IEEE Information Theory Society Newsletter

President's Column

Giuseppe Caire

It feels like just yesterday since I started my term as President of the Information Theory Society, and one year has almost passed! Looking back, it has been a good year, with more ups than downs, full of exciting events as well as challenges for our Society. Both ISIT and ITW took place in fairly unusual locations: Saint Petersburg, Russia, and Paraty, Brazil. Although not planned in advance, in the midst of the present economic crisis, focusing on the BRIC (with all due respect for the PIGS) was somehow a sign of the times. Letting alone the jokes on global politics and economics, it is a matter of fact that our Society is expanding its global outreach. The "C" (China) and the "I" (India) of "BRIC" are also overdue, and I am very pleased that the Board of Governors approved the organization of ISIT in Hong Kong in 2015.

Another highlight of 2011 was the Annual School of Information Theory, in Austin TX. In only a few years since its creation, the Annual School has become a major event, with a steady 200+ graduate students, and tens of faculty, lecturers and visitors from industry, attending and participating every year. Together with the European Winter School of Information Theory, that in 2011 was held in Barcelona, the School represents an exceptionally successful initiative of the Society towards its membership, and in particular towards our student members, who represent the future of our society and of our field. The two next Annual Schools are already planned for 2012 and 2013, in Cornell University and in Purdue University, respectively.

Talking about students, I'd like to acknowledge and congratulate the recipients of the 2011 ISIT Student Paper Award. The Award Committee decision has not been an easy one, with several high quality papers and presentations offered at ISIT. Wisely, the Award Committee decided to hold its decision in order to go over the top candidate papers again after the conference. Finally, the 2011 Student Paper Award was given to: A. Ingber, for the paper "The Dispersion of Infinite Constellations" (co-authored with R. Zamir and M. Feder), Y. Wu, for the paper "Degrees of Freedom of the Interference Channel: A General Formula" (co-authored with S. Shamai

and S. Verdú) and L. Zhang, for the paper "Capacity of Gaussian Channels with Duty Cycle and Power Constraints" (co-authored with D. Guo).

As said, this year has (almost) gone, and my term as the Society President is ending. In this regard, I'd like to congratulate the newly elected officers, our President for 2012, Muriel Médard, First Vice-President, Gerhard Kramer, and Second Vice-President, Abbas El Gamal. 2012 will be a jam-packed year for our Society, including the five-year review of our Transactions and of the Society by the corresponding IEEE Technical Activity Board committees, and ISIT at M.I.T., which is expected to beat all records of submission and attendance. I am fully confident that with Muriel, Gerhard and Abbas the Society is in great and capable hands, and that all challenges will be met with vision, leadership and dedication.

2011 has also been a critical transition year for the Transactions on Information Theory. Our new Editor in Chief, Helmut Bölcskei, presented the State of The Transactions and announced his editorial plan at the annual Board of Governors meeting in Saint Petersburg. While classical bibliometric indicators such as total number of citations, impact factor, eigenfactor, and article influence score are strong (in fact,the Transactions rank at the top in terms of total citations over all IEEE journals, other parameters such as sub-to-pub (time from first submission to publication) and publication queue (time from acceptance to publication, are not yet in line with our objectives and with the standards of top-quality journals. Helmut has taken several steps to tackle these long-standing problems. In particular, following his proposal, we approved to increase the page budget for 2011 in order to keep the publication queue under control. The transition from the old paper management system (Pareja) to the new system (ScholarOne), the increase of fast-rejects, and the introduction of a firm policy to avoid the re-submission of rejected papers without a duly and comprehensive revision, will play a key role in reducing the sub-to-pub time. Also, Helmut's effort to increase

From the Editor

Tracey Ho

Dear IT Society members,

In this issue we have Giuseppe Caire's last column as President of the IT Society. Please join me in thanking him for his inspiring and dedicated leadership over the past year, and in welcoming Muriel Médard as the incoming President next year. Gerhard Kramer's article, the second in our "Teaching IT" series, provides a fresh look at the classical Gelfand-Pinsker problem. Also in this issue are workshop and symposium reports, the minutes from the Board of Governors meeting at ISIT, and the announcement of the ISIT Student Paper Award winners – warmest congratulations on your outstanding work!

It's hard to believe that it's been three years since I started as newsletter editor and that I'm putting together my last issue. I've enjoyed working with all the contributors and, more recently, with the newsletter committee – many thanks to all for your great contributions and suggestions! And a big thank you to the past and present IT Society officers who helped me figure out the ropes and gave me very valuable advice at all stages.

I was very pleased to learn that Tara Javidi will be the next newsletter editor – please join me in welcoming her to the position. While announcements, news and events intended for both the printed newsletter and the website can be submitted jointly at the IT Society website http://www.it-soc.org/ using the links "Share News" and "Announce an Event", articles that do not fall into the above categories should be e-mailed to her at ITsocietynewsletter@ece.ucsd. edu, with a subject line that includes the words "IT newsletter". The deadlines for the next few issues are:
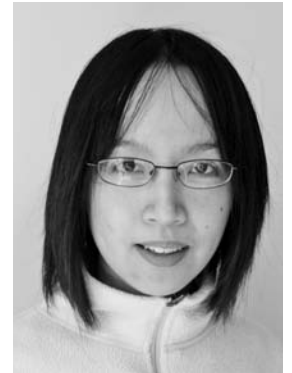
Issue	Deadline
March 2012	January 10, 2012
June 2012	April 10, 2012
September 2012	July 10, 2012

Please submit ASCII, LaTeX or Word source files; do not worry about fonts or layout as this will be taken care of by IEEE layout specialists. Electronic photos and graphics should be in high resolution and sent as separate files.

Thank you for your support and readership, and I look forward to continuing to enjoy your contributions in future issues.

Tracey Ho

Table of Contents

President's Column *continued from page 1*

the number of more senior people to serve as Associate Editor, including people who have served before, is paying off, as you can see from the inside front cover of the Transactions. I'd like to express all my gratitude and appreciation to Helmut and to the members of the executive editorial board, G. David Forney Jr., Shlomo Shamai (Shitz), Sergio Verdú, and Alexander Vardy for their effort and dedication.

However, maintaining the quality of the Transactions on Information Theory should not just be up to the efforts of the Editor in Chief and brave and dedicated Associate Editors. This should be the most cherished value for the whole Society, and requires a change of culture of all our members and, more generally, of all those researchers who have a vested interest in seeing our Transactions thrive and be universally recognized as a top-quality journal.

This change of culture calls on all of us to provide timely and high quality reviews, and stop considering reviewing papers as an overhead, but as a center piece of our activity as part of a scientific community. While I am writing this article, I am well aware of the fact that I have a few overdue reviews (yes, you can call this an "outing"), and that I have pushed back these reviews, since every day there is something more urgent to do. So, when I call for a change of culture, I definitely put myself among those who should improve.

In particular, I'd like to invite all Society members to help Helmut and the Transactions' editorial board to improve the review processing time of our Transactions, by acting as responsible reviewers, and accepting our own share of work, for the sake of the common good of our scientific community. After all, high-quality volunteers' service is the most precious resource of our Society, and it is time that we all feel engaged to make a difference.

Beyond improving the review time, it is a matter of fact that lately the Transactions have received an exponentially growing number of first submissions, in more and more diverse areas. Reasoning about the long term evolution of the Transactions has become a key strategic issue. For this reason, following Helmut's recommendation, I created an ad-hoc committee for the Future of the Transactions, chaired by Abbas El Gamal. This committee will provide a comprehensive "vision" plan for the future of the Transactions on Information Theory by the end of 2012, taking into account the ongoing evolution of publications inside IEEE, such as electronic-only publication, open-source, single paper publications (i.e., every paper is published with its own electronic publishing identifier on IEEE Xplore, not as part of an issue and volume) and other issues of this sort, which are difficult to predict but might have very important consequences on the way we will publish peer-reviewed archival scientific work in the future.

I'd like to conclude my last column with an enormous "thanks" to the two past presidents, Frank Kschischang and Andrea Goldsmith. They have been an enormous source of help and guidance for me. I hope I will be able to be as useful to the next Officers as they have been to me.

Teaching IT: An Identity for the Gelfand-Pinsker Converse

Gerhard Kramer

It can be useful to know that there is more than one way to prove a result. This article reviews an alternative proof of the converse for Gelfand and Pinsker's classic capacity theorem for channels with state known non-causally at the encoder [1]. The problem under consideration is also known as the "Gelfand-Pinsker problem" or the "writing on dirty paper" problem [2]. The main step of the alternative proof replaces the Csiszár sum identity with a telescoping identity.

A. Problem and Solution

The Gelfand-Pinsker problem is depicted in Fig. 1. A source puts out the word

$$M^b = M_1 M_2 \ldots M_b$$

of b message bits that has entropy $H(M^b) = nR$ bits where n is positive integer and R is non-negative real. The channel $P_{Y|XS}(\cdot)$ has interference in the form of a word

$$S^n = S_1 S_2 \ldots S_n$$

that is output from a discrete memoryless source $P_S(\cdot)$. The encoder has access to the interference S^n in a noncausal fashion, i.e., the encoder knows S^n ahead of time. The receiver does not know S^n. The encoder maps M^b and S^n to a channel input word X^n, and the decoder maps the channel output word Y^n to an estimate $\hat{M}^b$ of the message bits.

The problem is to find the supremum of the set of R such that for any $\epsilon_B, \epsilon_B > 0$, there is an integer n, an encoder, and a decoder such that $\Pr[\hat{M}^b \neq M^b] \leq \epsilon_B$. The solution of this problem is known to be (see [1])

$$C = \max_{P_{UX|S}} \left[I(U; Y) - I(U; S) \right] \qquad (1)$$

where $U - SX - Y$ forms a Markov chain. It turns out that X may be chosen as a deterministic function of US. For finite alphabets one may add an alphabet constraint on U, and one may add cost constraints. However, we will be interested in the expression (1) only.

