

Dr. Eric Rosenberg

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EDUCATION

- **Ph.D. in Operations Research**, Stanford University, Stanford, California
- **B.A. with Honors in Mathematics**, Oberlin College, Oberlin, Ohio

PROFESSIONAL EXPERIENCE

- Visiting Professor, Department of Industrial and Systems Engineering, Rutgers University (Fall 2019 – Spring 2020)
- AT&T Labs (1996-2019)
- Bell Labs (< 1996)
- Princeton University, Princeton, New Jersey (September 1993 – May 1994) Full Time Instructor (sabbatical replacement), School of Engineering and Applied Science

AWARDS

- AT&T Labs President's Excellence Award (2012)
- Distinguished Member of Technical Staff Award from AT&T (1987)

BOOKS

- E. Rosenberg, **Fractal Dimensions of Networks** (Springer, New York, 2020)
<https://www.springer.com/us/book/9783030431686>
- E. Rosenberg, **A Survey of Fractal Dimensions of Networks** (Springer, New York, 2018)
<https://www.springer.com/us/book/9783319900469>
- E. Rosenberg, **A Primer of Multicast Routing**. (Springer, New York, 2012)
<https://www.springer.com/us/book/9781461418726>
book review: <http://packetpushers.net/review-a-primer-of-multicast-routing/>

JOURNAL ARTICLES AND CONFERENCE PROCEEDINGS

39. E. Rosenberg, "**Generalized Hausdorff Dimensions of a Complex Network,**" *Physica A*, Vol. 511 (2018) pp. 1-17
38. E. Rosenberg, "**The Geometric Mean of the Box Probabilities of a Multifractal,**" *AASCIT Journal of Physics*, Vol. 4 (2018) pp. 64-68
37. E. Rosenberg, "**Erroneous Definition of the Information Dimension in Two Medical Applications,**" *International Journal of Clinical Medicine Research*, Vol. 4 (2017) pp. 72-75
36. E. Rosenberg, "**Non-monotonicity of the Generalized Dimensions of a Complex Network,**" *Physics Letters A*, Vol. 381 (2017) pp. 2222-2229
35. E. Rosenberg, "**Minimal Partition Coverings and Generalized Dimensions of a Complex Network,**" *Physics Letters A*, Vol. 381 (2017) pp. 1659-1664
34. E. Rosenberg, "**Maximal Entropy Coverings and the Information Dimension of a Complex Network,**" *Physics Letters A*, Vol. 381 (2017) pp. 574-580
33. E. Rosenberg, "**The Correlation Dimension of a Rectilinear Grid,**" *Journal of Interconnection Networks*, Vol. 16 (2016) 1550010
32. E. Rosenberg, "**Minimal Box Size for Fractal Dimension Estimation,**" *Community Ecology*, Vol. 17 (2016) pp. 24-27
31. E. Rosenberg, "**Lower Bounds on Box Counting for Complex Networks,**" *Journal of Interconnection Networks*, Vol. 14 (2013) 1350019
30. E. Rosenberg and J. Uttaro, "**A Fast Re-Route Method,**" *IEEE Communications Letters*, Vol. 17 (2013), pp. 1656-1659

