

# Curriculum Vita: Anat Bremler-Barr

## A. Personal Data



- Name: Anat Bremler-Barr
- Born: 1972 Israel
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- Marital status: married+2.

## B. Research Interests

- Networking: Network Algorithmics, Routing, IP-lookup & Classification, DPI, Network Protocols
- Network Security: Denial of Service (DDOS)

## C. Education

- **2002 Ph.D (with distinction):**  
Computer Science, Tel Aviv University, Israel  
Thesis title: Algorithm for Efficient and Reliable Routing in the Internet.  
**The title was awarded with distinction**  
Research supervised by Prof. Yehuda Afek
- **1997 M.Sc (Summa Cum Laude):**  
Computer Science, Tel Aviv University, Israel  
Graduated with honors (Summa Cum Laude)  
Thesis title: Self-Stabilizing Unidirectional Network Algorithms by Power Supply  
Research supervised by Prof. Yehuda Afek
- **1994 B.Sc. (Magna Cum Laude):**  
Mathematics and Computer Science, Tel Aviv University, Israel  
Graduated with honors (Magna Cum Laude)
- **1999 LL.B:**  
Law, Tel Aviv University, Israel

## D. Academic & Industrial Experience:

2003 - Current: Interdisciplinary Center Herzliya, CS Faculty member  
2009-current: Tenure  
2007-current: Senior Lecturer  
2006-current: Academic Director of the Security Specialty  
2003-2007: Lecturer

Summer 2005, 2006: Advisor at start up companies (Allot and Commtouch).

- 2001 - 2004: Riverhead Networks, Chief Scientist and Co-founder. One of the inventors of the fundamental technology of the company. Riverhead Networks developed advanced solutions for ISPs & MSPs that need to cope with extreme data overload conditions. In particular, Riverhead Networks solutions targeted Distributed Denial of Service attacks (DDoS) as well as "Flash Crowds". The company was acquired by CISCO in 2004.
- 2000: Summer Internship at AT&T Menlo Park under the supervision of Dr. Edith Cohen.
- 1992-2002: Tel-Aviv University Teaching Assistant
- 1998-1999: Tel-Aviv-Yafo college Teaching Assistant
- 1997-1998: RadView Programmer  
Programmer in C++, Developing multi-threaded application for performance testing of web-server.

### **E. Publications:**

#### I. Referred Conferences and Workshops:

- [P1] Y. Afek, A. Bremler-Barr, D. Hay, Y. Harchol, Y. Koral, "MCA2: Multi Core Architecture for Mitigating Complexity Attacks", accepted to ACM/EEE ANCS 2012.
- [P2] U. Ben-Porat, A. Bremler-Barr, H. Levy and B. Plattner, " On the Vulnerability of Hardware Hash Tables to Sophisticated Attacks ", in Networking 2012.
- [P3] A. Bremler-Barr, S. Tzur-David, D. Hay, Y. Koral, " Decompression-Free Inspection: DPI for Shared Dictionary Compression over HTTP ", in IEEE INFOCOM 2012 .
- [P4] U. Ben-Porat, A. Bremler-Barr and H. Levy, "Network and Computer Performance in Malicious Environments: The Good, the Bad and the Ugly", in NETGCoop 2011.
- [P5] A. Bremler-Barr, Y. Koral and V. Zigdon, "Shift-Based Pattern Matching for Compressed Web Traffic", in IEEE International Conference on High Performance Switching and Routing (HPSR), 2011.
- [P6] A. Bremler-Barr, Y. Harchol and D. Hay, "Space-time tradeoffs in Software-based Deep Packet Inspection", in IEEE International Conference on High Performance Switching and Routing (HPSR), 2011.
- [P7] A. Bremler-Barr, O. Dekel, R. Goldschmidt, H. Levy, "Controlling P2P applications via Address Harvesting: the Skype story" in HOT-P2P workshop, 2011.
- [P8] Y. Afek, A. Bremler-Barr, Y. Koral, "Efficient Processing of Multi-Connection Compressed Web Traffic" in NETWORKING, 2011.
- [P9] A. Bremler-Barr, R. Goldschmidt, "On the stability of Skype Super Nodes" in Traffic Monitoring and Analysis Workshop (TMA), 2011.

