

Seth L. Gilbert

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Education

Massachusetts Institute of Technology. *Cambridge, Massachusetts*

PhD 2007 in Computer Science

Advisor: Nancy A. Lynch, NEC Professor of Software Science and Engineering

Thesis: *Virtual Infrastructure for Wireless Ad Hoc Networks*

Massachusetts Institute of Technology. *Cambridge, Massachusetts*

MS 2003 in Computer Science

Advisor: Nancy A. Lynch, NEC Professor of Software Science and Engineering

Thesis: *RAMBO II: Rapidly Reconfigurable Atomic Memory for Dynamic Networks*

Yale University. *New Haven, Connecticut*

BS 1999 in Electrical Engineering (with Distinction) and in Mathematics

Employment

EPFL (Postdoctoral Researcher) *Feb. 2007–, Lausanne, Switzerland*

MIT (Research Assistant, Teaching Assistant) *2001-2007, Cambridge, MA*

Microsoft Corporation (Software Design Engineer) *1999-2001, Redmond, WA*

Sun Microsystems (Design-for-Test Engineer) *Summer, 1998, Chelmsford, MA*

Yale Comp. Sci. Dept. (Research Assistant) *Summer, 1996, New Haven, CT*

Professional Activities

Program Committee Member:

SPAA'09	21st Symposium on Parallelism in Algorithms and Architecture
DISC'09	23rd Intl. Symposium on Distributed Computing
SRWN	Workshop on Security and Reliability in Wireless Networks at DISC '09 (Organizer)
ICDCS'09	29th Intl. Conference on Distributed Computing Systems
SSS'09	11th Intl. Symp. on Stabilization, Safety, and Security of Distributed Systems
AlgoSensors'09	5th Intl. Workshop on Algorithmic Aspects of Wireless Sensor Networks
SIROCCO'09	16th Intl. Colloq. on Structural Information and Communication
DISC'08	22nd Intl. Symposium on Distributed Computing
SCW'08	Spatial Computing Workshop at SASO
RDDS'08	3rd Workshop on Reliability in Decentralized Distributed Systems
IPDPS'08	22nd Intl. Parallel and Distributed Processing Symposium
PODC'07	26th Symp. on Principles of Distributed Computing (Jr. Member)
HIPC'05	12th Intl. Conference on High Performance Computing

Reviewer:

Journals: Distributed Computing, Journal of Information and Computation, Transactions on Algorithms, Transactions on Computers, Transactions on Parallel and Distributed Systems, Transactions on Autonomous and Adaptive Systems, Security and Communication Networks

Conferences: Symposium on the Theory of Computing (STOC), Symposium on Principles of Distributed Computing (PODC), Symposium on Discrete Algorithms (SODA), Symposium on Parallelism in Algorithms and Architectures (SPAA), Symposium on Distributed Computing (DISC), International Conference on Dependable Systems and Networks (DSN), International Conference on Distributed Computing Systems (ICDCS), International Conference On Principles Of Distributed Systems (OPODIS), International Symposium on Stabilization, Safety, and Security (SSS), *et cetera*

Teaching

Distributed Algorithms, *Fall 2008, EPFL*

Lecturer (co-taught with Rachid Guerraoui)

Gave 50% of the 2-hour lectures, helped to design quizzes/exams/etc.

Selected Topics in Distributed Computing (Shared Memory), *Fall 2008, EPFL*

Lecturer (co-taught with Rachid Guerraoui)

Gave 33% of the 2-hour lectures, helped to design quizzes/exams/etc.

6.046, Introduction to Algorithms, *Fall 2005, MIT*

Teaching Assistant (for Profs. Erik Demaine and Charles Leiserson)

Course Evaluation: 5.7/7.0 (Highest ranking among 5 TAs.)

“S. Gilbert gave clear, straightforward explanations and had great blackboard technique.”

