

# ATHINA MARKOPOULOU

## CONTACT INFO

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## RESEARCH INTERESTS

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- ▶ My interests are in the general area of networking: design, analysis, and optimization of network protocols and algorithms. I am particularly interested in applications of network coding techniques to practical networking problems; as well as in the areas of network security (detection and mitigation of malicious traffic), multimedia streaming, network measurements, peer-to-peer systems and online social networks.

## EDUCATION

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- ▶ **Stanford University** *Stanford, CA*  
Ph.D. in Electrical Engineering *November 2002*  
Dissertation: "Assessing the Quality of Multimedia Communications over Internet Backbones". Advisor: Prof. Fouad Tobagi.
- ▶ **Stanford University** *Stanford, CA*  
M.S. in Electrical Engineering *March 1998*
- ▶ **National Technical University of Athens** *Athens, Greece*  
Diploma in Electrical and Computer Engineering *June 1996*  
Entered and graduated in the top 1% (in a class of ~250).

## HONORS AND DISTINCTIONS

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- ▶ NSF CAREER Award 2008.
- ▶ One of the 8 best papers in IEEE INFOCOM 2002.
- ▶ Graduate studies awards: L. Voudouri Foundation fellowship, 2001-2002; I. Latsis Foundation fellowship, 1997-2000; Fulbright Scholarship awardee, 1996-1997; Departmental Assistantship, Dept. of Electrical Engineering, Stanford, 1996-1997.
- ▶ Undergraduate studies awards: 3<sup>rd</sup> medal of excellence, National Technical University of Athens (in a class of ~250), 1998; State Scholarship Foundation (IKY), 1992-1994; Technical Chamber of Greece (TEE), 1993; I.Latsis Foundation fellowship, 1992-1996.
- ▶ Hellenic Olympiads in Mathematics (nation-wide): 1<sup>st</sup> prize, 1987; 3<sup>rd</sup> prize, 1988; distinction, 1991.

## RESEARCH AND WORK EXPERIENCE

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### ► Positions

- **EECS Department, UC Irvine** *Irvine, CA*  
*Assistant Professor* *January 2006-*  
Doing research in the area of networking and also teaching undergraduate and graduate courses in Electrical Engineering and Computer Science.
- **Arastra Inc.** *Palo Alto, CA*  
*Research Scientist, Member of the Technical Staff* *July 2005 - Dec. 2005*  
Worked on measurements, development of algorithms and performance evaluation, for research problems related to the company's product.
- **Stanford University, Electrical Engineering Dept.** *Stanford, CA*  
**Information Systems Laboratory (ISL)** *Aug. 2003 - June 2005*  
*Postdoctoral Research Fellow*  
Developed schemes to (i) improve the performance of video streaming over wireless packet networks and (ii) optimize power management in sensor networks.
- **Sprint Advanced Technologies Lab, IP Group** *Burlingame, CA*  
*Postdoctoral Member of Technical Staff* *Jan. - July 2003*  
Analyzed IS-IS data and performed a root cause analysis of link failures in the Sprint IP backbone network.

### ► Internships

- **Cisco Systems, Gigabit Ethernet Switching Group** *San Jose, CA*  
*Research Intern* *July - Sept. 2000*  
Evaluated the effectiveness of Differentiated Services mechanisms as implemented in routers, for supporting voice and video traffic.
- **Nokia Research Center** *Mountain View, CA*  
*Research Intern* *June-Sept 1999*  
Designed and evaluated a solution for provisioning a network with Differentiated Services to provide bandwidth guarantees.
- **Aloha Networks Inc.** *San Francisco, CA*  
*Research Intern* *June - Sept. 1998*  
Evaluated the performance of the company's proprietary MAC protocol for satellite networks; developed a module in the Network Simulator (NS).
- **Institut National des Télécommunications Francaises (I.N.T.)** *Evry, France*  
*Summer intern (I.A.E.S.T.E, european exchange program)* *June-Aug. 1994*

## EXTRAMURAL FUNDING

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- 07/2009-05/2014: AFOSR MURI, "Information Dynamics as Foundation for Network Management," 600K (360K for the base period and 240K for the option period).
- 02/2009-06/2009: Contract with DoCoMo USA Labs for 40K, A.Markopoulou, "Design of a new TCP-Friendly Media Transport".
- 02/2008-01/2013: NSF Award # 0747110 for 450K, A. Markopoulou, "CAREER: Network Coding Mechanisms for the Internet".