- [P10] U. Ben-Porat, A. Bremler-Barr, H. Levy, B. Plattner, "On the Vulnerability of Proportional Fairness scheduler to retransmission attacks" in IEEE INFOCOM, 2011
- [P11] A. Bremler-Barr, D. Hay, and Y. Koral, "CompactDFA: Generic State Machine Compression for Scalable Pattern Matching", in IEEE INFOCOM, 2010.
- [P12] A. Bremler-Barr, Y. Koral, "Accelerating Multi-patterns Matching on Compressed HTTP Traffic", in IEEE INFOCOM, 2009.
- [P13] U. Ben-Porat, A. Bremler-Barr, H. Levy, "On the Exploitation of CDF based Wireless Scheduling" (mini conference), in IEEE INFOCOM, 2009.
- [P14] A. Bremler-Barr, D. Hay, D. Hendler, R. Roth, "PEDS: A Parallel Error Detection Scheme for TCAM Devices", in (runner up to best paper) IEEE INFOCOM, 2009.
- [P15] A. Bremler-Barr, D. Hay, D. Hendler, B. Ferber, "Layered Interval Codes for TCAM-based Classification", (poster session) in SIGMETRICS, 2008; (full paper) in IEEE INFOCOM, 2009.
- [P16] U. Ben-Porat, A. Bremler-Barr, H. Levy, "The Vulnerability of Network Mechanisms to Sophisticated DDOS attacks", in IEEE INFOCOM (mini conference), 2008.
- [P17] A. Bremler-Barr, O. Mokryn, J. Kangasharju, N. Chen and Y. Shavitt "Bringing Order To BGP: Decreasing Convergence Message Complexity", (brief announcements) in PODC, 2007.
- [P18] A. Bremler-Barr, D. Hendler, "Efficient TCAM-based Packet Classification using Gray Code", in IEEE INFOCOM, 2007.
- [P19] A. Bremler-Barr, R. Halacmi-Bekel and J. Kangasharju, "Unregister Attacks in SIP", in NPSec Workshop, 2006.
- [P20] A. Bremler-Barr, H. Levy and N. Halachmi, "Aggressiveness Protective Fair Queueing for Bursty Applications", (short paper) in IWQoS Workshop, 2006.
- [P21] A. Bremler-Barr and H. Levy "Spoofing Prevention Method", Brief Announcement in PODC 2004, full paper in IEEE INFOCOM, 2005.
- [P22] A. Bremler-Barr and L. Epstein, "Path layout on tree networks: Tight bounds in different label switching model", in SIROCCO, 2004.
- [P23] Y. Afek, R. Brooks, N. Fischbach, P. Quinn, A. Friedrich, M. Binderberger, A. Bremler-Barr, B. Elgar, R. Hermoni, "MPLS-Based Synchronous Traffic Shunt", in NANOG, 2003.
- [P24] A. Bremler-Barr, Y. Afek, and S. Schwartzs, "Improved BGP Convergence via Ghost Flushing", in IEEE INFOCOM, 2003.

- [P25] Y. Afek, A. Bremler-Barr and O. Ben-Shalom, "On the structure and application of BGP Policy Atoms", in Internet Measurement Workshop, 2002.
- [P26] A. Bremler-Barr, E. Cohen, H. Kaplan, and Y. Mansour, "On the predictability and bypassability of end to end delays", in Internet Measurement Workshop, 2002.
- [P27] Y. Afek, A. Bremler-Barr, H. Nussbacher, D. Touitou "Diversion and Sieving Techniques to Defeat DDOS", in NANOG, 2001.
- [P28] A. Bremler-Barr, Y. Afek, H. Kaplan, E. Cohen, and M. Merrit, "Restoration by Path Concatenation: Fast recovery of MPLS paths", in SIGMETRIC 2001 (short abstract) full paper in PODC, 2001.
- [P29] A. Bremler-Barr, Y. Afek, "Trainet: A new label switching scheme", in IEEE INFOCOM, 2000.
- [P30] A. Bremler-Barr, Y. Afek and S. Har-Peled, "Routing with a Clue", in ACM SIGCOMM, 1999.
- [P31] Y. Afek and A. Bremler, "Self-Stabilizing Unidirectional Network Algorithms by Power Supply", in SODA, 1997.