6.895, Theory of Parallel Systems, *Fall 2003, MIT*

Teaching Assistant (for Prof. Charles Leiserson)

Awards

Franz Tuteur Award. Yale Electrical Engineering award for most outstanding senior research

Selected Invited Talks

Invited Lecture, *February 2009*, Winter School on Hot Topics in Distributed Computing
The Nine Circles of Torment: Algorithms for Robust Wireless Networks

Invited Talk (Lynch Symposium), *August 2008*, PODC, Canada
On Fault Tolerance in Wireless Networks

Distinguished Junior Lecturer Series, *April 2008*, Ben-Gurion University, Israel
Overcoming Disruption in Wireless Radio Networks

Invited Lecture, *February 2007*, Minema Winter School, Switzerland
Malicious Motes and Suspicious Sensors: Byzantine Interference in Wireless Networks

Selected Publications

- **Secure Communication Over Radio Channels.** Shlomi Dolev, Seth Gilbert, Rachid Guerraoui, and Calvin Newport. In the *Proceedings of the 27th Annual Symposium on Principles of Distributed Computing (PODC)*, August 2008.

Abstract: In this paper, we study the problem of secure communication in a multi-channel, single-hop radio network with a malicious adversary that can cause collisions and spoof messages. We assume no pre-shared secrets or trusted-third-party infrastructure. The main contribution of this paper is f-AME: a randomized (f)ast-(A)uthenticated (M)essage (E)xchange protocol that enables nodes to exchange messages in a reliable and authenticated manner. It runs in $O(|E|t^2 \log n)$ time and has optimal resilience to disruption, where E is the set of pairs of nodes that need to swap messages, n is the total number of nodes, C the number of channels, and $t < C$ the number of channels on which the adversary can participate in each round. We then show how to use f-AME to establish a shared secret group key, which can be used to implement a secure, reliable and authenticated long-lived communication service. The resulting service requires $O(nt^3 \log n)$ rounds for the setup phase, and $O(t \log n)$ rounds for an arbitrary pair to communicate. (In general, f-AME and its derivative protocols can achieve even better performance when more channels are available.) By contrast, existing solutions in this setting rely on pre-shared secrets, trusted-third-party infrastructure, and/or the assumption that all interference is non-malicious.

- **Virtual Infrastructure for Collision-Prone Wireless Networks.** Gregory Chockler, Seth Gilbert, and Nancy A. Lynch. In the *Proceedings of the 27th Annual Symposium on Principles of Distributed Computing (PODC)*, August 2008.

Abstract: Wireless ad hoc networks pose several significant challenges: devices are unreliable; deployments are unpredictable; and communication is erratic. One proposed solution is *Virtual Infrastructure*, an abstraction in which unpredictable and unreliable devices are used to emulate reliable and predictable infrastructure. In this paper, we present a new protocol for emulating virtual infrastructure in collision-prone wireless networks. At the heart of our emulation is a *convergent history agreement* protocol that tolerates lost messages and crash failures, and is designed specifically for ad hoc deployments: the participants are a priori unknown, and thus the protocol adapts to varying numbers of participants. The convergent history agreement protocol is quite efficient, as each agreement instance completes in a constant number of communication rounds, and the size of the messages is constant, independent of the length of the execution. Building on the convergent history agreement protocol, our virtual infrastructure emulation introduces only constant overhead per virtual round emulated. We believe that this new emulation algorithm, along with the techniques developed in this paper, help bring virtual infrastructure closer to reality.

- **Of Malicious Motes and Suspicious Sensors: On the Efficiency of Malicious Interference in Wireless Networks.** Seth Gilbert, Rachid Guerraoui, and Calvin Newport. In the *Proceedings of the 10th International Conference on Principles of Distributed Systems (OPODIS)*, December 2006. To appear in *Theoretical Computer Science*.

Abstract: How efficiently can a malicious device disrupt communication in a wireless network? Imagine a basic game involving two honest players, Alice and Bob, who want to

exchange information, and an adversary, Collin, who can disrupt communication using a limited budget of broadcasts. How long can Collin delay Alice and Bob from communicating? In fact, the trials and tribulations of Alice and Bob capture the fundamental difficulty shared by several n -player problems, including reliable broadcast, leader election, static k -selection, and t -resilient consensus. We provide round complexity lower bounds—and (nearly) tight upper bounds—for each of those problems. These results imply bounds on adversarial efficiency, which we analyze in terms of *jamming gain* and *disruption-free complexity*.

