome, Italy

Publicity:
A. Scaglione, Cornell U., USA

International Liaison:
Chong-Yung Chi

SPAWC 2003 Secretariat:

University of Rome, "La Sapienza"
Infocom Department,
Via Eudossiana, 18
00184 Roma, Italy
E-mail : spawc2003@uniroma1.it
Tel. (+39)0649766988
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URL: http://www.spawc2003.it

SPAWC-2003, fourth in a biannual series, is devoted to recent advances in signal processing for wireless and mobile communications. This workshop brings together members of the signal processing, communications and information theory communities, working in universities, research centers and telecommunications companies.

The meeting will feature keynote addresses by leading researchers, as well as invited and contributed papers. SPAWC-2003 will be held in Rome, Italy, in the fifteenth century cloister of the School of Engineering of the University of Rome "La Sapienza", next to the fifth century church of San Pietro in Vincoli, hosting the statue of Moses, one of Michelangelo's masterpieces. The place is located in the heart of Rome, within a walking distance from the Coliseum and the ancient Roman forum.

Prospective authors are invited to submit contributions in the following areas:

- Source-channel coding & iterative (turbo) decoding
- Smart antennas, MIMO systems, and space-time coding
- Modeling, estimation and equalization of wireless channels
- Signal separation, and interference rejection
- Acquisition, synchronization, and tracking
- Fundamental limits on capacity and performance analysis
- Single-carrier, multi-carrier, and multi-rate systems
- Multi-user and spread-spectrum systems
- Cross-layer issues: from physical to networking layers
- Signal processing tools for ad hoc and multihop networks
- Ultra-wideband radio
- Audio, video, and multimedia applications

Prospective authors should submit the full camera ready version of the paper (up to five pages) using the template provided at the workshop URL.

Submissions should include affiliations, addresses, tel/fax numbers, and e-mail addresses, and keywords identifying one of the above topics. All submissions will be electronic in PDF format.

IMPORTANT DATES:

Paper submissions deadline	**December 15, 2002**
Notification of acceptance	**February 15, 2003**
Final papers due	**March 15, 2003**

The event is sponsored by:

IEEE

IEEE Signal Processing Society

CALL FOR PAPERS

THE 2003 CANADIAN WORKSHOP ON INFORMATION THEORY

WATERLOO, ONTARIO
MAY 18 — MAY 21, 2003

The eighth Canadian Workshop on Information Theory will be held on the campus of the University of Waterloo in Waterloo, Ontario, from Sunday evening, May 18 through Wednesday, May 21, 2003. This Workshop provides an opportunity for Canadian and international researchers in Information Theory to meet and discuss aspects of their work in an informal setting.

Papers presenting new results in (but not limited to) the following areas are solicited:

- Applications of information theory
- 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 a 500 word summary. All summaries should be sent to one of the Workshop Co-Chairs listed below, and should include the authors' names, complete mailing addresses, telephone and fax numbers, and e-mail addresses (as applicable). Electronic submission of Microsoft Word or Postscript files is encouraged.

The deadline for submission is **January 7, 2003**. Acceptance will be announced in **early February 2003**. Authors of papers accepted for the workshop will be requested to submit a four page paper no later than **March 24, 2003**.

Correspondence regarding the Workshop should be addressed to one of the Workshop Co-Chairs:

Dr. En-hui Yang
Dept. of Electrical and Computer Engineering
University of Waterloo
200 University Avenue West
Waterloo, Ontario N2L 3G1
Phone: (519) 888-4567 ext. 2873
Fax: (519) 746-3077
Email: ehyang@bbcr.uwaterloo.ca

Dr. Brendan J. Frey
Dept. of Electrical and Computer Engineering
University of Toronto
10 King's College Rd.
Toronto, Ontario M5S 3G4
Phone: (416) 978-7001
Fax: (416) 946-7162
Email: frey@psi.toronto.edu

For further information on this Workshop, please visit our web page at:

http://www.multicom.uwaterloo.ca/cwit2003/

Sponsored by: Canadian Society for Information Theory, The Information Theory Chapter of the K-W IEEE Section.

CONFERENCE ANNOUNCEMENT

The 2004 IEEE International Symposium on Information Theory will be held at the Chicago Downtown Marriott in Chicago, Illinois, from Sunday, June 27, through Friday, July 2, 2004. The theme of ISIT 2004, "Exploring New Connections," represents a focus on fostering new connections among people, technical areas and ideas, both within the traditional boundaries of Information Theory, and beyond in related fields. Previously unpublished contributions to the following areas will be solicited in the call for papers:

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

The conference site is the Chicago Downtown Marriott Hotel, located on the "Magnificent Mile" of Michigan Avenue, near the Chicago river and lake front. The submission deadline and detailed information on special events, accommodations, travel arrangements, excursions, and pre-conference tutorials will be posted on the conference web site.

`http://www.isit2004.org`

Inquiries on general matters related to the Symposium should be addressed to Professor Daniel Costello (Email: dcostel1@nd.edu) or Professor Bruce Hajek (Email: b-hajek@uiuc.edu).

Conference Calendar

DATE	CONFERENCE	LOCATION	CONTACT/INFORMATION	DUE DATE
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	http://ece.iisc.ernet.in/ieee-itw2002/	June 1, 2002
November 17-21, 2002	**GLOBECOM 2002**	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	March 31, 2002
March 12-14, 2003	**37th Annual Conference on Information Sciences and Systems (CISS '03)**	The Johns Hopkins University, Baltimore, Maryland	2003 CISS Barbara Sullivan, Conference Coordinator The Johns Hopkins University 3400 N. Charles Street Baltimore, MD 21218 Phone: 410-516-7033 Fax: 410-516-5566 Email: ciss@jhu.edu http://www.ece.jhu.edu/ciss/index.html	January 3, 2003
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	See CFP in this issue. http://www.multicom.uwaterloo.ca/cwit2003	January 7, 2003
June 29 - July 4, 2003	**2003 IEEE International Symposium on Information Theory (ISIT)**	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 +81-45-339-4116 +81-45-338-1157 (fax) isit2003@kohnolab.dnj.ynu.ac.jp http://www.isit2003.org	Nov. 1, 2002

Conference Calendar

DATE	CONFERENCE	LOCATION	CONTACT/INFORMATION	DUE DATE
July 6-11, 2003	**2003 IEEE Information Theory Worshop**	Hong Kong, China	Victor Keh-wei Wei and Raymond Wai-ho Yeung The Chinese University of Hong Kong whyeung,kwwei}@ie.cuhk.edu.hk http://itwhk03.cs.ust.hk	TBA
September 1-5, 2003	**3rd International Symposium on Turbo Codes and Related Topics**	Brest, France	http://www-turbo.enst-bretagne.fr/	March 31, 2003
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	February 15, 2003
June 20 - 24, 2004	**2004 ICC**	Paris, France	http://www.icc2004.org	TBA
June 27 - July 2, 2004	**2004 IEEE International Symposium on Information Theory (ISIT)**	Chicago, Illinois, USA	http://www.comm.csl.uiuc.edu/isit2004/	TBA
August 27-29, 2003	**13th IFAC Symposium on System Identification**	Rotterdam, The Netherlands	Prof. Paul Van den Hof Delft University of Technology The Netherlands p.m.j.vandenhof@tnw.tudelft.nl www.sysid2003.nl	Nov. 20, 2002
TBA	**2005 IEEE International Symposium on Information Theory (ISIT)**	Adelaide, AUSTRALIA		TBA

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Piscataway, NJ 08855-1331 USA