Submitted:

- Y. Afek, A. Bremler-Barr and L. Schiff, "Space Efficient Priority Queues: The TCAM Case", submitted to INFOCOM 2013.

## II. Journals Papers:

- [J1] U. Ben-Porat, A. Bremler-Barr, H. Levy, "The Vulnerability of Network Mechanisms to Sophisticated DDOS attacks", accepted to IEEE Transactions on Computers 2012.
- [J2] A. Bremler-Barr, D. Hay, D. Hendler, B. Ferber, "Layered Interval Codes for TCAM-based Classification", Computer Networks, special issue on Challenges in High-Performance Switching and Routing in the Future Internet, 56(13):3023-3039, 2012.
- [J3] A. Bremler-Barr, D. Hendler "Space-Efficient TCAM-based Classification Using Gray Coding", IEEE Transactions on Computers, 61(1): 18-30, 2012.
- [J4] A. Bremler-Barr, Y. Koral, "Accelerating Multi-patterns Matching on Compressed HTTP Traffic", IEEE Transactions on Networking, 20(3): 970-983, 2012.
- [J5] Y. Afek, A. Bremler-Barr, Y. Koral "Efficient Processing of Multi-Connection Compressed Web Traffic", Computer Communication, 35(7): 810-819, 2012.
- [J6] A. Bremler-Barr, D. Hay, D. Hendler, R. Roth, "PEDS: A Parallel Error Detection Scheme for TCAM Devices", IEEE Transactions on Networking, 18(5): 1665-1675, 2010.

- [J7] A. Bremler-Barr , O. Mokryn, J. Kangasharju, N. Chen and Y. Shavitt “Bringing Order To BGP: Decreasing Convergence Message Complexity”, *Computer Networks*, 53(12): 2241-2256, 2009.
- [J8] A. Bremler-Barr, H. Levy and N. Halachmi, “Protecting Bursty Applications Against Traffic Aggressiveness”, *Computer Networks* 2007, Volume 51 , Issue 13 Pages 3864-3877, 2007.
- [J9] A. Bremler-Barr and L. Epstein, "Path layout on tree networks: Bounds in different label switching models", *Nord. J. Comput.* 14(1-2): 109-125, 2007.
- [J10] A. Bremler-Barr, Y. Afek, and S. Schwartz, “Improved BGP Convergence via Ghost Flushing”, *IEEE Journal on Selected Areas in Communications*, 22(10): 1933-1948, 2004.
- [J11] A. Bremler-Barr, E. Cohen, H. Kaplan, and Y. Mansour, “Predicting and bypassing end-to-end Internet service degradations”, *IEEE Journal on Selected Areas in Communications*,21(6): 961-978, 2003.
- [J12] A. Bremler-Barr, Y.Afek, H.Kaplan, E. Cohen, and M. Merrit, “Restoration by Path Concatenation: Fast recovery of MPLS paths”, *Special Issue of Distributed Computing*, 15 (4): 273-283, 2002.
- [J13] Y. Afek and A. Bremler and S.Har-Peled, “Routing with a clue”, *IEEE/ACM Transactions on Networking*, vol. 9 pp. 693-705. Dec. 2001.
- [J14] Y. Afek and A. Bremler, “Self-Stabilizing Unidirectional Network Algorithms by Power Supply”, *Special Issue for Self-stabilizing*, *Chicago Journal of Theoretical Computer Science*, Dec. 1998.

Submitted:

- A. Bremler-Barr, D. Hay and Y. Koral, “CompactDFA: Scalable Pattern Matching using Longest Prefix Match solution”, submitted to *IEEE Transaction on Networking*, 2012
- U. Ben-Porat, A. Bremler-Barr, H. Levy , "On the Exploitation of CDF based Wireless Scheduling", submitted to *Computer Networks*, special issue 2012.

In preparation:

- A. Bremler-Barr, Y. Harcol and D. Hay "Space-time tradeoffs in Software-based Deep Packet Inspection".