- **Contention Resolution with Heterogeneous Job Sizes.** Michael A. Bender, Jeremy T. Fineman, and Seth Gilbert. In the *Proceedings of the 14th Annual European Symposium on Algorithms (ESA)*, September 2006.

Abstract: In this paper, we study the problem of contention resolution for different-sized jobs on a simple channel. When a job makes a run attempt on a simple channel, it learns only whether the attempt succeeds or fails. We first analyze the binary exponential backoff protocol, and show that it achieves a makespan of $V2^{\Theta(\sqrt{\log n})}$, where V is the total work of all the contending jobs. This bound is significantly larger than when all jobs are constant sized. We then introduce a new protocol, SIZE-HASHED BACKOFF, specifically designed for jobs of multiple sizes that achieves makespan $O(V \log^3 \log V)$. The protocol is based on a careful use of hash functions to group jobs by size, combined with a protocol that achieves linear throughput when the jobs are well-grouped.

- **Consensus and Collision Detectors in Wireless Ad Hoc Networks.** Gregory Chockler, Murat Demirbas, Seth Gilbert, Calvin Newport, and Tina Nolte. In the *Proceedings of the 24th Annual Symposium on the Principles of Distributed Computing (PODC)*, July 2005. Also in *Distributed Computing*, 21(1):55–84, June 2008.

Abstract: We introduce a new model for unreliable wireless networks prone to message collisions, electromagnetic interference, and other communication anomalies. Messages may be lost for any reason, and we assume that the receiver may get unreliable information about collisions. (The sender, unlike the receiver, gets no information about collisions.) In this context, we study a fundamental coordination problem, consensus, and show upper and lower bounds on how efficiently it can be solved under different reliability assumptions. Our algorithms, and the underlying wireless model, are validated with simulations based on a realistic 802.11 MAC layer implementation and a detailed radio propagation model.

- **GeoQuorums: Implementing Atomic Memory in Mobile Ad Hoc Networks.** Shlomi Dolev, Seth Gilbert, Nancy A. Lynch, Alex A. Shvartsman, and Jennifer Welch. *Distributed Computing*, 18(2):125–155, November 2005.

Abstract: In this paper (and the preceding conference paper from DISC 2003), we introduce the idea of *Virtual Infrastructure*. Virtual infrastructure is a new type of abstraction layer that emulates geographically-local infrastructure in a wireless ad hoc network. Virtual infrastructure provides many of the advantages of a fixed infrastructure, in terms of simplicity and algorithm development, while simultaneously tolerating an ad hoc, potentially hostile, environment in which fixed infrastructure may be overly costly and impractical.

The GeoQuorums approach divides the world into *focal point regions*, each of which acts as a local virtual repository for storing data. These repositories form the virtual infrastructure. We

assume that, most of the time, the regions are populated by physical mobile nodes. Whenever a physical node is in a focal point region, it participates in a protocol to maintain consistent copies of the state of the associated virtual repository. A high-level protocol replicates the data across regions using reconfigurable quorum-based techniques to ensure consistency, efficiency, and long-term data survival, even as the set of available devices changes due to mobility or failures.

- **Rambo II: Rapidly Reconfigurable Atomic Memory for Dynamic Networks.** Seth Gilbert, Nancy A. Lynch, and Alex A. Shvartsman. In the *Proceedings of the International Conference on Dependable Systems and Networks (DSN)*, June 2003.

Abstract: This paper presents a new algorithm for implementing reconfigurable atomic read/write memory for highly dynamic environments. The original RAMBO algorithm, originally developed by Lynch and Shvartsman (DISC'02), guarantees atomicity for arbitrary patterns of asynchrony, message loss, and node crashes. RAMBO II implements a different approach to establishing new configurations: instead of operating sequentially, the new algorithm reconfigures aggressively, transferring information from old configurations to new configurations in parallel. This improvement substantially reduces the time to establish a new configuration and to remove obsolete configurations. This, in turn, substantially increases fault tolerance and reduces the latency of read/write operations when the network is unstable or reconfiguration is bursty. This paper presents RAMBO II in detail, a correctness proof, and a conditional analysis of its performance. Preliminary empirical studies illustrate the advantages of the new algorithm.

