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Reaching the Promised Land of Communications



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Message from the General Chair



Moshe Sidi

"It's all about branding" – this is the mantra of the day in the Internet era. INFOCOM, the major conference on computer communications and networking, has become a brand name. INFOCOM's competitiveness, excellence and technical innovation has been well-known for years, and INFOCOM 2000 is no exception. The conference's success is guaranteed with a technical program of exceptionally high quality and diversity, including 192 judiciously selected papers, 9 outstanding tutorials on hot and up-to-date topics, 2 panels on controversial issues, and a keynote address by Prof. Leonard Kleinrock – one of the founders of the field of computer networks.

The first communication revolution of the 20th century resulted in widely spread telephone-based communications. The second communication revolution gave us computer-based communications, the Internet, with applications ranging from e-mail to the web and beyond. The new millennium promises to bring a knowledge-based communications revolution where intelligent networks will enhance and expand human knowledge. The Internet will evolve from being a complex environment that takes time to master to a behind-the-scenes tool that will improve the quality of life.

Progress, however, results not only by revolution but also by evolution. Networks are like amoebas; they do not stay in one shape for very long. According to the amoeba theory of networks, things are always in transition, and there is no final form. Networks started as terminal-to-host creatures. Then they moved to become 10BaseT LAN, FDDI backbone, T1/E1

WAN organisms during the client/server era. Currently they undergo major topological transformations, becoming Internet-centric and gearing up to handle huge amounts of voice, data and video. Typical networks today are a mix of technologies. Although IP is the universal glue, Gigabit Ethernet is now being deployed in quantity, fiber backbones are running SONET, and veterans such as ATM, frame relay and 10/100 Ethernet continue to thrive. What is the next form of networks? The INFOCOM conference is the right place to learn and discuss the plausible futuristic directions. Definitely, the aspiration for the near future is to have intelligent networks (more than an amoeba) that are customized to the needs of individuals, giving the user a ubiquitous identical network view.

We are living in the big bandwidth era. One can never be too rich, too thin or have enough bandwidth – that has never been more true than it is today. Large amounts of bandwidth will continue to be needed as far into the future as we can see. Optical fiber capacity is doubled every nine months. Yet, Gigabit Ethernet trunks with Fast Ethernet to the desktop or even fatter pipes are not enough. Technologies that provide quality-of-service prioritization are inevitable for many of the foreseen applications. This is even more critical for bandwidth-limited technologies such as wireless networks. Their expansion is assured due to the proliferation of mobile devices such as cellular phones, laptops, notebooks, PDAs and Internet appliances. During the INFOCOM conference we will explore the coexistence of new massive wireless networks that provide low-bandwidth access and the high-bandwidth corporate networks, along with evolving technologies such as ad-hoc networks, multicast, quality-of-service and more.

Having the first INFOCOM of the new millennium in Israel is not accidental. Israel has established itself as a global technology incubator, especially in the communications and networking arenas. Many leading international technology companies have located their advanced development centers in Israel, including Lucent, Qualcomm, Sun Microsystems, Intel, IBM, Cisco, Microsoft, 3Com, and Bay Networks (now Nortel). These companies have chosen to develop their future product generation in Israel. Furthermore, Israel is home to quite a few internationally renowned companies such as Rad, CheckPoint, Comverse, VocalTec, Galileo and many more. All this is due to highly educated and competitive Israeli engineers and scientists, as is also reflected in active and noticeable participation in international conferences, including INFOCOM. It is therefore only natural that the next INFOCOM outside of the US will be held in Israel. Yet, without the continuous instigation of Kazem Sohraby, starting in 1995, this would not have become a reality, and we deeply thank him for that.

The high quality and breadth of INFOCOM 2000 is the cumulative result of the great time and effort invested by many volunteers who have worked continuously as reviewers, technical program committee members and executive committee members. Special thanks go to my close colleagues, Israel Cidon, Ariel Orda and Raphael Rom and to the chair of the INFOCOM steering committee, Harvey Freeman, with whom I shared the responsibilities for the conference. They were always ready to help with their good advice and step in when necessary. The technical program chairs, Henning Schulzrinne and Raphael Rom, were challenged with about 720 submissions and they, together with the authors, are to be commended for the outstanding program. The tutorial chairs, Reuven Cohen and Daniel Pitt, were able to attract a set of renowned experts in their fields and put together very attractive tutorials. The panel chairs, Roch Guerin and Hanoch Levy, organized two panels that will yield lively and informative