29. E. Rosenberg, "**Calculating Bandwidth Overbooking for Statistically Multiplexed Traffic**," *Journal of Interconnection Networks*, Vol. 14 (2013) 1350005
28. E. Rosenberg, "**The Complexity of Routing in Hierarchical PNNI Networks**," *Optimization and Engineering*, Vol. 11 (2010), pp. 277-302.
27. E. Rosenberg, "**Minimizing Hierarchical Routing Error**," *Computer Networks*, Vol. 53 (2009), pp. 1926-1938.
26. E. Rosenberg, "**Error Bounds for Hierarchical Routing**," chapter 5 in *Telecommunications Modeling, Policy, and Technology*, S. Raghavan, B. Golden, E. Wasil, editors, Springer, New York (2008) pp. 81-100.
25. W.S. Lai, L. Amiri, M. Ball, D. Jones, E. Rosenberg, and M. Ungar, "**Topology Aggregation in PNNI Networks, Part 1: Link Aggregation**," *Proc. IEEE Pacific Rim Conference on Communications, Computers, and Signal Processing (PacRim 2007)*, August 22-24, 2007, pp. 8-11.
24. E. Rosenberg and J. Uttaro, "**Scaling Virtual Private Networks**," *Recent Patents on Engineering*, Vol. 1 (2007) pp. 206-213.
23. W.S. Lai, L. Amiri, M. Ball, E. Rosenberg, and H. Tong, "**The Scalable Growth of AT&T's Global PNNI Network**," *Proc. 2006 Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS 2006)*, Calgary, Alberta, Canada, July 31 – August 2, 2006, pp. 363-370.
22. E. Rosenberg, "**Hierarchical Topological Network Design**," *IEEE/ACM Transactions on Networking* 13, Vol. (2005) pp. 1402-1409.
21. E. Rosenberg, "**Hierarchical PNNI Addressing by Recursive Partitioning**," *Proc. IEEE Pacific Rim Conference on Communications, Computers, and Signal Processing (PacRim 2005)*, August, 2005, pp. 133-136.
20. W.S. Lai, E. Rosenberg, L. Amiri, M. Ball, Y. Levy, H. Shulman, H. Tong, and M. Ungar, "**Analysis and Design of AT&T's Global PNNI Network**," *Proc. IEEE Pacific Rim Conference on Communications, Computers, and Signal Processing (PacRim 2005)*, August, 2005, pp. 129-132.

19. E. Rosenberg, "**The Expected Length of a Random Line Segment in a Rectangle,**" *Operations Research Letters*, Vol. 32 (2004) pp. 99-102.
18. E. Rosenberg, "**Capacity Requirements for Node and Arc Survivable Networks,**" *Telecommunications Systems*, Vol. 20 (2002) pp. 107-131.
17. E. Rosenberg, "**Dual Ascent for Uncapacitated Telecommunications Network Design with Access, Backbone, and Switch Costs,**" *Telecommunications Systems*, Vol. 16 (2001) pp. 423-435.
16. E. Rosenberg, "**Telecommunications Network Case Study: Selecting a Data Network Architecture,**" *Journal of Heuristics*, Vol. 6 (2000) pp. 9-20.
15. E. Rosenberg, "**Designing Multi-hour Hierarchical Communications Networks with Fixed Charge and Piecewise Linear Costs,**" *Telecommunications Systems*, Vol. 3 (1994) pp. 109-128.
14. E. Rosenberg and A. Gleit, "**Quantitative Techniques in Credit Management: A Survey,**" *Operations Research*, Vol. 42 (1994) pp. 589-613.
13. E. Rosenberg, "**Hardware configuration for StarLAN 10 local area networks: An application of integer programming,**" *European Journal of Operations Research*, Vol. 71 (1993) pp. 120-129.
12. E. Rosenberg, "**Optimal Aspect Ratios for Minimal Area Standard Cell Integrated Circuits,**" *AT&T Technical Journal*, Vol. 68 (1989) pp. 73-80.
11. E. Rosenberg, "**Optimal Module Sizing in VLSI Floorplanning by Nonlinear Programming,**" *Zeitschrift fur Operations Research*, Vol. 33 (1989) pp. 131-143.
10. E. Rosenberg, "**A Geometrically Convergent Subgradient Optimization Method for Nonlinearly Constrained Convex Programming,**" *Mathematics of Operations Research*, Vol. 13 (1988) pp. 512-523.
9. S. Chopra and E. Rosenberg, "**An Efficient Method for Custom Integrated Circuit Global Routing,**" *Proc. 1988 IEEE Custom Integrated Circuits Conference*, Rochester, New York, pp. 11.3.1-11.3.6.