Full List of Publications

Journal Articles

- [1] Gregory Chockler, Seth Gilbert, Vincent C. Gramoli, Peter M. Musial, and Alex A. Shvartsman. Reconfigurable distributed storage for dynamic networks. *Journal of Parallel and Distributed Computing*, 69(1):100–116, January 2009.
- [2] Seth Gilbert, Rachid Guerraoui, and Calvin Newport. Of malicious motes and suspicious sensors: On the efficiency of malicious interference in wireless networks. *Theoretical Computer Science*, 410(6–7):546–569, February 2009.
- [3] Seth Gilbert, Nancy Lynch, Sayan Mitra, and Tina Nolte. Self-stabilizing robot formations over unreliable networks. *ACM Transactions on Autonomous and Adaptive Systems*, 2009. Special Issue on Self-Adaptive and Self-Organising Wireless Networking Systems. Accepted, publication pending.
- [4] Gregory Chockler, Murat Demirbas, Seth Gilbert, Nancy A. Lynch, Calvin Newport, and Tina Nolte. Consensus and collision detectors in radio networks. *Distributed Computing*, 21(1):55–84, June 2008.
- [5] Shlomi Dolev, Seth Gilbert, Nancy A. Lynch, Alex A. Shvartsman, and Jennifer Welch. Geo-Quorums: Implementing atomic memory in mobile ad hoc networks. *Distributed Computing*, 18(2):125–155, November 2005.

- [6] Seth Gilbert and Nancy A. Lynch. Brewer’s conjecture and the feasibility of consistent, available, partition-tolerant web services. *SigAct News*, June 2002.
- [7] Seth Gilbert, Nancy A. Lynch, and Alex A. Shvartsman. RAMBO: Rapidly reconfigurable atomic memory for dynamic networks. Submitted, pending minor revisions.
- [8] Michael A. Bender, Jeremy T. Fineman, Seth Gilbert, and Charles E. Leiserson. On-the-fly maintenance of series-parallel relationships in fork-join multithreaded programs. Submitted, pending minor revisions.

Conference Publications

- [1] Seth Gilbert and Dariusz Kowalski. Distributed agreement with optimal communication complexity. In *Proceedings of the Symposium on Discrete Algorithms (SODA)*, January 2010.
- [2] Dan Alistarh, Seth Gilbert, Rachid Guerraoui, and Corentin Travers. Of choices, failures and asynchrony: The many faces of set agreement. In *Proceedings of the 20th International Symposium on Algorithms and Computation (ISAAC)*, December 2009.
- [3] Shlomi Dolev, Seth Gilbert, Rachid Guerraoui, Fabian Kuhn, and Calvin Newport. The wireless synchronization problem. In *Proceeding of the 28th Symposium on Principles of Distributed Computing (PODC)*, August 2009.
- [4] Seth Gilbert, Rachid Guerraoui, Dariusz Kowalski, and Calvin Newport. Interference-resilient information exchange. In *Proceedings of INFOCOM*, April 2009.
- [5] Michael A. Bender, Jeremy T. Fineman, and Seth Gilbert. A new approach to incremental topological ordering. In *Proceedings of the Symposium on Discrete Algorithms (SODA)*, January 2009.
- [6] Seth Gilbert, Nancy A. Lynch, Sayan Mitra, and Tina Nolte. Self-stabilizing mobile robot formations with virtual nodes. In *Proceedings of the Symposium on Stabilization, Safety and Security of Distributed Systems (SSS)*, December 2008.
- [7] Dan Alistarh, Seth Gilbert, Rachid Guerraoui, and Corentin Travers. How to solve consensus in the smallest window of synchrony. In *22nd International Symposium on Distributed Computing (DISC)*, September 2008.
- [8] Shlomi Dolev, Seth Gilbert, Rachid Guerraoui, and Calvin Newport. Secure communication over radio channels. In *Proceeding of the 27th Symposium on Principles of Distributed Computing (PODC)*, August 2008.
- [9] Chryssis Georgiou, Seth Gilbert, Rachid Guerraoui, and Dariusz Kowalski. On the complexity of asynchronous gossip. In *Proceeding of the 27th Symposium on Principles of Distributed Computing (PODC)*, August 2008.
- [10] Gregory Chockler, Seth Gilbert, and Nancy A. Lynch. Virtual infrastructure for collision-prone wireless networks. In *Proceeding of the 27th Symposium on Principles of Distributed Computing (PODC)*, August 2008.