B. Functional Dependence Graphs

To aid understanding, I find it useful to draw the relations between the random variables by using a *functional dependence graph* or FDG (see [3, Ch. 2] and [4, Appendix A.9]). The FDG for our problem is shown in Fig. 2 for $n = 3$ channel uses. The random variables represented by hollow circles are statistically independent. The encoder is the word of functions $f^n(\cdot) = f_1(\cdot) f_2(\cdot) \ldots f_n(\cdot)$ which maps $M^b S^n$ to a word X^n with discrete-alphabet letters

$$X_i = f_i(M^b, S^n), \quad i = 1, 2, \ldots, n.$$

Next, the channel is defined by a discrete-valued function $g(\cdot)$ and a word Z^n of independent and identically distributed (i.i.d.) noise random variables that is statistically independent of $M^b S^n$. The word Y^n is defined by[1]

$$Y_i = g(X_i, S_i, Z_i), \quad i = 1, 2, \ldots, n.$$

Finally, the decoder is a function $h(\cdot)$ that puts out the message estimate

$$\hat{M}^b = h(Y^n).$$

C. Fano's Inequality for Average Bit Error Probability

Consider the converse. The block error probability ϵ_B is greater than or equal to the average bit error probability

$$\epsilon = \frac{1}{b} \sum_{i=1}^{b} \Pr[\hat{M}_i \neq M_i].$$

---

[1] Shannon first used a functional approach to describe a *channel* in his classic paper [5, Sec. 11]. The "conditional probability distribution" that is usually used today was his second choice.
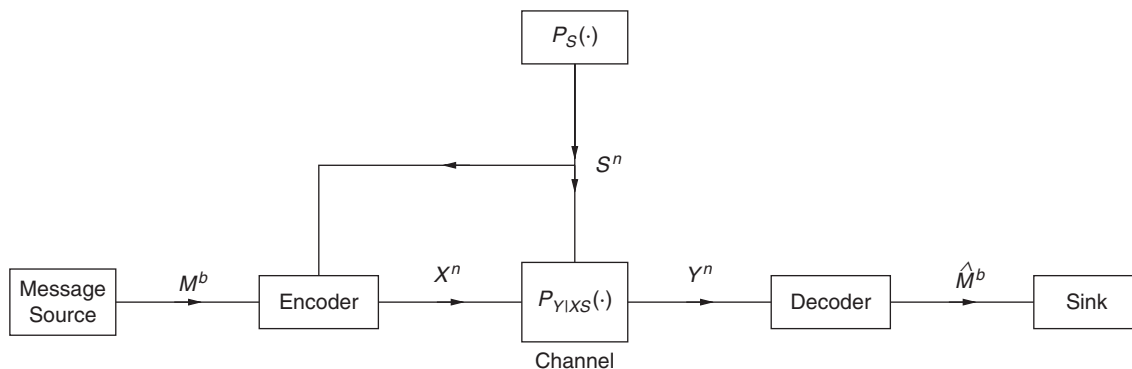

Fig. 1. Model for the Gelfand-Pinsker problem.

Thus, to make ϵ_B small we must make ϵ small. But Fano's inequality for average bit error probability (see [4, Ch. 3.3]) states that

$$nR - bH_2(\epsilon) \le I(M^b; Y^n) \tag{2}$$

where $H_2(\cdot)$ is the binary entropy function. We have $nR \le b$ and one usually chooses message bits from a binary symmetric source so that $b = nR$. If one prefers to fix R, one may choose $b = \lceil nR \rceil$ for example. The important thing is that b grows proportionally with n.

D. A First Identity

A common converse invokes an identity sometimes called the *Csiszár sum identity* [6, p. 409], [7, Sec. 2.3], namely

$$\boxed{\sum_{i=1}^{n} I(A_i; B_{i+1}^n | A^{i-1}) = \sum_{i=1}^{n} I(B_i; A^{i-1} | B_{i+1}^n).} \tag{3}$$

Here the notation A^{i-1} and B_{i+1}^n refer to the words

$$A^{i-1} = A_1 A_2 \ldots A_{i-1}, \text{ and } A^0 = \text{constant}$$

$$B_{i+1}^n = B_{i+1} B_{i+2} \ldots B_n, \text{ and } B_{n+1}^n = \text{constant}$$

where the "constant" is any choice of permitted letter. The identity (3) of course remains valid if one conditions all mutual information terms on a common random variable.

E. Converse Proof

Returning to (2), we have

$$I(M^b; Y^n) = \sum_{i=1}^{n} I(M^b; Y_i | Y^{i-1}) \tag{4}$$

$$= \sum_{i=1}^{n} I(M^b; Y_i | Y^{i-1})$$

$$+ \sum_{i=1}^{n} [I(Y_i; S_{i+1}^n | M^b Y^{i-1}) - I(S_i; Y^{i-1} | M^b S_{i+1}^n)] \tag{5}$$

$$= \sum_{i=1}^{n} [I(M^b S_{i+1}^n; Y_i | Y^{i-1}) - I(S_i; Y^{i-1} | M^b S_{i+1}^n)] \tag{6}$$

where (5) follows by (3) with $A_i = Y_i$, $B_i = S_i$, and by conditioning on M^b. Defining $U_i = M^b S_{i+1}^n Y^{i-1}$, we have

$$I(M^b S_{i+1}^n; Y_i | Y^{i-1}) = H(Y_i | Y^{i-1}) - H(Y_i | U_i)$$

$$I(S_i; Y^{i-1} | M^b S_{i+1}^n) = H(S_i) - H(S_i | U_i).$$

Since conditioning does not increase entropy, we have

$$I(M^b; Y^n) \le \sum_{i=1}^{n} [I(U_i; Y_i) - I(U_i; S_i)]$$

$$\le n \max_i [I(U_i; Y_i) - I(U_i; S_i)] \le n\, C \tag{7}$$

where the last step follows because $U_i - S_i X_i - Y_i$ forms a Markov chain for all i.[2] Inserting (7) into (2), we have

[2] Use *fd*-separation in the FDG of Fig. 2; see [4, Appendix A.9].
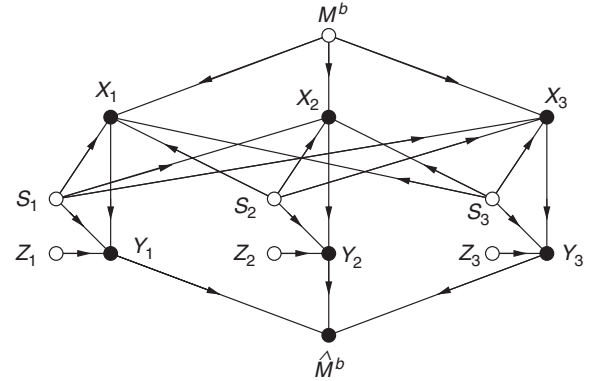
Fig. 2. FDG for the Gelfand-Pinsker problem and *n* = 3.

$$R - \frac{b}{n} H_2(\epsilon) \le C. \tag{8}$$

which is our desired converse. We remark that (8) is tight if $b = nR$ and n is large.

F. Alternative Proof

Consider the following alternative expansion to (4) (see [4, Ch. 6.6]):

$$I(M^b; Y^n) = \sum_{i=1}^{n} [I(M^b S_{i+1}^n; Y^i) - I(M^b S_i^n; Y^{i-1})]. \tag{9}$$

To verify (9), note that terms cancel pairwise in the sum except for two boundary terms for $i = n$ and $i = 1$, i.e., the sum in (9) is a *telescoping sum*. Now expand

$$I(M^b S_{i+1}^n; Y^i) = I(M^b S_{i+1}^n; Y^{i-1}) + I(M^b S_{i+1}^n; Y_i | Y^{i-1})$$

$$I(M^b S_i^n; Y^{i-1}) = I(M^b S_{i+1}^n; Y^{i-1}) + I(S_i; Y^{i-1} | M^b S_{i+1}^n)$$

and insert into (9) to recover (6). We have thus bypassed (3). Moreover, for all cases where (3) is used in the literature, there is a telescoping sum such as (9) that also works, and that often simplifies the proof by several steps.[3]

G. A Telescoping Identity

The reader may suspect that (3) and (9) are based on the same idea. Indeed, a simple proof of (3) uses the *telescoping identity*

$$0 = \sum_{i=1}^{n} [I(A^i; B_{i+1}^n) - I(A^{i-1}; B_i^n)] \tag{10}$$

or alternatively

$$\boxed{\sum_{i=1}^{n} I(A^i; B_{i+1}^n) = \sum_{i=1}^{n} I(A^{i-1}; B_i^n).} \tag{11}$$

Expanding the summands in (11), we recover (3) via

$$I(A^i; B_{i+1}^n) = I(A^{i-1}; B_{i+1}^n) + I(A_i; B_{i+1}^n | A^{i-1})$$

$$I(A^{i-1}; B_i^n) = I(A^{i-1}; B_{i+1}^n) + I(B_i; A^{i-1} | B_{i+1}^n).$$

[3] Gelfand and Pinsker also used a telescoping argument in their converse, but a different one; see [1, Eq. (4.6)].

We remark that the telescoping identity (11) is slightly simpler than the Csiszár sum identity (3). As a result, it is often easier to see a converse proof path via (11) rather than (3).

H. Discussion

Bo Bernhardsson attended a lecture I gave on the Gelfand-Pinsker problem in Lund in 2008, and he observed that telescoping reminded him of *integral calculus*. I feel that this insight could be useful.[4] For example, are there identities that generalize (9)–(11) in the sense that they can be interpreted as *multidimensional* integrals (sums) and derivatives (differences)? Perhaps such extensions can help to break the logjam in developing tight converses for broadcast channels with three or more receivers? One can always hope.

I. Concluding Remarks

Tracey Ho and Jörg Kliewer asked me to remark on why I chose the topic at hand for a "Teaching IT" article. The main motivation is to in turn motivate more work clarifying the converses for problems where the capacity involves strange "auxiliary random variables". For example, for the Gelfand-Pinsker problem the choice $U_i = M^b S_{i+1}^n Y^{i-1}$ is mysterious because the transmitter does not have access to Y^{i-1}. The converse thus does not "match" the coding theorem argument, as one expects it should. Furthermore, the Y^{i-1} prevents extending the proof method to other problems. One can make similar comments concerning broadcast channels.

Acknowledgments

I would like to thank Max Costa for reviewing the document. I found his thoughts insightful, so with his permission I have repeated an excerpt of his text below. For example, I chose the name "telescoping identity" based on Max's review. Interestingly, Frank Kschischang had similar comments upon reading an early version of the document. Frank also thought of divergence and Jim Massey's source coding work.

Max Costa: "The proof has a resemblance with the telescoping technique to calculate the sum of a geometrical progression. It is based on taking a step and subtracting, essentially the operations involved in computing a derivative. Naturally, Gauss's Theorem (Divergence Theorem) also relates to the idea. It also reminded me of a presentation that Jim Massey gave in the impromptu New Results Session of ISIT in Trondheim, Norway, in 1994. The audience and Jim agreed that the result had a calculus interpretation. The result appeared later as the paper "Leaf-Average Node-Sum Interchanges in Rooted Trees with Applications", by R. A. Rueppel and J. L. Massey, in the commemorative book Communications and Cryptography: Two Sides of One Tapestry, edited by R. E. Blahut, D. J. Costello, Jr., U. Maurer, and T. Mittelholzer."

---

[4]Integral (sum) and derivative (difference) identities help to understand how to design iteratively-decodable codes [8, 9, 10, 11] and how to understand relations between estimation and information theory [12]. Such identities are also useful for source coding problems, see the acknowledgments.

References

[1] S. I. Gel'fand and M. S. Pinsker, "Coding for channels with random parameters," *Problems of Control and Inform. Theory*, vol. 9, no. 1, pp. 19–31, 1980.

[2] M. H. M. Costa, "Writing on dirty paper," *IEEE Trans. Inf. Theory*, vol. 29, no. 3, pp. 439–441, May 1983.