- ▶ 09/2008-08/2011: NSF Award # 0831530 for 400K, A. Markopoulou (UCI) and M. Faloutsos (UCR), “CT-ISG: I-BLOCK: Understanding & Filtering Malicious IP Traffic”.
- ▶ 09/2006-05/2007: VURI gift from AT&T Research for 35K, for research on the topic of “Distributed Denial-of-Service Attacks Mitigation”.

## PROFESSIONAL ACTIVITIES

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- ▶ Technical Program Committee Member
  - 2010: IEEE INFOCOM 2010, Usenix WOSN 2010
  - 2008: ACM/USENIX IMC 2008, IEEE Global Internet 2008, IFIP Networking 2008
  - 2007: IEEE INFOCOM 2007, USENIX SRUTI 2007, IFIP Networking 2007.
  - 2006: IEEE Globecom 2006 (General Conference TPC, Committee for Best Paper Selection), IFIP Networking 2006, ACM SIGCOMM Posters 2006
  - 2005- : IFIP Networking 2004 - Grid Computing Workshop.
- ▶ Executive Committees
  - Travel Grants Chair for IEEE INFOCOM 2010
  - Travel Grants Chair for ACM SIGCOMM 2009
  - Local Arrangements Co-Chair: IEEE WoWMoM 2008
- ▶ Associate Editor: Elsevier Computer Networks, 2009-2011.
- ▶ TC Member: IEEE Multimedia Communications Technical Committee (2009+)
- ▶ Served as reviewer in NSF panels:
  - 2009: 2 panels in CISE/NeTS
  - 2008: 2 panels in CISE/NeTS and Cybertrust
  - 2007: 2 panels in CISE/NeTS
- ▶ Served as reviewer for AFOSR
- ▶ Referee for Journals: IEEE/ACM Transactions on Networking (2006-08), IEEE Trans. on Inf. Theory (July 2009), IEEE JSAC (2008), WCM, ACM CCR (Jan. 2008), IEEE Trans. on Multimedia (June 07, May 2009, July 2009), ACM TOMCCAP (Jan. 2007), IEEE Journal of Selected Topics (Jan. 2007, 2008), IEEE Transactions on Audio, Speech and Language Processing (March 2006), IEEE Communications Letters (March 2006 and July 2006), Springer Telecommunications Systems Journal (March 2006), IEEE Transactions on Multimedia (July '07, Aug. '07), Elsevier Computer Networks Journal, Elsevier Computer Communications Journal, IEEE Network Magazine, Wireless Networks.
- ▶ Referee for Conferences: IEEE ICC 2009, IEEE ICIP 2008, IEEE ICC (2007, 2008), IEEE GLOBECOM 2006 (Spring 2006), IEEE INFOCOM, ACM SIGCOMM, ACM Hot-Nets , IEEE IWQoS, IEEE WCNC, ACM/USENIX IMC, IEEE Hot Interconnects, ACM Multimedia, IFIP Networking, Packet Video Workshop, IEEE ICME (Mar. 2007).
- ▶ Member of IEEE and ACM.