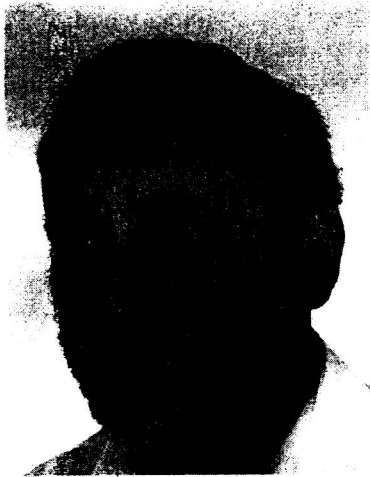
discussions. The financial chairs, Shlomi Dolev and Nina Taft-Plotkin, the local arrangements chairs, Yehuda Afek and Meir Herzberg, the publicity chair, Fred Bauer, the publication chairs, Irene Katzela and Yuval Shavitt, the Internet chairs, Yitzhak (Tsahi) Birk and Joe Touch, the corporate partners chair, Ran Giladi, the keynote lecture chair, Israel Cidon and the registration chair, Amotz Bar-Noy, have been an exceptional and dedicated team without whom INFOCOM 2000 could not have happened. The international vice-chairs, Luigi Fratta, Ramesh Nagarajan, Laszlo Pap, Guy Pujolle and Tetsuya Takine, have played an important role in increasing worldwide awareness about INFOCOM. Last but not least, I would like to thank the INFOCOM 2000 vice-chair, Bhaskar Sengupta, and local vice-chair, Ariel Orda, for their constant support and help. To all these people, I want to again extend my deepest thanks and appreciation. They are the ones to be credited for the success of INFOCOM 2000.

I would like to take this opportunity to thank the NSF and the Communications Society for providing student grants and the INFOCOM 2000 corporate partners, Lucent Technologies Networks (Israel), Qualcomm Israel, Rad Data Communications and Sun Microsystems for supporting the conference.

This year's INFOCOM promises to be one of the best ever. We feel that we have succeeded in assembling a comprehensive and attractive technical content in an enjoyable setting. Tel-Aviv, the non-stop city, offers a myriad of stretches of sandy clean beaches, outdoor cafes and vibrant streets. Israel, the promised land of the Bible, is a modern, thriving, and vibrant country. On behalf of the INFOCOM 2000 organizers, I extend a sincere welcome to you: I hope you'll extend your stay to enjoy not just the conference, but also Tel-Aviv and Israel.

Moshe Sidi
Tel-Aviv, Israel, 2000

Message from the Technical Program Chairs



Raphael Rom



Henning Schulzrinne

Welcome to INFOCOM 2000 and Tel Aviv!

IEEE INFOCOM, now in its nineteenth year, has become the largest networking conference and one of the most selective IEEE conferences in this area. We are extremely proud to maintain this reputation and present an outstanding program of papers, panels and keynote address. Specifically, we have 192 papers that are organized in five tracks, hopefully in a way that will let everybody attend and listen to as many presentations as possible.

In addition to the technical paper presentations, INFOCOM 2000 features two panels, one reflecting the keynote topic on nomadic networks, the other on where future networking research will take place: academia, research labs or start-ups.

INFOCOM spans the whole range of topics in computer communication and networks, both in layer, ranging from physical layer issues in wireless communications and optical networks, to routing, congestion control and applications such as the web and Internet telephony. Papers span the gamut of approaches, from applied stochastics and queueing theory, to protocol analysis, descriptions of network and router architectures, to system measurements.

Quality of service continues to be a dominant theme among INFOCOM authors, with 196 papers submitted listing it as a topic. Other major themes were wireless networks, multicast and congestion control, as well as traditional strong points such as queueing theory. We observed a

marked increase in the number of papers that treat the Internet as a whole as a research topic, not just individual elements or protocols in the abstract. On the other hand, topics such as DQDB and protocol verification have disappeared from the program, with ATM diminishing in coverage.

For the first time we have made INFOCOM papers publicly available before the conference. We hope this will create livelier discussions during and between the presentations and should help conference participants in selecting the presentations they want to attend. These papers, along with many papers from the previous three INFOCOM conferences, are available in the new conference web site at <http://www.ieee-infocom.org>. Henceforth, this will be the official INFOCOM web site.

This year, we reviewed 717 papers and were only able to accommodate 192 for an acceptance ratio of 27%. The number of papers submitted is the highest for a conference outside of North America and the second highest in INFOCOM history.

Due to the limited space (and the unavoidable "noise" in the review process), many good papers could not be accommodated.

Authors of papers were located in 36 different countries, with about 400 papers coming from the United States, with the Republic of China (Taiwan) as the second-most prolific source (38 papers), followed by France, P.R. China (including Hong Kong), Korea, Israel, Japan, and Italy. (The "nationality" of papers is divided among its authors. A paper co-authored by an Italian and a Korean counts as half a paper for each country.)