[3] G. Kramer, *Directed Information for Channels with Feedback*, vol. ETH Series in Information Processing, Vol. 11, Hartung-Gorre Verlag, Konstanz, Germany, 1998.

[4] G. Kramer, "Topics in multi-user information theory," *Foundations and Trends in Networking*, vol. 4, no. 4–5, pp. 265–444, 2007.

[5] C. E. Shannon, "A mathematical theory of communication," *Bell Syst. Tech. J.*, vol. 27, pp. 379–423 and 623–656, July and October 1948, Reprinted in *Claude Elwood Shannon: Collected Papers*, pp. 5–83, (N.J.A. Sloane and A.D. Wyner, eds.) Piscataway: IEEE Press, 1993.

[6] I. Csiszár and J. Körner, *Information Theory: Coding Theorems for Discrete Memoryless Channels*, Akadémiai Kiadó, Budapest, 1981.

[7] A. El Gamal and Y.-H. Kim, *Network Information Theory*, Cambridge, 2011, Draft.

[8] S. ten Brink, "Exploiting the chain rule of mutual information for the design of iterative decoding schemes," in *Proc. 39th Annual Allerton Conf. on Commun., Control, and Computing*, Monticello, IL, 2001.

[9] A. Ashikhmin, G. Kramer, and S. ten Brink, "Extrinsic information transfer functions: model and erasure channel properties," *IEEE Trans. Inf. Theory*, vol. 50, no. 11, pp. 2657–2673, Nov. 2004.

[10] C. Measson, A. Montanari, T. Richardson, and R. Urbanke, "The generalized area theorem and some of its consequences," *IEEE Trans. Inf. Theory*, vol. 55, no. 11, pp. 4793–4821, Oct. 2009.

[11] S. Kudekar, T. Richardson, and R. Urbanke, "Threshold saturation via spatial coupling: why convolutional LDPC ensembles perform so well over the BEC," in *Proc. IEEE Int. Symp. Inform. Theory*, Austin, TX, June 13–18 2010, pp. 684–688.

[12] D. Guo, S. Shamai, and S. Verdú, "Mutual information and minimum mean-square error in Gaussian channels," *IEEE Trans. Inf. Theory*, vol. 51, no. 4, pp. 1261–1282, Apr. 2005.

The Historian's Column

Anthony Ephremides

Today's column owes its content to the honorary Historian Toby Berger who has frequently suggested and contributed most interesting topics and ideas. This one concerns the Bussgang theorem. Julian Bussgang is a long-time member of our community who has had a distinguished career in Communications Theory and Applications. One of his best known contributions is the method for computing autocorrelation functions from discrete Gaussian data, known as the Bussgang theorem. The method estimates R(n) by adding the observed values of the data but reversing the sign of each summand if the value of the term n units away is negative and then normalizing the result. The method is very simple and when it was invented (back around 1950) a distinct advantage of it was the fact that no multiplications were needed.

This result was part of Julian's MS thesis and was never published (our Transactions did not exist yet when he invented this method) but was eventually included in a collection of Benchmark Papers edited by Abe Haddad in 1975. It was published as a technical report within the Research Laboratory of Electronics of MIT in 1952. Actually, as Julian tells it, it was named "Bussgang's theorem" by Athanasios Papoulis in his well known book on Probability, Random Variables, and Stochastic Processes in the '60's.

It became the basis for a process known as "Bussgang's Algorithm" used in modems for blind equalization.

In a recent exchange of letters between Toby and Julian it was revealed that the way Julian thought of this method was, when as a graduate student of Jerry Wiesner at MIT, he became aware of Van Vleck's theorem that basically says that the autocorrelation of a clipped Gaussian signal is proportional to the arcsin of its unclipped version. By the way, Van Vleck was a professor at Harvard and later won the Nobel Prize in Physics. This inspired Julian to cross-correlate the clipped and the unclipped versions and he observed that the result was proportional to the autocorrelation of the unclipped. He later extended this to other nonlinear distortions (beyond just clipping). There are still details involved that convert these observations to the aforementioned method that estimates the autocorrelation in a very simple manner. An interesting speculation by Julian is that this intrinsic property of the correlations of Gaussian signals may explain why clipped speech continues to be quite intelligible.

There are of course issues about the quality of this estimate and a detailed analysis is not available to fully answer the questions that one could ask prompted by this remarkable result.

It was not trivial to persuade his advisor that the result was correct. Apparently, Wiesner consulted Yuk-Wing Lee at RLE, who verified the correctness of the claim and thus Julian got his thesis. As an aside, I am urging the reader to speculate about how many MS theses nowadays are of comparable caliber. But this is another, bigger story.

Julian engaged in some other activities (let us call them "para-professional") that added spice to the exchange between Toby and Julian, which Toby communicated to me. It turns out that a common friend of all three of us, Terry Fine, enters in the picture. Terry "told" on Julian to Toby when he revealed that in 1957–58 Julian was caught speeding at 85 miles per hour in a 5 miles-per-hour zone and was allowed to walk away (or, more correctly, drive away) unfined. The issue of a "fine" revealed by Terry Fine is a mere coincidence.

How did that happen? Well, it turns out that Julian was sent to Cape Canaveral in Florida when he started working at the Aerospace Division of RCA. He was with a colleague of his and they decided to do some sightseeing and drove to nearby Daytona. They went right on the beach where people do drive but at a severely low speed limit of 5 mph. The two colleagues erroneously thought that this beach was the famous Daytona Speedway where cars are racing as part of world-famous competitions. So, they went for it and zoomed at 85 mph. Luck had it that it was a cool day and only few people on the beach. So, no one was hurt. Sure enough they were stopped (Julian was driving) but they had the good fortune to deal with an exceptionally nice police officer who accepted their explanation of misjudging the beach for the famous race-track and let them go. I wish I had their luck when I was stopped recently for crawling at 1 mph through a stop sign!

For those who do not know Julian, here is some biographical information. He was born in 1925 in Lwow, Poland, which eventually was "absorbed" by the Soviet Union, and is now Lviv in Ukraine. In 1939 he fled the Nazis and ended up in Tel Aviv where he finished high school. He went on to fight in the War and came to the United States in 1949. He got his CS degree from the University of London, his MS degree from MIT, and his PhD from Harvard (in Physics). He worked for most of his life in the Electronics Industry and after retiring he served as a volunteer in the International Executive service Corps in Warsaw and Krakow, helping privatize Polish industrial firms. Recently (Sept 22, 2011) he was decorated with a Knight's Cross of the Order of Merit of the Republic of Poland for his activities in the cause of Polish-Jewish dialog at a special event at the Consulate General of Poland in New York.

I thought this story was a fascinating example of the variety of notable members our Community boasts among its ranks. There are many colleagues, young and old, who each, in his/her own way, is unique and noteworthy both as scientists and engineers as well as citizens of the world.

International Symposium on Information Theory (ISIT) 2011 Student Paper Award

The ISIT 2011 Student Paper Award winners are

A. Ingber, for the paper "The Dispersion of Infinite Constellations". co-authored with R. Zamir and M. Feder

Y. Wu, for the paper "Degrees of Freedom of the Interference Channel: A General Formula", co-authored with S. Shamai and S. Verdú

L. Zhang, for the paper "Capacity of Gaussian Channels with Duty Cycle and Power Constraints", co-authored with D. Guo

The ISIT Student Paper Award is given annually for up to three outstanding papers at the ISIT for which a student is the principal author and presenter. This author must be a registered student at the time of paper submission to be eligible for this award. The criteria for the award include both content and presentation. The award consists of a $500 honorarium divided equally among all student authors of the paper, and a plaque for each such author.

GOLOMB'S PUZZLE COLUMN™

The Sequence $n^3 - n$

Solomon W. Golomb

For every $n > 1$, each term of the sequence $\{n^3 - n\}$ is the product of three consecutive positive integers, $n - 1, n$, and $n + 1$. The sequence begins $\{6, 24, 60, 120, 210, 336, \ldots\}$. Here are some questions about this sequence.

1) For which values of $n > 1$ is $n^3 - n = k!$ for some integer k?

2) For $n > 3$, prove that $n^3 - n$ must have at least three different prime factors.

3) What are all the values of $n > 1$ for which $n^3 - n$ has (only) three different prime factors? (The same prime factor is allowed to occur more than once in $n^3 - n$.)

4) What three different conditions on one of $(n - 1, n, n + 1)$ may make it possible for $n^3 - n$ to have (only) four different prime factors? (The same prime factor is allowed to occur more than once.) The number of cases of each type appears to be infinite, but this cannot currently be proved.

5) Try to list all $n, 3 < n < 10^6$, for which $n^3 - n$ has exactly four different prime factors. The same prime factor is allowed to occur more than once. (A computer program may be used, but the number of examples is not huge.)

From here on, we consider only those $n > 1$ for which $n^3 - n$ is *square-free*; i.e. that each prime factor of $n^3 - n$ occurs only to the first power.

6) Which two prime numbers must divide $n^3 - n$ for every $n > 1$? What can you say about which factors, among $n - 1, n$, and $n + 1$, each of these two primes will divide?

7) Asymptotically, what fraction of integers $n, 1 < n \le x$, give square-free values of $n^3 - n$? (Give an infinite product expression and a numerical value.)

8) Show that if $n^3 - n$ is square-free, it can have $k < 5$ distinct prime factors only finitely many times.

9) List all values of $n > 1$ for which $n^3 - n$ is square-free with k distinct prime factors, $1 < k < 5$.

10) List the first three occurrences of square-free $n^3 - n$ having exactly k distinct prime factors for each $k, 5 \le k \le 10$. (The smallest cases for $k = 5, 6, 8$, and 9 are remarkable for the number of different small prime factors found among three consecutive integers.)

GOLOMB'S PUZZLE COLUMN™

Primes and Divisibility Solutions

Solomon W. Golomb

1) The probability that random n is not a multiple of p^2 is $1 - (1/p^2)$, for any given prime number p; and using the statistical independence of divisibility by p_i and by p_j for $i \neq j$, the probability that n has no square factor is given by

$$\prod_{\text{allprimes } p_i} \left(1 - \frac{1}{p_i^2}\right) = \frac{6}{\pi^2} = 0.6079271\ldots$$

(Here we used Euler's product formula for the Zeta-function,

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s} = \prod_{\text{all } p_i}(1 - p_i^{-s})^{-1} \text{ for } Rl(s) > 1, \text{ and Euler's}$$

result $\zeta(2) = \sum_{n=1}^{\infty}\frac{1}{n^2} = 1 \Big/ \prod_{\text{all } p_i}\left(1 - \frac{1}{p^2}\right) = \frac{\pi^2}{6}.$)

2) Let m and n be two randomly chosen positive integers. For any given prime p_i the probability that p_i divides m is $1/p_i$, and the probability that p_i divides n is $1/p_i$, so by independence, the probability that p_i divides both m and n is $1/p_i^2$. (Sanity check: the probability that randomly chosen m and n are both even, i.e. divisibility 2, is $(1/2)^2 = 1/4$.) So the probability that p_i does not divide both m and n is $1 - (1/p_i^2)$. Thus, the probability that no prime divides both m and n is given by

$$\prod_{\text{all } p_i}\left(1 - \frac{1}{p_i^2}\right) = \frac{6}{\pi^2} = 0.6079271\ldots,$$

the same answer as in Problem 1.