## PUBLICATIONS

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► **JOURNAL PAPERS**

- J8 H.Seferoglu, A.Markopoulou, “Video-Aware Opportunistic Network Coding over Wireless Networks”, in *IEEE JSAC, Special Issue on Network Coding over Wireless Communication Networks*, vol.27(5), June 2009.
- J7 Y.Li, A. Markopoulou, J.Apostolopoulos, N.Bambos, “Content-Aware Payout and Packet Scheduling for Video Streaming over Wireless Links”, in *IEEE Trans. on Multimedia*, Vol. 10, Issue 5, Aug. 2008, pp: 885 - 895.
- J6 A. Markopoulou, G.Iannaccone, S.Bhattacharyya, C.N.Chuah, Y.Ganjali, C.Diot, “Characterization of Failures in an Operational IP Backbone Network,” in *IEEE/ACM Trans. on Networking*, Vol. 16, Issue 4, Aug. 2008, pp: 749 - 762.
- J5 Y. Li, A. Markopoulou, N. Bambos, J. Apostolopoulos, “Joint power-payout control for media streaming over wireless links”, in *IEEE Transactions in Multimedia*, Vol.8, Issue 4, pp. 830 - 843, Aug. 2006.
- J4 A. Markopoulou, F. Tobagi, and M. Karam, “Loss and Delay Measurements of IP Backbone Networks,” in *Elsevier Computer Communications Journal - Special Issue on Measurements and Monitoring of IP Networks*, Vol.29, pp. 1590-1604, June 2006.
- J3 A. Markopoulou, F. Tobagi, and M. Karam, “Assessing the Quality of Voice Communications over Internet Backbones,” in *IEEE/ACM Transactions on Networking*, Vol.11, No 5, pp.747-760, Oct. 2003.
- J2 S. Guha and A. Markopoulou, “Hierarchical Reliable Multicast: Performance Analysis and Placement of Proxies,” in *Elsevier Computer Communications Journal*, Vol.26, pp. 2070-2081, Oct. 2003.
- J1 A. Markopoulou and M. Anagnostou, “Optimal Grouping of Components in a Distributed System,” in *Elsevier Computer Communications Journal*, Vol.21, pp.1452-1461, 1998.

► **PEER-REVIEWED CONFERENCES**

- C19 F.Soldo, A.Le, A.Markopoulou, “Predictive Blacklisting as an Implicit Recommendation system,” to appear in *IEEE INFOCOM 2010*, San Diego, April 2010.
- C18 M.Gjoka, M.Kurant, C.Butts, A.Markopoulou, “Walking in Facebook: a Case Study of Unbiased Sampling of Facebook,” to appear in *IEEE INFOCOM 2010*, San Diego, April 2010.
- C18 P.Sattari, A.Markopoulou, C.Fragouli, “Multiple Source Multiple Destination Topology Inference using Network Coding,” in *Proc. of NetCod 2009*, EPFL, Lausanne, June 2009.
- C17 H.Seferoglu, A.Markopoulou, U.Kozat, “Network coding-aware rate control and scheduling in wireless networks,” in *Proc. of ICME 2009*, Special Session on “Network Coding for Multimedia Streaming,” New York
- C16 H.Seferoglu, A.Markopoulou, “Distributed Rate Control for Video Streaming over Wireless Networks with Intersession Network Coding,” in *Proc. of Packet Video 2009*, Seattle, May 2009.
- C15 X. Yang, M. Gjoka, P. Chhabra, A. Markopoulou, P. Rodriguez, “Kangaroo: Video Seeking in P2P Systems,” in *Proc. of USENIX IPTPS*, Boston, April 2009.
- C14 F. Soldo, A. Markopoulou, K. Argyraki, “Optimal Filtering of Source Address Prefixes: Models and Algorithms,” in *Proc. of IEEE INFOCOM 2009*, Rio de Janeiro, Brazil, Apr. 2009.