### III. Technical Reports

- Y. Afek and A. Bremler-Barr and S. Schwartz “**Explicit Edge Withdrawal in BGP**” (Shemer Schwartz, thesis manuscript), 2003
- A. Bremler-Barr, Y. Mansour, and Y. Rosenbaum, “**Towards automatic root cause analysis of connection degradation**” (Y. Rosenbaum, thesis manuscript), 2005
- A. Bremler-Barr, O. Dekel, R. Goldschmidt, H. Levy “**The Super Nodes of Skype: Measurements, Behavior and Vulnerability**”, 2010.

### F. Patents:

#### Ph.D:

- Y. Afek, A. Bremler-Barr, S. Har-Peled “**Method for fast IP-lookup - routing with a clue**”, United States Patent Application 6876655, 2005.
- Y. Afek, A. Bremler-Barr, S. Har-Peled, “**Method for Fast Multi-Dimensional Packet Classification**”, United States Patent Application 6633860, 2003.

#### Riverhead Networks:

- Anat Bremler-Barr, Keren Horvitz, Dan Touitou, Rafi Tzadikario, Yehuda Afek, “**Weighted fair queuing-based methods and apparatus for protecting against overload conditions on nodes of a distributed network**”, United States Patent Application 20030076848, 2003.
- Guy Pazi, Anat Bremler-Barr, Rami Rivlin, Dan Touitou, “**Protecting against distributed denial of service attacks**” (PCT/IL02/00714, 10/232,993) , United States Patent Application 20030076848, 2003.
- Anat Bremler-Barr, Touitou Dan, Rafi Zadikario, Yehuda Afek, “**Protecting against malicious traffic**” (PCT/IL02/00996), 2002.
- Rafi Zadikario, Dan Touitou, Anat Bremler-Barr, “**Protecting against and stopping the spread of malicious worm traffic on the Internet**”, (60/445,605), 2003.
- Anat Bremler-Barr, Dan Touitou, Rami Rivlin, “**Detecting and protecting against worm traffic on a network**”, United States Patent Application 20030076848, 2005.
- Anat Bremler-Bar, Hank Nussbacher, Roi Hermoni, “**Selective diversion and injection of communication traffic**”, United States Patent Application 20030076848, 2006.

#### IDC:

- Anat Bremler-Barr, David Hay, Danny Hendler and Ron M. Roth. “**TCAM with Fast Error Detection**”. U.S. Provisional Patent Application No. 61/130129, May 2008.

- Anat Bremler-Barr, Omer Dekel, Hanoch Levy, "**Detecting and controlling peer-to-peer traffic**", PCT **2008**.Anat Bremler-Barr, and Yaron Koral "**Accelerating Multi-pattern Matching on Compressed HTTP Traffic**", submitted PCT 2009.
- Anat Bremler-Barr, David Hay and Yaron Koral "**State machine compression for scalable pattern matching**", submitted PCT 2010.

### G. Grants:

- Kabrnit consortium, "Algorithms for automatically defining and finding signatures for news attacks", the Office of the Chief Scientist of the Ministry of Industry, 300K NIS a year (with Prof. Yehuda Afek) 2012-2014.
- ERC starting grant," Deep Packet Inspection of Next Generation Network Devices", 990,400 Euro, Grant agreement no 259085, 2010-2014.
- Checkpoint research grant, "Deep Packet Inspection (DPI) with a Small Memory Footprint: Software Approach to CompactDFA Implementation ", 50K NIS,2009.
- SNF (Swiss) Grant, "The Vulnerability of Networks and Computers to DDoS Attacks: Quantifications, Evaluation and Solutions", with B. Plattner (ETH), H. Levy (Tel-Aviv University), 2009-2011, 142,725 CHF.
- Cisco Research Grant, 2007, 75,000\$ "Fault-Resilient TCAMs" with Danny Hendler (Ben Gurion University) and Ronny Roth (Technion).
- REMON 4G Wireless consortium, "Resilience of Scheduling Algorithm", the Office of the Chief Scientist of the Ministry of Industry, Trade and Labor, Magnet 1.5.2007-30.4.2009, 180K NIS a year.
- Young G.I.F 2005, 32,500 Euro, " The cost of securing BGP, the Internet Routing protocol".