- [11] Hamed S. Alavi, Seth Gilbert, and Rachid Guerraoui. Extensible encoding of type hierarchies. In *Proceedings of the Symposium on Principles of Programming Languages (POPL)*, January 2008.
- [12] Seth Gilbert, Rachid Guerraoui, and Dariusz Kowalski. On the message complexity of indulgent consensus. In *Proceedings of the the 21st International Symposium on Distributed Computing (DISC)*, September 2007.
- [13] Shlomi Dolev, Seth Gilbert, Rachid Guerraoui, and Calvin Newport. Gossiping in a multi-channel radio network (an oblivious approach to coping with malicious interference). In *Proceedings of the the 21st International Symposium on Distributed Computing (DISC)*, September 2007.
- [14] Seth Gilbert, Rachid Guerraoui, and Calvin Newport. Of malicious motes and suspicious sensors: On the efficiency of malicious interference in wireless networks. In *Proceedings of the 10th International Conference On Principles Of Distributed Systems (OPODIS)*, December 2006.
- [15] Michael A. Bender, Jeremy T. Fineman, and Seth Gilbert. Contention resolution with heterogeneous job sizes. In *Proceedings of the 14th Annual European Symposium on Algorithms (ESA)*, September 2006.
- [16] Matthew Lepinski, David Liben-Nowell, Seth Gilbert, and April Rasala Lehman. Playing games in many possible worlds. In *Proceedings of the Seventh ACM Conference on Electronic Commerce (EC)*, June 2006.
- [17] Gregory Chockler, Seth Gilbert, Vincent C. Gramoli, Peter M. Musial, and Alex A. Shvartsman. Reconfigurable distributed storage for dynamic networks. In *9th International Conference on Principles of Distributed Systems (OPODIS)*, December 2005.
- [18] Shlomi Dolev, Seth Gilbert, Limor Lahiani, Nancy A. Lynch, and Tina Nolte. Timed virtual stationary automata for mobile networks. In *9th International Conference on Principles of Distributed Systems (OPODIS)*, December 2005.
- [19] Gregory Chockler, Murat Demirbas, Seth Gilbert, Calvin Newport, and Tina Nolte. Consensus and collision detectors in wireless ad hoc networks. In *24th Annual Symposium on the Principles of Distributed Computing (PODC)*, July 2005.
- [20] Michael A. Bender, Jeremy T. Fineman, Seth Gilbert, and Bradley C. Kuszmaul. Concurrent cache-oblivious B-trees. In *Proceedings of the Seventeenth Symposium on Parallelism in Algorithms and Architectures (SPAA)*, July 2005.
- [21] Seth Gilbert and Grzegorz Malewicz. The quorum deployment problem. In *Proceedings of the 8th International Conference on Principles of Distributed Systems (OPODIS)*, December 2004.
- [22] Shlomi Dolev, Seth Gilbert, Nancy A. Lynch, Elad Schiller, Alex A. Shvartsman, and Jennifer Welch. Virtual mobile nodes for mobile ad hoc networks. In *Proceeding of the 18th International Conference on Distributed Computing (DISC)*, October 2004.

- [23] Michael A. Bender, Jeremy T. Fineman, Seth Gilbert, and Charles E. Leiserson. On-the-fly maintenance of series-parallel relationships in fork-join multithreaded programs. In *Proceedings of the Sixteenth ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, July 2004.
- [24] Shlomi Dolev, Seth Gilbert, Nancy A. Lynch, Alex A. Shvartsman, and Jennifer Welch. Geo-Quorums: Implementing atomic memory in mobile ad hoc networks. In *Proceeding of the 17th International Conference on Distributed Computing (DISC)*, October 2003.
- [25] Seth Gilbert, Nancy A. Lynch, and Alex A. Shvartsman. RAMBO II: Rapidly reconfigurable atomic memory for dynamic networks. In *Proceedings of the International Conference on Dependable Systems and Networks (DSN)*, June 2003.