- C13 M.Gjoka, M.Sirivianos, A.Markopoulou, X.Yang, "Poking Facebook: Characterization of OSN Applications," in *Proc. of ACM SIGCOMM Workshop on Online Social Networks (WOSN)*, Seattle, Aug. 2008.
- C12 H.Seferoglu, A.Markopoulou, "Opportunistic Network Coding for Video Streaming over Wireless," in *Proc. of IEEE Packet Video*, Lausanne, Switzerland, Nov. 2007.
- C11 M.Gjoka, C.Fragouli, P.Sattari, A.Markopoulou, "Loss Tomography in General Topologies with Network Coding," in *Proc. of IEEE GLOBECOM 2007*, Washington, DC, Nov. 2007.
- C10 C. Fragouli, D. Katabi, S. Katti, A. Markopoulou, M. Medard, H. Rahul, "Wireless Network Coding: Opportunities & Challenges," in *Proc. of MILCOM*, Oct. 2007.
- C9 K.El Defrawy, M.Gjoka, A.Markopoulou, "Bottorrent: Misusing BitTorrent to Launch DDos Attacks," in *Proc. of USENIX SRUTI*, Santa Clara, June 2007.
- C8 Y.Li, A.Markopoulou, J. Apostolopoulos, N.Bambos, "Packet Transmission and Content-Dependent Playout for Video Streaming over Wireless", in *Proc. IEEE MMSP'05 - special session on Content-Aware Video Coding and Communication*, Oct.30-Nov.2 2005, Shanghai, China.
- C7 A. Markopoulou, Y. Li, C.Chan, and N. Bambos, "Power Management in Battery-Constrained Hand-held Devices," in *Proc. of IEEE 2nd Int. Conference on Broadband Networks - Wireless Symposium*, pp:441 - 450, Oct. 3-7, 2005, Boston, MA.
- C6 Y. Li, A. Markopoulou, N. Bambos, and J. Apostolopoulos, "Joint Power/Playout Control Schemes for Media Streaming over Wireless Links," in *Proc. of IEEE 14<sup>th</sup> Packet Video Workshop*, Irvine, Dec. 2004, CA, USA.
- C5 A. Markopoulou, G. Iannaccone, S. Bhattacharyya, C.N. Chuah, and C. Diot, "Characterization of Failures in an IP Backbone Network," in *Proc. of IEEE INFOCOM 2004*, March 2004, Hong Kong. (*Acceptance rate 18.4%*).
- C4 A. Markopoulou, E. Setton, M. Kalman, and J. Apostolopoulos, "WiSE Video: Improving rate-controlled video streaming over wireless links, using in-band wireless loss notification," in *Proc. of IEEE Int'l Conference on Multimedia and Expo (ICME'04)*, July 2004, Taipei, Taiwan. (*Acceptance rate 24.8%*).
- C3 A. Markopoulou, F. Tobagi, and M. Karam, "Assessment of VoIP quality over Internet backbones," in *Proc. of IEEE INFOCOM 2002*, June 2002, New York, USA. (*Acceptance rate 20.5%*).
- \* Among the 8 best papers in the conference
- C2 A. Markopoulou and B. Subbiah, "Dynamic traffic conditioning for a DiffServ domain using feedback and topology techniques," in *Proc. of IC 2000*, Arizona, USA, 2000.
- C1 A. Markopoulou and F. Tobagi, "Performance analysis of Hierarchical Reliable Multicast," in the *Proc. of ACM 2nd Int'l Workshop on Network Group Communications (NGC 2000)*, Nov. 2000, Stanford, CA. (*Acceptance rate 24.5%*)

#### ► INVITED PAPERS

- I8 F.Soldo, K. El Defrawy, A. Markopoulou, B.Krishnamurthy, K. van der Merwe, "Filtering algorithms for unwanted traffic," in *Proc. of ITA Workshop '08*, UCSD, Jan. 2008.
- I7 K. El Defrawy, A. Markopoulou, K.Argyragi, "Optimal allocation of Filters against DDos Attacks," in *Proc. of ITA Workshop '07*, UCSD, Jan. 2007.
- I6 C.Fragouli, A.Markopoulou, R.Srivasanan, S.Diggavi, "Network Monitoring: It Depends on your Points of View," in *Proc. of ITA Workshop'07*, UCSD, Jan. 2007.

- I5 C. Fragouli, A. Markopoulou, S.Diggavi, “Topology Inference using Network Coding”, in *Proc. of the 44<sup>th</sup> Allerton Conference on Communication, Control, and Computing*, Monticello, IL, Sept. 2006.
- I4 C.Fragouli, A.Markopoulou, “A Network-Coding Approach to Overlay Network Monitoring”, in *Proc. of the Allerton Conference 2005*, Sept. 2005.
- I3 A. Abbas and A. Markopoulou, “A Bayesian - Maximum Entropy Approach to Subjective Voice Quality Testing,” in *Proc. of AIP 23<sup>rd</sup> International WorkShop on Maximum Entropy and Bayesian Inference*, Jackson Hole, WY, USA, Aug. 2003.
- I2 F. Tobagi, A. Markopoulou, and M. Karam, “Is the Internet ready for VoIP?,” in *Proc. of 2002 Tyrrhenian International Workshop on Digital Communications (IWDC 2002)*, Capri, Italy, pp.49-57, Sept. 2002, Capri, Italy.
- I1 F. Tobagi, W. Nouredine, B. Chen, A. Markopoulou, M. Karam, C. Fraleigh, J.M. Pulido and J. Kimura, “Service Differentiation in the Internet to support multimedia traffic,” in *Proc. of 2001 Tyrrhenian Int’l Workshop on Digital Communications (IWDC 2001)*, and printed by *Springer Verlag LNCS*, Vol. 2170, p.381, 2001.