### H. Professional Activities

- Conference Program Committee: INFOCOM 2008-2013,PODC 2008,2011,HPSR 2010-2012
- Co-organizer (with Prof. Isaac Keslassy) of Israeli Networking Day 2007.
- Referee for the following journals: IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Computers, Theoretical Computer Science, Computer Networks, IEEE Transactions on Dependable and Secure Computing, IEEE Transaction on Networking.
- Non academic Conferences:
  - Co-organizer of the **Panel on the Biometry Repository**, September 2009, where ministers and researchers from computer science and social science presented their opinion about the Knesset's (the Israeli legislative authority) attempts to legislate the Biometry Repository Law.
  - Co-organizer of **OWASP-IL (Open Web Application Security Project) Conference** at IDC years 2007-2012 - The conference was attended by 250 people from the application security industry.

## **I. Honors & Awards:**

- Runner-up for the best INFOCOM paper award (2009)
  - One of the best 3 papers in the conference, out of 282 accepted papers and 1435 total submissions.
- Excellent Researcher IDC (2007)
- Eshkol fellowship for Ph.D. (2000)
- Excellence prize for Ph.D. research, Tel Aviv University (1999)
- An Intel Fellowship for distinguished graduate students, Tel-Aviv University (1998)
- A Wolf Fellowship for M.Sc. (1996)
- Annual Dean's list mentioning, faculty of Exact Sciences, Tel Aviv University, for every year of study for the B.Sc. and M.Sc (1991-1996).

## **J. Graduate Students (supervision of master thesis):**

### II. Current Students:

#### Post Doc

- Shimrit Tzur, IDC ( Co-Advisor with Prof. Yehuda Afek)

#### PhD students:

- Yaron Koral, Tel-Aviv University, co-Advisor with Prof. Afek, 2010- now submitting the PhD thesis.
- Udi Ben- Poret, ETH Zurich, co-Advisor with Prof. Levy and Prof. Plattner, 2009 -soon
- Liron Schiff, Tel-Aviv University, co-Advisor with Prof. Afek, 2010-
- Yotam Harchol, Hebrew University, co-Advisor with Dr. Hay, 2011-

### II. Former Students:

#### Master Students:

- Omer Ben-Shalom, Tel-Aviv University, co-Advisor with Prof. Afek,2003
- Shemer Schwarts Tel-Aviv University, co-Advisor with Prof. Afek, 2005
- Yaron Rosenbaum, IDC,2006,co-advisor with Prof. Yishay Mansour
- Nir Halacmi, IDC,2006
- Ronit Halachmi, IDC,2007
- Omer Dekel, IDC,2008
- Farber Boris, IDC,2008
- Nir Chen, IDC,2008
- Udi Ben- Poret, Tel-Aviv University, co-Advisor with Prof. Levy, 2008
- Yaron Koral,IDC,2009
- Ran Goldschmit, Haifa University,2009
- Victor Zidon, IDC,2010
- Adam Mor, IDC,2012



## K. Teaching Experience

- Lecturer at the following courses:
  - *Operating system* at IDC 2007-2012
  - *Workshop: Network Security* at IDC 2007,2008
  - *Data Structure* at IDC 2004-2007
  - *Advanced topics in IP Networks* at IDC 2004,2005,2007,2009-2012
  - *Seminar: Internet Attacks - On worms and DDOS* at IDC 2006,2007,2011
  - *Seminar: Network Algorithmics* at IDC 2012
  - *Advanced topics in Computer Architecture* at IDC 2004,2006,2008
  - *Computer structure* course at Tel-Aviv University,1998-2002.
  - *Operating system* course at Tel-Aviv University, 1998-2002, MTA (Tel-Aviv-Yafo college) 1998-1999.
  - *Seminar: Advanced topics in IP network* at Tel-Aviv University, 1999-2002, IDC 2012
  - *Distributed Algorithm* in MTA (Tel-Aviv-Yafo college) 1999.
  - *Introduction to System Programming* - at Tel-Aviv University, 1995-1998.
- Teaching assistant: 1996-1999.
- Computer Lab Advisor at Tel-Aviv University, 1993-1994.