Workshop Publications

- [1] Matthew Brown, Seth Gilbert, Nancy A. Lynch, Calvin Newport, Tina Nolte, and Michael Spindel. The virtual node layer: A programming abstraction for wireless sensor networks. In *Proceedings of the the International Workshop on Wireless Sensor Network Architecture (WWSNA)*, April 2007.
- [2] Gregory Chockler, Seth Gilbert, and Boaz Patt-Shamir. Communication-efficient probabilistic quorum systems. In *Proceedings of the International Workshop on Foundations and Algorithms for Wireless Networking (FAWN)*, March 2006.
- [3] Shlomi Dolev, Seth Gilbert, Elad Schiller, Alex A. Shvartsman, and Jennifer Welch. Autonomous virtual mobile nodes. In *Proceeding of the 3rd Workshop on Foundations of Mobile Computing (DIAL-M-POMC)*, September 2005.
- [4] Gregory Chockler, Murat Demirbas, Seth Gilbert, Nancy A. Lynch, Calvin Newport, and Tina Nolte. Reconciling the theory and practice of unreliable wireless broadcast. In *International Workshop on Assurance in Distributed Systems and Networks (ADSN)*, June 2005.
- [5] Jake Beal and Seth Gilbert. RamboNodes for the metropolitan ad hoc network. In *Proceedings of DIWANS Workshop, International Conference on Dependable Systems and Networks (DSN)*, July 2004.

Other Publications

- [1] Shlomi Dolev, Seth Gilbert, Limor Lahiani, Nancy A. Lynch, and Tina Nolte. Timed virtual stationary automata for mobile networks. In *Proceeding of the 43rd Allerton Conference on Communication, Control, and Computing*, September 2005. Invited.
- [2] Gregory Chockler, Murat Demirbas, Seth Gilbert, and Calvin Newport. A middleware framework for robust applications in wireless ad hoc networks. In *Proceeding of the 43rd Allerton Conference on Communication, Control, and Computing*, September 2005. Invited.
- [3] Shlomi Dolev, Limor Lahiani, Seth Gilbert, Nancy A. Lynch, and Tina Nolte. Brief announcement: Virtual stationary automata for mobile networks. In *Proceeding of the 24th Symposium on Principles of Distributed Computing (PODC)*, July 2005.

- [4] Athicha Muthitacharoen, Seth Gilbert, and Robert Morris. Etna: a fault-tolerant algorithm for atomic mutable DHT data. Technical report, MIT, June 2005.
- [5] Shlomi Dolev, Seth Gilbert, Nancy A. Lynch, Elad Schiller, Alex A. Shvartsman, and Jennifer Welch. Brief announcement: Virtual mobile nodes for mobile ad hoc networks. In *Proceeding of the 23rd Symposium on Principles of Distributed Computing (PODC)*, July 2004.

Theses

- [1] Seth Gilbert. *Virtual Infrastructure for Wireless Ad Hoc Networks*. PhD thesis, MIT, 2007.
- [2] Seth Gilbert. RAMBO II: Rapidly reconfigurable atomic memory for dynamic networks. Master's thesis, MIT, 2003.

Other Service to the Community

Program Committee. CSAIL Student Workshop (CSW), 2005.
Theory Colloquium. Organizer, Spring 2005–Fall 2005.
Theory Group Space Committee. Member, 2004.
Theory Student Seminar Series. Organizer, 2004.