► **TECHNICAL REPORTS**

- TR5 F.Soldo, A.Le, A.Markopoulou, “Predictive Blacklisting as an Implicit Recommendation System,” Technical Report arXiv:cs.NI/0908.2007, *arXiv.org*, Aug. 2009.
- TR4 M.Gjoka, M.Kurant, C.T. Butts, A. Markopoulou, “A Walk in Facebook: Uniform Sampling of Users in Online Social Networks,” Technical Report arXiv:cs.NI/0906.0060, *arXiv.org*, May 2009.
- TR3 F. Soldo, A. Markopoulou, K. Argyraki, “Optimal Filtering of Malicious IP Sources,” Technical Report arXiv:cs.NI/0811.3828, *arXiv.org*, Nov. 2008.
- TR2 A. Markopoulou, D. Cheriton, “The Case for Redundant Arrays of Internet Links (RAIL),” Technical Report ArXiv:cs.NI/0701133, *arXiv.org*, Jan. 2007.
- TR1 K. El Defrawy, A. Markopoulou, K. Argyraki, “Optimal filter allocation against DDoS attacks,” Technical Report arXiv:cs.NI/0612066, *arXiv.org*, Dec. 2006.

► **POSTERS and SHORT PAPERS**

- S3 A.Markopoulou, H.Seferoglu, “Network Coding Meets Multimedia: Opportunities and Challenges,” *invited letter, IEEE MMTC E-Letter*, Vol.4, No.1, pp.12-15, Feb.2009.
- S2 C.Fragouli, A. Markopoulou, “Network Coding Techniques for Network Monitoring: A Brief Introduction”, in *IEEE Int’l Zurich Seminar (IZS) on Communications*, pp.82-83, ETH, Zurich, Switzerland, Feb. 2006.
- S1 A. Markopoulou, N.Bambos “Optimizing Timeout-Based Sleep Algorithms,” *poster appeared in the WIP session of IEEE/ACM IPSN 2005*.

## TEACHING AND ADVISING EXPERIENCE

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► **EECS Dept, UC Irvine**

*Jan. 2006 - today*

- Undergraduate classes taught:
  - \* *EECS140 (Engineering Probability)*: Spring 2006, Spring 2007, Spring 2008.
- Graduate classes taught:
  - \* *EECS246/NetSys256 (Network Coding)*: Fall 2009 (new class).
  - \* *EECS248B (Design and Analysis of Algorithms)*: Fall 2009

- \* *EECS248B/NetSys250 (Performance Analysis of Networks)*: Winter '07, '08.
- \* *EECS298/NetSys270 (Advanced Topics on Networking)*: Spring '07, Spring '08.
- \* *NetSys295 (Networked Systems/Distinguished Speakers Seminar)*: Winter '08, Spring '09.
- Research Supervision:
  - \* Supervised one postdoctoral scholar (M.Kurant) visiting from EPFL Lausanne, March-July 2009. (Previously also external committee member in his Ph.D. thesis at EPFL.)
  - \* *Ph.D students*: Currently advising 5 Ph.D. students: two are enrolled in the EECS Dept. (H.Seferoglu, P.Sattari), two in the Networked Systems program (F.Soldo, M.Gjoka), and one in the CS department (A.Le). They are working on various topics including: malicious traffic (filtering algorithms, blacklists characterization, Internet Denial-of-Service), applications of network coding (to network measurement and inference, video streaming, rate control), peer-to-peer (video-on-demand over p2p, misusing p2p traffic for DDoS attacks) and online social networks.
  - \* *M.S. students*: One EECS student (G.Valente) graduated in Dec.2007 - currently with Cisco Systems; M.S. thesis on “Using multiple paths to improve end-to-end performance.” External member on the M.S. thesis committee of Ramya Srinivasan in EPFL, Lausanne.
  - \* *Undergraduate*: supported the research of one undergraduate visitor from Italy (Jan.-June 2009), 2 senior design projects (2007 -2008), supervised two undergraduate students in summer and fall of 2008 (supported by UROP fellowship).