3) The probability that a random square-free positive integer is a multiple of a specific prime number q is $1/(q + 1)$. To show this, recall from Problem 1. that the "density" of the set of square-free positive integers is given by

$$\prod_{\text{all } p_i}\left(1 - \frac{1}{p_i^2}\right) = \left(1 - \frac{1}{q^2}\right)\prod_{\text{all } p_i \neq q}\left(1 - \frac{1}{p_i^2}\right).$$

The "density" of positive integers divisible by no p_i^2 for $p_i \neq q$, but divisible by q through not by q^2, is given by

$$\left(\frac{1}{q} - \frac{1}{q^2}\right)\prod_{\text{all } p_i \neq q}\left(1 - \frac{1}{p_i^2}\right).$$

The ratio of this density of square-free positive integers divisible by q to the density of all square-free positive integers is thus:

$$\left(\frac{1}{q} - \frac{1}{q^2}\right)\Big/\left(1 - \frac{1}{q^2}\right) = \frac{q - 1}{q^2 - 1} = \frac{1}{q + 1},$$

where the infinite products canceled between numerator and denominator.

4) For $n \in \mathbb{Z}^+$ and n square-free, write $n = \prod_{i=1}^{k} q_i$. Then, from Problem 3., and statistical independence between divisibility by q_i and q_j for $i \neq j$, the probability that a random positive square-free integer is divisible by square-free n is given by $\prod_{i=1}^{k}(1/(q_i + 1))$. (For $n = 1$, this is the empty product, which equals 1, so all square-free positive integers are divisible by 1.)

(Note that $\prod_{i=1}^{k}(1/(q_i + 1)) = 1/(\sigma(n))$, where $\sigma(n)$ is the sum of all integer divisors of n, including 1 and n.)

5) In the vicinity of x, the probability that an integer n is prime (by the PNT) is $\approx 1/(\ln x)$, and $n + 2$ is also in the vicinity of x, so it too has a probability of $1/(\ln x)$, of being prime; but these two probabilities are not independent. If n is prime, it is odd with probability 1, and then $n + 2$ is odd, doubling the chance that $n + 2$ is prime. Now consider any prime $p > 2$. Originally, $n + 2$ would have probability $(p-1)/p$ of avoiding divisibility by p; but since n was prime, $n + 2$ must be in one of the other $p - 2$ residue classes modulo p to avoid being a multiple of p, so has only a probability of $((p-2)/(p-1))$ of avoiding divisibility by p. Thus the "correction" for $n + 2$ not being divisible by prime $p > 2$ is $((p-2)/(p-1))/((p-1)/(p)) = p(p - 2)/(p - 1)^2 = 1 - (1/(p-1))^2$. Thus, in the vicinity of x, the probability that n and $n + 2$ are both prime is given by

$$2\prod_{\text{all } p_i > 2}\left(1 - \frac{1}{(p_i - 1)^2}\right) = 1.32032\ldots = C_2,$$

and the conjectured number of "twin primes," $T_2(x)$, up to x, is

$$T_2(x) \sim C_2 \frac{x}{\ln^2 x}, \ x \to \infty.$$

6) For pairs of primes differing by $2k$, let $q_1, q_2, \ldots, q_r$ be the distinct odd prime divisors of k (if any). Then the conjectured formula is

$$T_{2k}(x) \sim \prod_{i=1}^{r}\left(\frac{q_i - 1}{q_i - 2}\right)T_2(x), x \to \infty.$$

Note. The correct value of C_2 was first determined by V. Brun, ca. 1915. The simple derivation of C_2 in the solution to Problem 5. is due to S. Golomb (1960). See also P. Ribenboim's *The Little Book of Bigger Primes, Second Edition*, Springer, 2004, pp. 194–195.

To date, no rigorous proof that the set of twin primes is infinite has been found, though the "statistical evidence" is overwhelming, and several independent approaches point toward the correctness of the asymptotic expression derived here for $T_2(x)$, and more generally for $T_{2k}(x)$.

Symposium in Remembrance of Rudolf Ahlswede, Bielefeld, July 25–26, 2011

Harout Aydinian, Ning Cai,
Christian Deppe and Ulrich Tamm

On July 25 and 26 a memorial symposium for Rudolf Ahlswede took place in the Center for Interdisciplinary Research (ZIF) at the University of Bielefeld. The symposium was organized by the ZIF and the department of mathematics in close cooperation with Rudolf Ahlswede's former students and partners of his many research projects. About 100 participants came to Bielefeld to remember life and work of Rudolf Ahlswede who had passed away suddenly and unexpectedly on December 18, 2010.

Before the official start of the symposium, a warm-up lecture by Charles Bennett on "Quantum information" already attracted a lot of interest.

The first day then was devoted to personal memories on Rudolf Ahlswede's life and academic career. After official addresses by representatives of the Center for Interdisciplinary Research (ZIF), the University of Bielefeld and the Department of Mathematics Rudolf Ahlswede's former wife Beatrix and his son Alexander gave very emotional and moving words about their joint life and also presented some anecdotes from his childhood to his late years in Bielefeld and Polle. After that his thesis advisor Konrad Jacobs looked back at the time in Göttingen.

Ahlswede's early work in the seventies was described in three lectures by Edward van der Meulen (on information theory), by Jackie Daykin, the daughter of David Daykin who passed away only a few months before Rudolf Ahlswede (on the Ahlswede-Daykin inequality) and by Mikhail Maljutov (on search problems).

The main lectures of the first day were delivered by Gunter Dueck and Ingo Althöfer, who spoke about their times as assistant professors at Rudolf Ahlswede's chair in Bielefeld covering the years from 1975 to 1985 and from 1985 to 1995, respectively.

Rudolf Ahlswede's many research projects after 1995, which continued far beyond his official retirement in 2003, were then remembered in short addresses by his former students Ulrich Tamm, Ning Cai, Bernhard Balkenhol, Christian Deppe, Andreas Winter and Christian Heup as well as by his coauthors and project partners Gurgen Khachatrian (about Ahlswede's intensive cooperation with his brother Levon), Kingo Kobayashi, Vladimir Blinovsky, Harout Aydinian, Ferdinando Cicalese, and Holger Boche.

Outside the lecture hall there were a poster wall with pictures and permanent video presentations from Rudolf Ahlswede's Shannon lecture and from the memorial session at the ITA in San Diego. At the conference dinner further videos were presented by Vladimir Lebedev and Tatiana Dolgova about their last visit in Polle and by Rüdiger Reischuk from the conference on Rudolf Ahlswede's 60th birthday.

The second day of the symposium was devoted to scientific lectures on Ahlswede's many fields of research. The main lectures of this day were delivered by Imre Csiszár (information theory), Gyula Katona (combinatorics), and András Sárközy (number theory). Further lecturers were Prakash Narayan, Andreas Winter, Alon Orlitsky, Rüdiger Reischuk, Harout Aydinian, Ning Cai, Sören Riis, Ludo Tolhuizen, László Székely, and Sergej Bezrukov.

Further participants include among others – just to mention the information theorists – Arkadi Dyachkov, Peter Gács, Te Sun Han, Gerhard Kramer, Aydin Sezgin, Faina Soloveeva, and Frans Willems.

Report on the First Workshop on Network Coding and Data Storage (NCDS 2011)

Raymond W. Yeung

Network coding is a promising methodology for reducing the amount of data transmitted over the network by mixing packet streams at the intermediate nodes in the network. One emerging application of network coding is to improve the robustness of distributed storage systems. Recent work has shown that network coding can improve the performance of data recovery in case of storage node failure, while requiring less resource (storage and/or bandwidth) than traditional storage approaches such as replication and erasure coding. Nevertheless, there remains room for substantial research work for advancing both the theoretical and practical impacts of network coding in distributed data storage.

On July 21–22, 2011, the Institute of Network Coding (INC) at The Chinese University of Hong Kong (CUHK) organized the First Workshop on Network Coding and Data Storage (NCDS 2011). The General Co-Chairs were John Lui and Raymond Yeung of CUHK. The aim of the workshop is to bring together researchers in the fields of network coding, data storage, and distributed systems to explore the potential of network coding applications in distributed storage systems.

The program consists of a number of invited talks by experts in the area:

Kannan Ramchandran, University of California, Berkeley
Network Codes for Next-Generation Distributed Storage Systems: Opportunities and Challenges

Alex Dimakis, University of Southern California
Tutorial on Distributed Storage Problems and Regenerating Codes

Patrick Lee, The Chinese University of Hong Kong
Design and Implementation of a Network-Coding-Based Distributed File System

P. Vijay Kumar, Indian Institute of Science
Efficient Code Constructions for Reliable Distributed Storage

Yinlong Xu, University of Science and Technology of China
A Hybrid Approach of Failed Disk Recovery Using RAID-6 Codes: Algorithms and Performance Evaluation

Salim El Rouayheb, University of California, Berkeley
Data Security in Distributed Storage Systems

James She, Hong Kong University of Science and Technology
Making Network Coding Social For Better Data Storage and Content Delivery

Yuchong Hu, The Chinese University of Hong Kong
The Scaling Problem for Cloud Storage

The workshop was very well attended, with a total of over 80 registrations. There were active discussions among the workshop participants, who came from Japan, Singapore, Australia, S. Africa, Australia, France, and USA. It was decided that the next workshop will be held in California in 2012, with Kannan Ramchandran and Alex Dimakis being the General Co-Chairs.

The videos and slides of all the talks can be accessed online through the INC homepage: http://www.inc.cuhk.edu.hk/ or directly at the Workshop homepage: http://www.ncds2011.inc.cuhk.edu.hk/

Workshop Report: Algebraic Structure in Network Information Theory

Michael Gastpar (UC Berkeley and EPFL),
Frank Kschischang (University of Toronto)
August 14–19, 2011, Banff, Alberta, Canada

A group of around forty researchers gathered at the Banff International Research Stations (BIRS) this summer to discuss the significance and applications of algebraic arguments in Network Information Theory. Besides the organizers, the group included invited experts and students from diverse but related fields. BIRS (http://www.birs.ca) is a joint Canadian, US, and Mexican initiative that provides an outstanding environment for creative interaction and the exchange of ideas, knowledge, and methods within the Mathematical Sciences, and with related sciences. At an elevation of 1440m, BIRS is located on the site of the astounding Banff Centre in Banff, Alberta, in the Canadian Rockies.