INFOCOM authors like to wait until the very last minute in submitting their work. Fully one third of the papers arrived on the day of the final submission deadline, and 79% in the last week before the deadline.

INFOCOM authors are rather eclectic in their choice of word processors and text formats. 60% chose LaTeX, 21% chose Microsoft Word and 14% submitted PDF of unidentifiable origin, with the remainder using a variety of other tools. If your answer to "Where do you want to go next spring?" was Tel Aviv, however, submitting via Word only gave you a 9% chance, while LaTeX increased your chances to 35%.

For the first time, all papers were submitted and handled electronically – FedEx has lost a major customer for good... Reviews were submitted via web pages, with TPC members selecting papers that they were most familiar with.

Each edition of INFOCOM modifies the traditional INFOCOM review process a bit. Compared to other conferences, even those with a much smaller number of papers, the INFOCOM review process is very thorough. The 98 members of the Technical Program Committee afforded almost all papers with three reviews, and some up to five reviews. This year, two of the three reviews for each paper were prepared by INFOCOM TPC members, with the third submitted almost always by another independent reviewer from an institution not affiliated with the TPC members. We have allowed TPC members to select the papers they preferred to review so that papers

receive the best and most adequate treatment. Indeed, of a total of 2214 reviews that had been submitted, only 53 reviews were "missing in action" at the end.

For the first time and as an experiment, we allowed authors to see their reviews before the TPC meeting and submit brief rebuttals to correct factual errors. The reviews and rebuttals were then used by about half of the technical program committee, meeting at Columbia University, to select the papers for the conference.

While TPC members dealt admirably with the unexpectedly high review load, two members of the program committee stood out in the timeliness and thoroughness of their reviews. In recognition of their special dedication to ensuring a quality program, Roch Guerin and Jennifer Rexford will receive a special *Distinguished Reviewer* award, a new INFOCOM feature.

As is tradition, we will submit about a dozen distinguished INFOCOM papers for rapid review by the IEEE Transactions on Networking. Also, a best paper award will be presented at the conference.

Putting together a technical program as large as INFOCOM is impossible without the dedicated help of many volunteers and staff. First, we thank the 1,522 authors who entrusted their work to the conference. The selection process could not have happened without the 583 external reviewers.

Thanks are also due to Gitta Abraham, for invaluable administrative assistance, Martin Peres, for printing the submitted papers, Kelly Donnelly and Ashutosh Dutta at Columbia University, who helped with the technical program meeting.

We hope that you will find the INFOCOM program technically rewarding, but also find time to catch up with colleagues and explore our host city. Enjoy INFOCOM 2000!

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 Ramamurthy
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Medy Sanadidi	Suresh Subramaniam	Fugui Wang	
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Iraj Saniee	Madhu Sudan	Shieyuan Wang	
Brunilde Sanso	Wei Sun	Weiguo Wang	
Saswati Sarkar	Behrmard Suter	Wenye Wang	
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Paolo Scotton	Marco Tacca	Andy Ward	
Panagiotis Sebos	Avner Taieb	Kimberly Wasserman	
Adrian Segall	Hideaki Takagi	Vijitha Weerackody	
Nemo Semret	Yoshitaka Takahashi	Philip Whiting	
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Sherlia Shi	Panos Trimintzios	Xiaowei Yang	
Chih-Heng Shih	John Trotter	Roy Yates	

Table of Contents

Volume 1—Tuesday

Ad Hoc Networks

<i>Performance Comparison of Two On-Demand Routing Protocols for Ad Hoc Networks</i>	3
S. Das, C. Perkins, and E. Royer	
<i>Medium Access Control Protocols using Directional Antennas in Ad Hoc Networks</i>	13
Y.-B. Ko, V. Shankarkumar, and N. Vaidya	
<i>Energy Conserving Routing in Wireless Ad Hoc Networks</i>	22
J.-H. Chang and L. Tassiulas	
<i>Max-Min D-Cluster Formation in Wireless Ad Hoc Networks</i>	32
A. Amis, R. Prakash, T. Vuong, and D. Huynh	

Congestion Control I

<i>On the Use of Destination Set Grouping to Improve Inter-receiver Fairness for Multicast ABR Sessions</i>	42
T. Jiang, M. Ammar, and E. Zegura	
<i>Distributed Algorithms for Computation of Fair Rates in Multirate Multicast Trees</i>	52
S. Sarkar and L. Tassiulas	
<i>Receiver-Initiated Multicasting with Multiple QoS Constraints</i>	62
A. Fei and M. Gerla	
<i>On Service Models for Multicast Transmission in Heterogeneous Environments</i>	71
M. Grossglauser and J. Bolot	