► **Stanford University**

- *Co-organizer of the Stanford Networking Seminar (NetSeminar)* *2004-05*  
The seminar brought together networking researchers from academia and industry.
- *Teaching Assistant* *Winter 2000*  
for the graduate course EE384A on “Internet protocols and standards”.
- *Supervision.* *2001-2004*  
I had the privilege to supervise the research of several graduate students at Stanford. In Spring 2001, I supervised a project for EE384B, which resulted in developing a DiffServ simulator in NS. In Winter and Spring 2001, I worked with the MS student A. Vyas, on the processing of large measurement data sets. In Fall 2003, I initiated and led the WiSE project with Ph.D. students E. Setton and M. Kalman (which resulted in an IEEE ICME paper). Since Spring 2004, I advised the Ph.D. student Y. Li on a project related to video streaming over wireless (which resulted in several conference and journal papers).

► **National Technical University of Athens**

*Sept. 1993 - Nov. 1994*

*Assistant in the Computer Science Lab*

I gave tutorials on programming languages and supervised programming projects, at undergraduate level. I was also a part-time network and system administrator.

## TALKS

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► **INVITED TALKS**

- “Highly Predictive Blacklisting”, *invited talk in SuRI (Summer Research Institute)*, Special Session: “Rediscovering Favorites”, EPFL, Lausanne, June 2009.

- “Filtering Malicious Sources: Models and Algorithms,” *invited talk to the IPAM Workshop II: Applications of Internet MRA to Cyber-Security*, UCLA, Oct.2008.
- “Dealing with Malicious Traffic”, panel organizer and speaker *in IEEE CCW08 Workshop*, Colorado (Oct. 2008).
- “(Some) Novel Applications of Network Coding,” presented at:
  - *DocomoLabs, Palo Alto, CA*, March 2008.
  - *GeorgiaTech, Network Seminar*, Nov. 2007.
- “Optimal Filter Allocation against DDoS Attacks”, presented at:
  - *CAIDA, San Diego Supercomputer Center*, Feb. 2007
  - *AT&T Research*, New Jersey, Feb. 2007
- “Improving Network Inference using Network Coding Techniques”, presented at:
  - *University of Southern California*, March 2007.
  - *CS Colloquium, UC Riverside*, Nov. 2006
- “Control Mechanisms for Multimedia Streaming over Wireless”, presented at:
  - *Networked Systems Seminar, UC Irvine*, May 2006
  - *Summer Research Institute at EPFL*, Lausanne, Switzerland, July 2006.
  - *IDIAP Research Institute*, Martigny, Switzerland, July 2006.
  - *EECS Dept, UC Irvine*, CA, March 2005
  - *Google Inc.*, Mountain View, CA, June 2005
- “Rate-control for real-time multimedia applications”, Guest lecture in EEC273 graduate class on Computer Networks, **UC Davis, CA** Jan. 2005.
- “Improving the Dependability of the Internet,” Stanford Networking Seminar (Net-Seminar), *Stanford University*, Jan. 2005
- “Improving Video Streaming over Wireless Links,” presented to:
  - *Microsoft Research*, Cambridge, UK, Dec. 2004
  - *National Technical University of Athens*, Greece, Jan. 2005.
- “The Good, the Bad and the WISE: Three Problems in Designing a Ubiquitous Packet Network,” *Sprint ATL*, Burlingame, CA, USA, March 2004
- “Failures and Availability in IP Backbone Networks,” presented to:
  - *AT&T Labs* at Florham Park, NJ, USA, June 2004
  - *National Technical University of Athens*, Athens, Greece, Dec. 2003
  - *Athens University of Economics and Business*, Athens, Greece, Dec. 2003
  - *EECS Dept. Seminar, UC Berkeley*, Berkeley, CA, USA, Aug. 2003
  - *Sprint Retreat*, Miami Beach, FL, USA, May 2003
- “Is the Internet ready for VoIP?,” presented, from Aug. to Nov. 2002:
  - *AT&T Labs*, Menlo Park, CA & at Florham Park, NJ, USA
  - *Lucent-Bell Labs*, Holmdel & Murray Hill, NJ, USA
  - *Nokia Research Center*, Mountain View, CA, USA
  - *CAIDA*, San Diego, CA, USA
- “Differentiated Services for Voice and Video”, *University of Crete, Computer Science Dept.*, Heraklion, Greece, July 2000

## REFERENCES

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Available upon request.