Personal Information

Nationality: United States of America (married to a French/American national)
Languages: English, French (conversational)

Complete List of Lectures and Presentations

Fracas-Malisse Workshop, *Arcachon, France*, September 2008
 Invited talk. *Overcoming Disruption in Wireless Networks*

PODC, *Toronto, Canada*, August 2008
 Invited talk (Lynch Symposium). *On Fault Tolerance in Wireless Networks*

PODC, *Toronto, Canada*, August 2008
 Conference talk. *Virtual Infrastructure for Collision-Prone Wireless Networks*

PODC, *Toronto, Canada*, August 2008
 Conference talk. *On the Complexity of Asynchronous Gossip*

BBN, *Cambridge, MA*, May 2008
 Invited talk (Information Security Seminar). *Security in Wireless Radio Networks: How to Overcome Malicious Disruption*

Technion, *Haifa, Israel*, April 2008
 Seminar talk. *Overcoming Disruption in Wireless Radio Networks*

IBM Research, *Haifa, Israel*, April 2008
 Seminar talk. *Gossip in an Asynchronous World*

Ben-Gurion University, Beersheba, Israel, April 2008
Distinguished (Junior) Lecturer Series. *Overcoming Disruption in Wireless Radio Networks*

EPFL, Lausanne, Switzerland, February 2008
School seminar. *Malicious Disruption in Wireless Radio Networks*

University of Liverpool, Liverpool, Great Britain, November 2007
Seminar talk. *Virtual Infrastructure for Wireless Ad Hoc Networks*

University of Liverpool, Liverpool, Great Britain, October 2007
Seminar talk. *Gossiping in a Multi-Channel Radio Network*

DISC, Lemesos, Cyprus, October 2007
Conference talk. *Gossiping in a Multi-Channel Radio Network*

DISC, Lemesos, Cyprus, October 2007
Conference talk. *On the Message Complexity of Indulgent Consensus.*

Malisse Meeting, Lyon, France, April 2007
Invited talk. *Oblivious Byzantine Gossip in a Multi-Channel Radio Network*

Minema Winter School, Anzère, Switzerland, February 2007
Invited lecture. *Malicious Motes and Suspicious Sensors: Byzantine Interference in Wireless Networks*

ESA, Zurich, Switzerland, September 2006
Conference talk. *Contention Resolution for Jobs of Heterogeneous Size*

Microsoft Research, Silicon Valley, Mountain View, CA, April 2006
Seminar talk. *Virtual Infrastructure for Wireless Ad Hoc Networks*

California Institute of Technology, Pasadena, CA, March 2006
Seminar talk. *Virtual Infrastructure for Wireless Ad Hoc Networks*

University of Toronto, Toronto, Canada, January 2006
Seminar talk. *Virtual Infrastructure for Wireless Ad Hoc Networks*

PODC, Las Vegas, NV, July 2005
Conference talk. *Consensus and Collision Detectors for Mobile Ad Hoc Networks*

OPODIS, Grenoble, France, December 2004
Conference talk. *The Quorum Deployment Problem*

King's College, London, England, October 2004
Seminar talk. *Geographic Abstractions for Mobile Ad Hoc Networks*

DISC, Amsterdam, Netherlands, October 2004
Conference talk. *Virtual Mobile Nodes for Mobile Ad Hoc Networks*

PODC, St. Johns, Canada, August 2004
Conference brief talk. *Virtual Mobile Nodes for Mobile Ad Hoc Networks*

Sun Microsystems, Burlington, MA, August 2004

Seminar talk. *Concurrent Cache-Oblivious Search Trees*

Dagstuhl Seminar: Cache-Oblivious and Cache-Aware Algs, Germany, July 2004

Invited presentation. *Concurrent Cache-Oblivious Search Trees*

Ben-Gurion University, Beersheba, Israel, July 2004

Seminar talk. *The RAMBO Algorithms*

DIWANS, Florence, Italy, July 2004

Conference talk. *RamboNodes for the Metropolitan Ad Hoc Network*

DISC, Sorrento, Italy, October 2003

Conference talk. *GeoQuorums: Implementing Atomic Memory in Mobile Ad Hoc Networks*

Student Oxygen Workshop, Cambridge, MA, September 2003

Workshop talk. *GeoQuorums: Implementing Atomic Memory in Mobile Ad Hoc Networks*

Theory Student Seminar Series, Cambridge, MA, February 2003

Seminar talk. *Distributed Algorithms: A Scattered Survey*

DSN, San Francisco, CA, July 2003

Conference talk. *RAMBO II: Rapidly Reconfigurable Atomic Memory for Dynamic Networks*