Internet Telephony and Packet Audio

<i>DOSA: An Architecture for Providing Robust IP Telephony Service</i>	81
C. R. Kalmanek, W. T. Marshall, P. P. Mishra, D. M. Nortz, and K. K. Ramakrishnan	
<i>Management of Advanced Services in H.323 Internet Protocol Telephony</i>	91
B. Pagurek, J. Tang, T. White, and R. Glitho	
<i>An Empirical Study of Real Audio Traffic</i>	101
A. Mena and J. Heidemann	
<i>Effects of Interleaving on RTP Header Compression</i>	111
C. Perkins and J. Crowcroft	

QoS Routing I

<i>Networks With Advance Reservations: The Routing Perspective</i>	118
R. Guérin and A. Orda	
<i>QoS Routing: The Precomputation Perspective</i>	128
A. Orda and A. Sprintson	
<i>QoS Routing with Performance-Dependent Costs</i>	137
F. Ergun, R. Sinha, and L. Zhang	
<i>On Scalable QoS Routing: Performance Evaluation of Topology Aggregation</i>	147
F. Hao and E. Zegura	

Queueing I

<i>Coupled Processors with Regularly Varying Service Times</i>	157
S. Borst, O. Boxma, and P. Jelenkovic	
<i>General QBD Processes with Applications to Overload Control</i>	165
S.-H. Choi, K. Sohraby, and B. Kim	
<i>Cell Loss Asymptotics in Buffers Fed by Heterogeneous Long-Tailed Sources</i>	173
N. Likhanov and R. Mazumdar	
<i>General Discrete-Time Queueing Systems with Correlated Batch Arrivals and Departures</i>	181
R. Jafari and K. Sohraby	

Mobility

<i>Approximation Models of Wireless Cellular Networks Using Moment Matching</i>	189
K. Mitchell, K. Sohraby, A. van de Liefvoort, and J. Place	
<i>Efficient Handoff Rerouting Algorithms: A Competitive On-Line Algorithmic Approach</i>	198
Y. Bejerano, I. Cidon, J. Naor	
<i>An Intersystem Handoff Technique for IMT-2000 Systems</i>	208
J. McNair, I. F. Akyildiz, and M. Bender	
<i>Analysis of a Mobile Cellular Systems with Hand-Off Priority and Hysteresis Control</i>	217
S.-H. Choi and K. Sohraby	

Bandwidth Allocation I

<i>Dynamic Bandwidth Allocation in a Circuit-Switched Satellite Network: Provision of Deterministic and Statistical QoS guarantees</i>	225
N. Blefari-Melazzi, M. Femminella, and G. Reali	
<i>Abstraction and Constraint Satisfaction Techniques for Planning Bandwidth Allocation</i>	235
C. Frei and B. Faltings	
<i>Receiver Based Management of Low Bandwidth Access Links</i>	245
N. Spring, M. Chesire, M. Berryman, V. Sahasranaman, T. Anderson, and B. Bershad	
<i>Fair Bandwidth Sharing Among Virtual Networks: A Capacity Resizing Approach</i>	255
R. Garg and H. Saran	

Topology Discovery and Network Measurement I

<i>Topology Discovery in Heterogeneous IP Networks</i>	265
Y. Breitbart, M. Garofalakis, C. Martin, R. Rastogi, S. Seshadri, and A. Silberschatz	
<i>Dynamic Distance Maps of the Internet</i>	275
W. Theilmann and K. Rothermel	
<i>A Network Measurement Architecture for Adaptive Applications</i>	285
M. Stemm, R. H. Katz, and S. Seshan	
<i>On the Placement of Internet Instrumentation</i>	295
S. Jamin, C. Jin, Y. Jin, D. Raz, Y. Shavitt, and L. Zhang	

Network Architecture

<i>Transport Network Architectures in an IP World</i>	305
R. D. Doverspike, S. J. Phillips, and J. R. Westbrook	
<i>Satellite over Satellite (SOS) Network: A Novel Architecture for Satellite Network</i>	315
J. Lee and S. Kang	
<i>Network Border Patrol</i>	322
C. Albuquerque, B. J. Vickers, and T. Suda	
<i>Performance of Hashing-Based Schemes for Internet Load Balancing</i>	332
Z. Cao, Z. Wang, and E. Zegura	

Traffic Modeling

<i>A Predictability Analysis of Network Traffic</i>	342
A. Sang and S.-Q. Li	
<i>Performance Impacts of Multi-Scaling in Wide-Area TCP/IP Traffic</i>	352
A. Erramilli, O. Narayan, A. Neidhardt, and I. Saniee	
<i>Variance of Aggregated Web Traffic</i>	360
R. Morris and D. Lin	
<i>A New Approach to Model the Stationary Behavior of TCP Connections</i>	367
C. Casetti and M. Meo	
 <i>Author Index</i>	after page 376