The aim of the workshop was to bring together researchers from pure and applied mathematics, computer science, and engineering, who are interested in problems relating to network information theory and algebraic structure. The most elegant information-theoretic proofs rely purely on statistical arguments, most notably, Shannon's random coding theorem and its many extensions. Algebraic structure only enters the picture when it comes to designing codes of realistic complexity. However, such codes typically involve a performance penalty as compared to the random coding arguments.

By contrast, in network information theory, several currently emerging applications of algebraic arguments suggest that such arguments will be key to understanding the fundamental capacity limits of networks. Historically, to the best of our knowledge, this was first observed by Körner and Marton in their 1979 paper on encoding the modulo-2 sum of dependent binary sources. Indeed, for this problem, it turns out that with random binning arguments, a strictly suboptimal performance is attained in the sense that one has to fully encode both sources (as in the Slepian-Wolf problem). By contrast, a simple construction involving random *linear* codes achieves much better (and, in fact, strictly optimal) performance.

More recently, a variety of algebraic arguments have proved to be key in a series of problems in network information theory. In network coding, the need for algebraic structure appears as soon as scenarios beyond the classical multicast are studied. In relay networks, it appears when more than one source of information is considered. In interference channels, it appears when more than two unicast connections interfere with each other. In distributed source coding, it has also been observed, though it ultimately depends on the interaction between the statistical model of the source and the reconstruction fidelity criterion.

Program

The workshop started out with a day of covering foundations, followed by four major areas within network information theory—relay networks, interference alignment, network coding, and

distributed source coding—where algebraic structure has recently been observed to play an important role. The workshop program was composed of two longer tutorial lectures and a sequence of more focused half-hour talks, interspersed with shorter student talks and ample discussion time. Indeed, an important goal of the workshop was to stimulate fruitful collaborations.

Below, we provide a listing of the talks of the workshop, grouped into the above five categories. The detailed program including abstracts, as well as slides of many talks and a video lecture can be found at http://www.birs.ca/events/2011/5-day-workshops/11w5074.

Fundamentals of Algebraic and Lattice Codes

Ram Zamir, "Lattice codes in information theory (and anti-structure problems)"
Uri Erez, "Lattice coding problems: The easy and the hard"
Sandeep Pradhan, "Asymptotically good nested linear codes: toward algebraic network information theory"
Nigel Boston, "Trellises and pseudocodewords"

Algebraic Structure in Relay Networks

Shlomo Shamai, "Lattice-based structuring to combat interference in simple wireless networks"
Bobak Nazer, "Lattice techniques in AWGN networks: What's missing?"
Urs Niesen, "The degrees of freedom of compute-and-forward"
Krishna Narayanan, "Coding for parallel Gaussian bi-directional relay channels: A deterministic approach"
Sae-Young Chung, "How helpful is algebraic structure in network information theory?"
Gerhard Kramer, "Message lengths for noisy network coding"
Slawomir Stanczak, "Applications of the Perron-Frobenius theory of nonnegative matrices in communications and information theory"
Natasha Devroye, "Lattice codes for Gaussian relay channels"
Liang Xie, "On the optimal compress-and-forward relay scheme"
Ashish Khisti, "Prospicient source-channel codes for real-time streaming"

Student talks:

Chen Feng, "An algebraic approach to physical-layer network coding"
Matthew Nokleby, "Cooperative computation over multiple-access channels"
Yiwei Song "Further comments on lattices for Gaussian relay networks"
Jiening Zhan, "Mitigating interference with integer-forcing receivers"

Algebraic Structure and Interference Alignment

Alex Vardy, "Algebraic list decoding of subspace codes"
Alex Dimakis, "Interference alignment for network coding and distributed storage"
Viveck Cadambe, "Common invariant subspaces and tensor products for interference alignment in wireless communications and distributed storage"

Sriram Vishwanath, "Structured transmission schemes for interference networks"
Aylin Yener, "Interference, structured random codes and secrecy: Lessons learned from information theory"

Student talk:

Guy Bresler, "Feasibility of interference alignment for the MIMO interference channel: the symmetric square case"

Algebraic Structure and Network Coding

Joachim Rosenthal, "Schubert calculus and its relation to network coding"
Frédérique Oggier, "An error probability approach to wiretap code design"
Emanuele Viterbo, "Wireless network coding over finite rings"
Babak Hassibi, "Network codes and groups"
Danilo Silva, "Error control and security for noncoherent network coding"
Tracey Ho, "On coding for networks with errors"

Student talks:

Katie Morrison, "Properties of rank-metric and matrix codes with applications to network coding"
Anna-Lena Trautman, "Cyclic orbit codes".

Algebraic Structure and Distributed Source Coding

Aaron Wagner, "When do structured codes help in distributed compression?"
Prakash Ishwar, "Exploring function and distribution structure in interactive computing through examples"
Mohammad Maddah-Ali, "Distributed source coding: Using lattices to eliminate unneeded layers of source"

Conclusions Drawn

The workshop achieved its main goal of providing a focused environment for in-depth discussion of this emerging research direction. None of the existing forums could provide a similarly dedicated setting. Deep technical discussions were enabled by the many high-quality research talks providing a steady stream of input, but perhaps even more importantly by several sessions dedicated to open problems. The BIRS setup provides a uniquely stimulating environment for this, including lecture halls of various sizes with ample blackboard space. While algebraic arguments provide network information-theoretic results that are out of reach of the classical random coding arguments, they can at present rarely be proved to be strictly optimal. This nagging fact provided ample open problems and many intriguing discussions. Another factor that contributed to the highly interactive environment was the fact that room and board were provided by BIRS, free of charge to participants. Therefore, many interesting discussions took place over breakfast, lunch and dinner and well into the night over coffee and other drinks in the well-equipped lounge at the BIRS facility.

Holding a workshop at BIRS was a truly enjoyable experience for all involved, and we encourage others in the Information Theory Society to consider this attractive venue for future workshops.

IEEE Information Theory Society Board of Governors Meeting Minutes

ISIT, St. Petersburg, Russia, 07.30.2011, 12–6 pm

Natasha Devroye

Present: Giuseppe Caire, Muriel Médard, Bruce Hajek, Gerhard Kramer, Natasha Devroye, Frank Kschischang, Alex Vardy, Emanuele Viterbo, Prakash Narayan, Paul Siegel, Emina Soljanin, Michelle Effros, Rolf Johannesson, Li Ping, Nick Laneman, Adriaan Van Wijngaarden, Ezio Biglieri, Helmut Bölcskei, Anthony Ephremides, Martin Bossert, David Tse, Sriram Vishwanath, Andrea Goldsmith, Abbas El Gamal, Hans-Andrea Loeliger, Matthieu Bloch, Sergio Verdú

The meeting was called to order at 1:10 pm by the society President, Giuseppe Caire, who welcomed the Board of Governors.

1) The minutes of the BoG Meeting on 02/06/2010 at ITA were approved.

2) The agenda was approved.

3) Giuseppe Caire presented the President's report:

   - outlined the meeting agenda

   - Nihar Jindal is terminating his role as treasurer at the end of 2011. Giuseppe thanked him for the excellent job he has done in the last years.

   - Motion: to appoint Aylin Yener as treasurer. This was unanimously approved.

4) The treasurer's report was given by Giuseppe Caire on behalf of Nihar Jindal:

   - final numbers for 2010 were reported: net surplus +$492,000, total reserves $3,430,000

   - because of the backlog in IT Transactions, this year ~2000 pages were budgeted for 2011 to attempt to clear out the queue, costing $150,000.

   - Andrea Goldsmith asked whether the net reserves increased or decreased; this needs to be checked and was not included in the slides. **(ACTION)**

   - it was suggested that the BoG discuss further increases to the cost for print copies at a future BoG meeting, for example at the BoG meeting at ITW in Paraty, October 2011

   - net income from the IT Transactions is stable at about $350,000 a year, conference publications are stable at about $250,000 a year

   - the total number of pages is increasing every year

   - the IT Transactions expenses are dominated by editing expenses (fixed charge times number of pages) at

around $1100/article. It was noted that while the society can afford the extra expenses to clear out the queue for a year, but if the increasing page number trend continues, we may need to reconsider some of the publication policies.

   - in summary, the IT society continues to be in excellent financial shape, but given the possibility for change in publication models (e.g. open access) it may be prudent to remain fiscally conservative. The large reserve may call for the creation of an endowment, but this is not possible through the IEEE Foundation, as was made clear during a TAB meeting. Future presidents may want to investigate other avenues at IEEE. (**ACTION**)

   - there was a discussion regarding possibilities for tapping into the IT society reserves. Muriel Médard asked whether the former mechanism of tapping into the reserves for special initiatives is still open; Giuseppe Caire stated that as he understood it, this ability is limited to one-time, truly special, initiatives. Alex Vardy expressed concern that the IT Society reserves are in large part controlled by the IEEE, and could be taken away at any point. The society may want to do something to protect the reserves. David Tse suggested we be more aggressive in spending the reserves; Frank Kschischang stated that the IT Society is able to withdrawn about 3%/year. Alex Vardy suggested that the society find a more formal way of suggesting special initiatives to access the reserves. Frank Kschischang suggested the IT Society be less fiscally conservative and try to squeeze more out of the actual budget.

5) Andrea Goldsmith presented the report from the Nominations and Appointments committee:

   - outlined the committee members: Andrea Goldsmith, Frank Kschischang, Dan Costello, Jim Massey, Dave Neuhoff

   - put forward a BoG slate of candidates at this meeting; this was not voted on at this meeting

   - Andrea Goldsmith outlined how BoG members are selected: 12 society members were suggested 2 weeks prior to BoG meeting; additional nominations may be made at this meeting as long as the person is willing, The BoG members are then formally elected in fall, along with one from each under-represented region. There were no under-represented regions this year. The slate of BoG candidates was composed after soliciting suggestions from the BoG and N&A committee, after taking numerous other factors into account.

- the BoG candidates are available at http://www.itsoc. org/people/bog/bog-meeting-isit-2011-st.-petersburg-russia/BoGSlate2011.pdf

- Andrea Goldsmith opened the floor to additional BoG nominations. None were made.

- Motions: the election of the Officers. Paul Siegel nominated Michelle Effros as Second Vice-President; this was approved. Giuseppe Caire nominated Abbas El Gamal as Second Vice-President; this was approved. Frank Kschischang nominated Gerhard Kramer as First Vice-President; this was approved. Andrea Goldsmith nominated Muriel Médard as President; this was approved.

- bylaws changes will be completed in fall BoG meeting. Andrea Goldsmith will draft the text for making Online and Student Committees standing committees. Muriel Médard moved to harmonize the joint IT Society/ Communications Society best paper award so this deadline does not change from year to year depending on who is in charge. **(ACTION)**

6) Helmut Bölcskei presented the Editor in Chief's report:

- thanked the executive editorial board: G.D. Forney Jr., S. Shamai (Shitz), A. Vardy, S. Verdú.

- introduced the new Senior IEEE editor Megan Vorel Hernandez

- currently, the papers submitted under the online Pareja system will be completed by the Pareja system, while all new papers are already, and will continue to be handled by the recently introduced online ScholarOne system.

- Administrative Assistant for ScholarOne is Alison Larkin

- new AE appointments were listed and voted on. Jean-Claude Belfiore for coding theory: approved. Olgica Milenkovic for coding theory: approved. Robert Fischer for Communications: approved. Bertrand Hochwald for Communications: approved. Angel Lozano for Communications: approved. Francois Baccelli for Communication Networks: approved. Ronald Cramer for Complexity and Cryptography: approved. Ueli Maurer for Complexity and Cryptography: approved. Adam Smith for Complexity and Cryptography: approved. Alexander Holevo for Quantum Information Theory: approved. Michael Elad for Signal Processing: approved. Giuseppe Durisi for Publications Editor: approved. Alex Vardy asked whether the AE could be approved in one go rather than each individually? A few years ago, the BoG wanted to discuss each nominated AE individually, and it has remained like this since then.

- the area of cryptography, in relation to the Transactions on IT was discussed. It was asked why there are so many new editors in this area if it is not the central focus of the Transactions. It was responded that there

are an overwhelming number of papers submitted in this area. This topic was explicitly discussed in the executive editorial board, and it was decided that only papers that have a clear connection with IT, or are truly exceptional will be accepted.The editorial policy concerning cryptography and complexity reads: "Submissions in the editorial area of cryptography will be accepted for review only if they relate to information and/or coding theory or are clearly outstanding contributions to cryptography." Leading cryptographers were consulted by the editorial board and it was agreed that the Transactions on IT is not perceived as the top journal to which to submit papers in cryptography. To address this perception, leading researchers in cryptography were elected as AE in cryptography. Muriel Médard stated that while we certainly want to keep papers that have a strong connection to IT, if we have so many editors in cryptography, it is like soliciting in this area. Helmut Bölcskei stated that the IT Transactions does not want to discourage submissions, and wants to maintain its reputation as an intellectually strong and open society. Helmut hesitates to remove the area of cryptography altogether – this is too strong of a message. Andy Loeliger agrees that that is too drastic, and historically there is a strong connection between IT and cryptography. The IT Transactions is hoping to bring quality back up using the new AEs which should attract excellent papers.

- the general submission/publication statistics were discussed. The initially alarming 1500 suspected submissions this year was a hiccup in Scholar One; the actual number of submissions is slightly down. The publication queue is still quite significant but is being reduced by publishing additional pages this year. To further decrease the queue, there will be no special issues in 2012. The projected page count for 2011 is 8000 pages, up from the 3000 pages in 2000. The accept to print delay was increasing, but is coming down now, so the queue is indeed emptying. Giuseppe Caire warned about emptying out the queue completely. IEEE takes about 10 weeks to process a paper, so the minimal delay is around 3 months.

- 30% of the papers are fast rejected, significantly more than in the past. It was noted that some authors were quite grateful for the fast turnaround and suggestions (usually out of scope or language issues).

- the IT Transactions is the most cited of all IEEE journals

- a discussion was had concerning where the IT Society sees the IT Transactions going. At the panel of editors meeting, it became clear that the publication model for the IT Transactions will change dramatically in the next 5 years. As such, Helmut Bölcskei proposed forming an Ad Hoc Committee to investigate options for the IT Transactions. Abbas El Gamal stated that some societies have several journals, might this be considered? Michelle Effros stated that it is unclear how making more journals would impact the society since all journals appear to be going online, and there is relatively little distinction between online journals. Moving to

electronic only will not change the finances drastically, as it is the editing cost that is costly, not the printing cost. If length of papers is a problem, and # of pages is the main issue, one possibility would be to consider papers that relegate technical details to online. The appendices would be reviewed but not necessarily edited to cut costs. Concerning the editing costs, it was noted that most authors carefully write, edit and submit their papers in latex, and that the IEEE editors then re-write everything in XML, which requires the authors to again carefully proofread the IEEE proof. A general feeling is that this step is wasteful. Some suggestions were made: Michelle Effros suggested that we submit the papers in latex. It was noted that it would be extremely difficult to get the IEEE to accept and use latex (rather than XML). Andy Loeliger suggested using ITSOC funds to fund a technical attempt to overcome latex to xml conversion, or something to simplify publication/editing process. Alex Vardy stated that if we had software to convert latex to XML then we could persuade the IEEE to bring down the cost per page and cut processing time. Helmut Bölcskei suggested forming a small committee headed by Stephan Moser to overcome technical issues. IEEE is exceedingly reluctant to change. Frank Kschischang stated that an out of IEEE publishing model may be more appropriate; some other societies do this. Open access papers would cost about $3,000 per paper.

- Motion: to form an ad-hoc committee to address the growth of Transactions of IT. Andrea Goldsmith asked whether there are specific questions this committee would address and how it would use the work of the prior committee led by Alex Vardy? **(ACTION)**

- Motion: to stop sending authors of Transactions of IT papers courtesy copies of the issues they are published in, which would save $10k/year. It would still be possible for an author to request a copy. Muriel furthermore suggests sending an automatic email to authors about when their paper will appear. The motion was unanimously approved. **(ACTION)**

- many statistics concerning the impact factor, where publications come from, statistics of other comparable journals were presented. Overall, the Transactions on IT ranks well, though the Transactions on IT is a far outlier in terms of sub-to-pub time, averaging around 90 weeks, far longer than other Transactions. Alex Vardy suggested that it may be useful to make and publish statistics regarding the sub-to-pub time of shorter papers. If this turns out to be shorter than longer papers, it may encourage authors to reduce paper length.

- various items discussed in the executive editorial board were brought up. The editorial policies were skipped due to time constraints and will be discussed at the next BoG meeting. Authors will be asked to submit their papers in two-column format. Forwarding ISIT reviews to the Transactions on IT, and the reviewer credit system were heavily debated in the executive editorial board but not discussed at this BoG. One issue with ScholarOne was

brought up: that we cannot attach papers automatically to review invitations. Alex Vardy suggested asking ScholarOne to tailor this to our needs.

- Andrea Goldsmith and the BoG gave Helmut a round of applause for all the work he has done for the Transactions on IT.

7) Muriel Médard presented the Award Committee report:

- outlined committee members

- outlined the procedure for the IT paper award, where it was noted that more participation and paper recommendations are needed from the publications committee. Muriel Médard suggests including the following "best practice" in the Officers' notes: putting all papers on a website, making one report per paper by committee members, which are again put online.

- non BoG and nominated authors were asked to leave the room.

- Motion: to accept the Awards Committee's report for the Best Paper award for 2011 was made. It was unanimously approved.

- Motions: several were made concerning the best paper award. It was finally decided that the 2011 IT Transactions Best Paper Award would be made jointly to two papers:

- the joint IT/Comsoc paper award had 6 papers under consideration, mostly nominated by the IT Society. Comsoc should be generating more, higher quality nominations; this should be taken up with the Award Committee (or equivalent) chair of the Comsoc. Muriel Médard again recommended the "best practice" of creating a website for all papers, and assigning these papers to committee members to write a report. Muriel Médard further suggested harmonizing the nomination dates (March 1 in our by-laws, February 15 in Comsoc years) in the fall revision of the bylaws **(ACTION)**. Other proposals on how to increase the number of nominations included encouraging nominations from the IT editorial board, which could be enabled by adding a box in ScholarOne to ask whether the paper is award-worthy **(ACTION)**.

- the Baker award was discussed next. Four papers which had previously won awards and several other papers with significant impact were considered. Reports on all papers were made, and the awards committee finally made a recommendation to IEEE, who ultimately has the final say. The paper Viveck R. Cadambe, Syed A. Jafar, Interference Alignment and the Degrees of Freedom of the K user Interference Channel, IEEE Transactions on Information Theory, Aug. 2008, Vol. 54, No. 8, pages 3425 – 3441. The committee recommends keeping the paper E. Arikan, "Channel Polarization: A Method for Constructing CapacityYAchieving Codes for Symmetric Binary–Input Memoryless Channels", IEEE Transactions on Information Theory, Jul. 2009 in mind for future years. It was also noted that the Baker award took

considerable time and effort and should not be considered to be a minor part of the awards committee work.

- ISIT student paper award nominations were made. Some of the nominated students could not make it to ISIT, which led to the discussion of whether or not a paper will be eligible if the student does not make a serious effort to attend to ISIT, and presents via a video instead. Comparing a video presentation and a live one seemed unfair, and it was concluded that since video presentations appear to be happening more and more (rather than be the exception, once every few years), that this needs to be put on the agenda of a future meeting, possibly leading to a bylaw change (**ACTION**). A best-practice learned was to put the list of finalists online.

- this year the Kyoto Prize in Advanced Technology is focusing on the field of "information science" (this is the case every 3 years). The nomination deadline is September 16; nominations are welcome.

- Andrea Goldsmith suggested also considering our society members for BBVA awards. This would constitute an enormous amount of work, so Giuseppe Caire suggested soliciting institutes to create nomination packages that the ITSOC could endorse. It was suggested that Shannon award winners could be considered for the BBVA awards.

8) Gerhard Kramer presented the Membership and chapter committee report:

- the chapter of the year award was given to the Spain Section chapter this year.

- Ezio Biglieri spoke about European School of Information Theory: there was a record attendance of 70 (received over 100 requests), and the organizers received very positive feedback from participants (4.35/5.0). Ezio Biglieri outlined the committee members, instructors, sponsors, cost, and technical program.

- Sriram Vishwanath spoke about the North American School of Information Theory, held in Austin in May 2011, over memorial day weekend. He outlined the organizing committee and schedule, noting that unlike past schools, one full day was devoted to working on the new Information Theory Wiki page started by Rudiger Urbanke and Alon Orlitsky. The school had 122 attendees, lower than previous years (178 in 2010). The disadvantage was that there were fewer students, but Sriram saw this as an advantage, as this resulted in a lower budget and higher teacher-to-student ratios. Sriram suggested that late June – August would be a better time than May to host future schools. The total budget was $55,000 USD. It was noted that this year students were asked to provide a credit card for reserving their dorm rooms, which was much easier than dealing with checks, and resulted in fewer cancellations.

- Gerhard Kramer spoke about the Oulu Wireless Information Theory Summer School: there were 75 par-

ticipants, a registration of 120 Euros which covered the lectures and meals.

- Deniz Gunduz proposed to hold the European School of IT in 2012 in Turkey. Due to the great demand, positive feedback, loads of interest from countries in the Middle East and North Africa, an annual (rather than biennial) school might be warranted. The chairs would be Deniz Gunduz and Gerhard Kramer; local arrangements would be Alkan Soysal; the school would take place at the end March/beginning of April. Deniz would like to use the ITSOC website as platform. Antalya and Kusadasi are possible locations; a list of potential hotels and prices were also mentioned. Deniz intends to continue the tradition of having lectures for 4 mornings, and student talks/posters in the afternoon. Wednesday afternoon would be reserved for sightseeing. The estimated total cost, assuming 80 (possibly go up to 100) students, is 41,000 euros. The organizers plan to charge students 250–300 Euros per person (includes all food).

- Motion: that ITSOC support the 2012 European School of Information with a grant of $21,000 USD or 14,000 Euros on July 29. This motion was approved. However, it was noted that this was an increase from last year's $10,000 USD, and that it was not held in a university, but rather in a 5 star hotel, also breaking tradition. Frank Kschischang stated that locating it in a 5 star hotel would set a precedent. Gerhard Kramer noted that the level of support requested is similar to the level requested by the North American school of IT.

- Gerhard Kramer spoke about the 2012 North American School of Information Theory to be held on the Cornell campus from June 19–22, 2012. Aaron Wagner and Salman Avestimehr will be co-chairs; lodging will be in the dorms. The estimated cost is $57,000 USD. The School will raise additional funds by approaching funding agencies and local private schools.

- Motion: that ITSOC support the 2012 School of Information Theory with a grant of $20,000 USD. This motion was approved.

9) Bruce Hajek presented the Conference Committee report:

- the term of Dan Costello and Tony Ephremides is ending, and the BoG thanked them for their 4.5 years of service.

- Motion: to approve Elza Erkip and Lars Rasmussen as IEEE ITSOC Conference Committee chairs. This motion was approved.

- Tony Ephremides reported that the last registration figure for ISIT 2011 was 780 participants. Financially, ISIT 2011 appears to be a success.

- future ISITs to be held in Cambridge 2012, Istanbul 2013, and Hawaii 2014 are all on track.

- two proposals for ISIT 2015 were: Hong Kong by David Tse and Melbourne by Emanuele Viterbo. Both were very

strong proposals. It was noted that since both are such strong proposals, that the proposal not chosen for 2015 would be considered for the following relevant ISIT year. Both options were discussed at length.

- Motion: to hold ISIT 2015 in Hong Kong. By show of hands, this motion was approved.

- Motion: to approve the budget of ITW 2012 in Lausanne. This motion was approved.

- Motion: for technical co-sponsorship (no monetary contribution, but IEEE Xplore access and advertising) of:

  - International Symposium on Problems of REdundancy in Information and Control Systems in September 2012. Approved.

  - the IEEE Swedish Communication Technologies Workshop (Sweets) 2011. Approved.

  - International Symposium on Turbo Codes & Iterative Information Processing. Approved

- there were no current proposals for ITW 2013; proposals are welcome.

10) **Matthie**u Bloch gave a report on the ITSOC website: the ITSOC website was hacked through Matthieu Bloch's account; the hackers caused the servers to crash. The ITSOC website server was fine, but the server responsible for the mailing-list and videos was brought down. No data was lost. In the past months there were additional hiccups and in general the IT people are responsive, but the ITSOC may need other options. Mattheiu Bloch welcomed suggestions on how to handle the ITSOC IT systems in the future. He suggested reading his report, which outlined 4 options

and their tradeoffs for the mailing list. Frank Kschischang stated that the BoG vote mailing list is absolutely critical, and that while BoG announce is useful, it is not crucial like the BoG vote list. Within next month Matthieu will formulate more precise options **(ACTION)**.

11) **Alon** Orlitsky and Rudiger Urbanke spoke about the Platform for Online Science and Technology Education **and Research.** The goal is to create an integrated and interactive platform for research development and education in science and technology. This includes knowledge dissemination, creation, and education. This would be similar to Wikipedia, but for technical topics, and providing greater breadth, depth, and reliability. Much work remains to be done, and help needed. During the North American Summer School of IT, one day was allocated to jumpstarting this tool. In addition, Tuesday after the sessions at ISIT 2011 is also allocated to this project. Alon and Rudiger requested suggestions on how to sustain this in the longer term. It would be useful if ITSOC members and/or students would contribute articles. One possible way to do this would be through class projects/surveys of an area.

12) Michelle Effros presented a report on "Supporting Community Research: A Case Study". The Computing Research Association (CRA) and the Computing Community Consortium (CCC) have been highly successful in marketing computer science, in particular to the NSF, DARPA and various other governmental funding agencies. Whether and how the ITSOC could interact with these associations, or better market information theory (not confined to US organizations, though this was the case study examined and presented) was discussed. **ACTION:** Alex Vardy suggested that the ITSOC president for an ad hoc committee on this topic, that is not too US-centric.

13) The meeting was adjourned at 7:21 pm.

Call for Nominations

IEEE Information Theory Society 2012 Claude E. Shannon Award

The IEEE Information Theory Society Claude E. Shannon Award is given annually for consistent and profound contributions to the field of information theory. Award winners are expected to deliver the Shannon Lecture at the annual IEEE International Symposium on Information Theory held in the year of the award.

NOMINATION PROCEDURE: Nominations and letters of endorsement must be submitted by March 1, 2012 to the current President of the IEEE Information Theory Society, who in 2012 will be Muriel Medard <medard@MIT.edu>. The nomination form is available at http://www.itsoc.org/honors/claude-e.-shannon-award.

IEEE Information Theory Society 2012 Aaron D. Wyner Distinguished Service Award

The IT Society Aaron D. Wyner Award honors individuals who have shown outstanding leadership in, and provided long standing exceptional service to, the Information Theory community. Each Wyner Award winner receives an ISIT or ITW participation fee waiver, a specially engraved plague, and a certificate. This award was formerly known as the IT Society Distinguished Service Award.

NOMINATION PROCEDURE: Nominations and letters of endorsement must be submitted by March 1, 2012 to the current President of the IEEE Information Theory Society, who in 2012 will be Muriel Medard <medard@MIT.edu>. The nomination form is available at http://www.itsoc.org/honors/wyner.

IEEE Information Theory Society 2012 Paper Award

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 (2010–2011). The purpose of this Award is to recognize exceptional publications in the field and to stimulate interest in and encourage contributions to fields of interest of the Society. The Award consists of a certificate and an honorarium of US$1,000 for a paper with a single author, or US$2,000 equally split among multiple authors. The award will be given for a paper published in the two preceding years.

NOMINATION PROCEDURE: Nominations and optional letters of endorsement must be submitted by March 15, 2012 to the Awards Committee chair, who in 2012 will be Gerhard Kramer <gerhard.kramer@tum.de>. Please email the name of the paper you wish to nominate, along with a supporting statement explaining its contributions.

IEEE Joint Comsoc/IT 2012 Paper Award

The Joint Communications Society/Information Theory Society Paper Award recognizes outstanding papers that lie at the intersection of communications and information theory. Any paper appearing in a ComSoc or IT Society publication during the preceding three calendar years (2009–2011) is eligible for the 2012 award. A Committee with members from both societies will make the selection. The award consists of a plaque and cash prize presented at the Comsoc or IT symposium of the authors' chosing.

NOMINATION PROCEDURE: By February 15, 2012, please email the name of the paper you wish to nominate, along with a supporting statement explaining its contributions to both communications and information theory, to the Awards Committee chair, who in 2012 will be Gerhard Kramer <gerhard.kramer@tum.de>.

IEEE Fellow Program

For (s)he's a jolly good (IEEE) Fellow! Do you have a friend or colleague who is a senior member of IEEE and is deserving of election to IEEE Fellow status? If so, consider submitting a nomination on his or her behalf to the IEEE Fellow Committee. The deadline for nominations is March 1st. IEEE Fellow status is granted to a person with an extraordinary record of accomplishments. The honor is conferred by the IEEE Board of Directors, and the total number of elected Fellows in any one year is limited to 0.1% of the IEEE voting membership. For further details on the nomination process please consult: http://www.ieee.org/web/membership/fellows/index.html.

IEEE Awards

The IEEE Awards program has paid tribute to technical professionals whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society and the engineering profession. For information on the Awards program, and for nomination procedures, please refer to http://www.ieee.org/portal/pages/about/awards/index.html.

2012 IEEE International Symposium on Information Theory (ISIT 2012)

July 1 - 6, 2012 - Cambridge, Massachusetts

Please join us for ISIT 2012 in Cambridge, MA

ISIT 2012 will take place on the MIT campus from July 1 to July 6, 2012. Cambridge and Boston offer outstanding cultural and recreational activities, as well as many choices for children's activities and camps. July 4th will feature a family afternoon event. The symposium will have on-campus housing for a pleasant and affordable option.

Papers are solicited in the following areas:

- Channel coding
- Coding theory and practice
- Communication theory
- Complexity and computation theory
- Cryptography and security
- Compression and source coding
- Detection and estimation
- Emerging applications of information theory
- Information theory and statistics
- Network coding
- Network communication theory
- Multi-terminal information theory
- Pattern recognition and learning
- Quantum information theory
- Sequences
- Shannon theory
- Signal processing

Submitted papers should be of sufficient depth for review by experts in the field. Final papers will be limited to 5 pages in standard IEEE conference format. The paper submission deadline is February 03, 2012, at midnight, Eastern Time (New York, USA). Notification of acceptance by April 18, 2012. Detailed information on paper submission, technical program, tutorials, travel, social programs, and travel grants will be announced on the ISIT 2012 website.

General co-chairs
Muriel Médard
Lizhong Zheng

TPC co-chairs:
Giusepppe Caire
Michelle Effros
Hans-Andrea Loeliger
Alexander Vardy

TPC Members

Emmanuel Abbe	Michael Langberg
Fadi Alajaji	Amos Lapidoth
Venkat Anantharam	Luis Lastras
Jeff Andrews	Yingbin Liang
Salman Avestimehr	Tamas Linder
Richard Baraniuk	Athina Markopoulou
Alexander Barg	Neri Merhav
Andrew Barron	Olgica Milenkovic
Jean-Claude Belfiore	Michael Mitzenmacher
Toby Berger	Stefan Moser
Ian Blake	Ralf Mueller
Yoram Bresler	Chandra Nair
David Burshtein	David Neuhoff
Jun Chen	Aria Nosratinia
Max Costa	Erik Ordentlich
Dan Costello	Alon Orlitsky
Ronald Cramer	Joseph O'Sullivan
Merouane Debbah	Kenny Paterson
Suhas Diggavi	Henry Pfister
Stark Draper	Vince Poor
Yonina Eldar	Bixio Rimoldi
Abbas El Gamal	Justin Romberg
Tony Ephremides	Ronny Roth
Elza Erkip	Anant Sahai
Tuvi Etzion	Moshe Schwartz
Meir Feder	Shlomo Shamai
G. David Forney	Lalitha Sankar
Christina Fragouli	Mohamed Slim Alouini
Massimo Franceschetti	Gadiel Seroussi
David Gesbert	Andrew Singer
Jerry Gibson	Emina Soljanin
Andrea Goldsmith	Alex Sprintson
Guang Gong	Yossi Steinberg
Vivek Goyal	Sekhar Tatikonda
Albert Guillen i Fabregas	Aslan Tchamkerten
Venkatesan Guruswami	Antonia Tulino
Andras Gyorgy	Daniela Tuninetti
Patrick Hayden	Sennur Ulukus
Robert Heath	Ruediger Urbanke
Al Hero	Venu Veeravalli
Tracey Ho	Sergio Verdu
Alexander Holevo	Sriram Vishwanath
Michael Honig	Pramod Viswanath
Anders Host-Madsen	Paul Vitanyi
Tommi Jaakkola	Emanuele Viterbo
Syed Jafar	Pascal Vontobel
Sidharth Jaggi	Aaron Wagner
Tara Javidi	Marcelo Weinberger
Navin Kashyap	Michelle Wigger
Young-Han Kim	Stefan Wolf
Joerg Kliewer	Henk Wymeersch
Mari Kobayashi	Abraham Wyner
Ioannis Kontoyiannis	Roy Yates
Gerhard Kramer	Aylin Yener
Frank Kschischang	Raymond Yeung
Vijay Kumar	Gilles Zemor

WWW.ISIT12.ORG

ISIT**2012** BOSTON

ISITA 2012 HAWAII

Symposium Committee
General Co-Chairs
Toru Fujiwara (Osaka U.)
Anders Høst-Madsen (U. Hawaii)
Symposium Advisors
Ikuo Oka (Osaka City U.)
Toshiyasu Matsushima (Waseda U.)
Marc P.C. Fossorier (ETIS ENSEA)
General Secretaries
Yuichi Kaji (NAIST)
Takuya Kusaka (Okayama U.)
Finance
Tadashi Wadayama (Nagoya Inst. Tech.)
Shigeaki Kuzuoka (Wakayama U.)
James Yee (U. Hawaii)
Publicity
Motohiko Isaka (Kwansei Gakuin U.)
Shun Watanabe (U. Tokushima)
Publication
Hidenori Kuwakado (Kobe U.)
Masanori Hirotomo (Saga U.)
Registration
Hideki Yoshikawa (Tohoku Gakuin U.)
Galen H. Sasaki (U. Hawaii)
Local Arrangement
Hitoshi Tokushige (U. Tokushima)
Manabu Hagiwara (AIST)

Technical Program Committee
Co-Chairs
Tomohiko Uyematsu (Tokyo Inst. Tech.)
Narayana P. Santhanam (U. Hawaii)

International Advisory Committee
Co-Chairs
Yoshikuni Onozato (Gunma U.)
Yasutada Oohama (U. Electro-Comm.)
J. B. Nation (U. Hawaii)

Sponsor
Research Society of Information Theory
and its Applications, IEICE

Technical Co-Sponsors
IEEE Information Theory Society
Dept. of Electrical Engineering,
University of Hawaii at Manoa

2012 International Symposium on Information Theory and its Applications

Hawaii Convention Center, Honolulu, Hawaii, USA
October 28-31, 2012

The 2012 International Symposium on Information Theory and its Applications (ISITA2012) will take place in Honolulu, Hawaii, USA, during October 28-31, 2012. The symposium has been held every two years. Hawaii is the place where the first ISITA in 1990 and the sixth in 2000 were organized.

Topics of interest include, but are not limited to:

Error Control Coding	Coding Theory and Practice
Coded Modulation	Data Compression and Source Coding
Communication Systems	Optical Communications
Detection and Estimation	Mobile Communications
Spread Spectrum Systems	Pattern Recognition and Learning
Signal Processing	Speech/Image Coding
Rate-Distortion Theory	Shannon Theory
Stochastic Processes	Cryptography and Data Security
Data Networks	Applications of Information Theory
Multi-User Information Theory	Quantum Information Theory

Papers will be selected on the basis of a full paper (not exceeding 5 pages). The deadline for submission is planned to be March 28, 2012. Notification of decisions will be made by the middle of June, 2012.

Accepted papers will appear in the symposium proceedings. Detailed information on paper submission, technical program, plenary talks, social events, and registration will be posted on the symposium web site:
http://www.isita.ieice.org/2012/

Enquiries on
General matters: isita-2012@mail.ieice.org
Paper submission: isita-2012tpc@mail.ieice.org

Deadline for paper submission — March 28, 2012
Notification of paper acceptance — Middle of June, 2012
Deadline for final paper submission — July 18, 2012
Deadline for author registration — July 18, 2012

WiOpt 2012
10th Intl. Symposium on Modeling and Optimization in
Mobile, Ad Hoc, and Wireless Networks
May 14 – 18, Paderborn, Germany
http://www.wi-opt.org/

WiOpt 2012 intends to bring together researchers and practitioners working on modeling and optimization of wireless network design and operations. It welcomes original, high-quality work on different perspectives, including performance analysis and simulation, algorithms and protocol design, optimization theory and application, information-theoretic analysis, for all forms of wireless networks.

Contributions to the symposium should improve the state of the art in design, analysis, dimensioning, and operations of wireless network by providing insights into theoretical aspects or providing practical methods and tools. All forms of wireless networks are of interest: from cellular to ad hoc networks; domain-specific vehicular, public-transport, and personal-area networks as well as application-specific sensor networks.

Topics of relevance include, but are not limited to, the following:

- Asymptotic system properties, e.g., capacity, connectivity, coverage, delay
- Cognitive radios
- Cross-layer design and optimization
- Dynamic spectrum management
- Energy efficiency
- Game theoretic models, contract, pricing, and incentives
- Interference in wireless networks
- Mobility modeling and management
- Modeling, simulations, and performances analysis
- Network and multi-user information theory
- Network protocol design
- Opportunistic and cooperative communications
- Optimal control of network operations
- Optimization of network design
- Routing protocols
- Scalability and manageability of network architectures
- Security in wireless networks

Technical papers describing original, previously unpublished research, which are not currently under review by another conference or journal are solicited.

The submission format for the papers is an extended abstract, up to eight pages long. Please use 11 pt character size, one column text, double spacing, and letter paper. This page budget should contain all figures, tables, references, etc. The extended abstract should include a brief abstract of up to 150 words. The submission will be handled via EDAS (http://edas.info). Only PDF files are acceptable; please make sure that the paper prints without problems (take care to embed all required fonts, etc.). Full papers, of up to 8 pages, in IEEE conference double column format, will be published in the conference proceedings and will be available via the IEEE Xplore website.

Important dates		
Submission Deadline	**Notification of Acceptance**	**Camera Ready Papers**
January 6, 2012	March 9, 2012	March 30, 2012

General chairs	**TPC chairs**	**Publication chair**	**Publicity chairs**	**Workshop chairs**
Catherine Rosenberg	Afef Feki	Hannes Frey	Stefan Valentin	Halim Yanikomeroglu
Jie Lie	John S. Baras		Chia-Chin Chong	Slawomir Stanczak
Holger Karl	Jianwei Huang		Jianhua Zhang	

Information Theory Workshop (ITW)
September 3-7, 2012
Lausanne - Switzerland

◆IEEE

Workshop Chairs
Christina Fragouli (EPFL)
Emre Telatar (EPFL)

Technical Program Chairs
Suhas Diggavi (UCLA)
Rudiger Urbanke (EPFL)

Call for Papers

The past decade has seen an exponential increase in the data stored in distributed locations in various forms including corporate & personal data, multimedia (videos, photos) and also medical data in repositories. The grand challenge is to store, process and transfer this massive (and growing) amount of data, efficiently and securely over heterogeneous communication networks. This leads to interesting connections between information theory and areas such as machine learning, privacy & cryptography and bio-informatics.

The focus of this workshop is in exploring such connections.

The scope of the workshop includes,
but is not limited to the following topics:

- Information theoretic security
- Privacy and cryptography
- Machine learning and information theory
- Information theory in biology
- Network data compression
- Multi-terminal information theory
- Graph-based codes and iterative decoding
- Compressed sensing

Important deadlines:

Paper Submission:	April 2, 2012
Notification of Acceptance:	June 19, 2012
Camera Ready Submission:	July 10, 2012

Further information regarding the technical and social programs, workshop registration, and hotel accommodations will be posted on the website: http://itw2012.epfl.ch

Contact: itw2012@epfl.ch

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Technical Program committee

Erdal Arikan	Tara Javidi	Olgica Milenkovic	Leandros Tassiulas
Giuseppe Caire	Yiannis Kontoyiannis	Andrea Montanari	Antonia Tulino
Sae-Young Chung	Gerhard Kramer	Alon Orlitsky	Daniela Tuninetti
Max Costa	Frank Kschischang	Ashutosh Sabharwal	Sergio Verdu
Elza Erkip	Vijay P. Kumar	Devavrat Shah	Pramod Vishwanath
Alex Grant	Olivier Levêque	Shlomo Shamai	Sriram Visvanath
Tracey Ho	Hans-Andrea Loeliger	Mikael Skoglund	Pascal Vontobel
Syed Ali Jafar	Nicolas Macris	Toshiyuki Tanaka	Aylin Yener

Conference Calendar

DATE	CONFERENCE	LOCATION	WEB PAGE	DUE DATE
February 5–10, 2012	2012 Information Theory and Applications Workshop	San Diego, CA, USA	http://ita.ucsd.edu/workshop.php	By Invitation
Feb. 29–Mar. 2, 2012	2012 International Zurich Seminar on Communications	Zurich, Switzerland	http://www.izs.etzh.ch/	Passed
March 21–23, 2012	46th Annual Conference on Information Sciences and Systems (CISS 2012)	Princeton, NJ, USA	http://ee-ciss.princeton.edu	January 6, 2012
March 25–30, 2012	IEEE INFOCOM 2012	Orlando, FL, USA	http://www.ieee-infocom.org	Passed
May 6–9, 2012	2012 IEEE 75th Vehicular Technology Conference (VTC2012-Spring)	Yokohama, Japan	http://www.ieeevtc.org/vtc2012spring	Passed
May 14–18, 2012	10th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt 2012)	Paderborn, Germany	http://www.wi-opt.org/	January 6, 2012
June 10–15, 2012	IEEE International Conference on Communications (ICC 2012)	Ottawa, Canada	http://www.ieee-icc.org/	Passed
July 1–6, 2012	2012 IEEE International Symposium on Information Theory (ISIT 2012)	Cambridge, MA, USA	http://isit12.org/	February 3, 2012
August 27–31, 2012	7th International Symposium on Turbo Codes & Iterative Information Processing	Gothenberg, Sweden	http://www.ee.kth.se/turbo-symposium-2012/	March 9, 2012
September 3–6, 2012	2012 IEEE 76th Vehicular Technology Conference (VTC2012-Fall)	Quebec City, Canada	http://www.ieeevtc.org/vtc2012fall/	January 19, 2012
September 3–7, 2012	2012 IEEE Information Theory Workshop (ITW 2012)	Lausanne, Switzerland	http://itw2012.epfl.ch/	April 2, 2012
October 28–31, 2012	2012 International Symposium on Information Theory and its Applications (ISITA 2012)	Honolulu, HI, USA	http://www.isita.ieice.org/2012	March 28, 2012

Major COMSOC conferences: http://www.comsoc.org/confs/index.html