8. E. Rosenberg, "**A Nonlinear Programming Heuristic for Computing Optimal Link Sizes in a Multi-Hour Alternate Routing Communications Network,**" *Operations Research*, Vol. 35 (1987) pp. 354-364.
7. E. Rosenberg, "**A New Iterative Supply/Demand Router with Rip-Up Capability for Printed Wire Boards,**" *Proc. 24 Design Automation Conference* (1987) pp. 721-726.
6. E. Rosenberg, "**Epsilon-Subgradient Optimization Techniques in Convex Programming and Lagrangian Duality,**" *Opsearch*, Vol. 21 (1986) pp. 71-88.
5. J.G. Klincewicz, H. Luss, and E. Rosenberg, "**Optimal and Heuristic Algorithms for Multiproduct Uncapacitated Facility Location,**" *European Journal of Operations Research*, Vol. 26 (1986) pp. 251-258.
4. E. Rosenberg, "**Exact Penalty Functions and Stability in Locally Lipschitz Programming,**" *Mathematical Programming*, Vol. 30 (1984) pp. 340-356.
3. E. Rosenberg, "**A Globally Convergent Condensation Method for Geometric Programming,**" *Utilitas Mathematica*, Vol. 22 (1982) pp. 47-64.
2. E. Rosenberg, "**On Solving a Primal Geometric Program by Partial Dual Optimization,**" *Mathematical Programming*, Vol. 21 (1981) pp. 319-330.
1. E. Rosenberg, "**Globally Convergent Algorithms for Convex Programming,**" *Mathematics of Operations Research*, Vol. 6 (1981) pp. 437-444.

PATENTS

- (19) E. Rosenberg and K. Pandit, U.S. Patent # 10,620,987 "**Increasing blade utilization in a dynamic virtual environment,**" issued April 14, 2020.
- (18) E. Rosenberg and Y. Serbest, U.S. Patent # 10,594,625 "**Managing physical resources for virtual network functions,**" issued March 17, 2020.
- (17) E. Rosenberg, U.S. Patent # 9,912,583 "**Methods and apparatus to selectively assign routing tables to router linecards,**" issued March 6, 2018.

- (16) E. Rosenberg and J. Uttaro, U.S. Patent # 9,584,398 “**Methods and apparatus to utilize route parameter sets for exchanging routes in a communication,**” issued February 28, 2017.
- (15) J. Uttaro and E. Rosenberg, U.S. Patent # 9,553,791 “**Virtualization of control plane network elements,**” issued January 24, 2017.
- (14) E. Rosenberg and J. Uttaro, U.S. Patent # 9,300,575 “**Methods and apparatus to utilize route parameter sets for exchanging routes in a communication network,**” issued March 29, 2016.
- (13) J. Uttaro and E. Rosenberg, U.S. Patent #9,172,579 “**Virtualization of Control Plane Network Elements,**” issued October 27, 2015.
- (12) E. Rosenberg, U.S. Patent #9,154,329 “**Methods and Apparatus to Selectively Assign Routing Tables to Router Linecards,**” issued October 6, 2015.
- (11) E. Rosenberg and J. Uttaro, U.S. Patent #9,065,726 “**Methods and Apparatus to Utilize Route Parameter Sets for Exchanging Routes in a Communication Network,**” issued June 23, 2015.
- (10) J. Uttaro, E. Rosenberg, and M.R. Sundt, U.S. Patent #8,934,485 “**Methods and Apparatus to Determine an Alternate Route in a Network,**” issued January 13, 2015.
- (9) E. Rosenberg and J. Uttaro, U.S. Patent #8,634,316, “**Methods and Apparatus to Utilize Route Aggregation for Exchanging Routes in a Communication Network,**” issued January 21, 2014.
- (8) J. Uttaro, E. Rosenberg, and M.R. Sundt, U.S. Patent #8,514,859, “**Methods and Apparatus to Determine an Alternate Route in a Network,**” issued August 20, 2013.
- (7) E. Rosenberg, U.S. Patent #7,924,855 “**Method for Controlling Memory Consumption in Router-Based Virtual Private Networks,**” issued April 12, 2011.
- (6) E. Rosenberg and J. Uttaro, U.S. Patent #7,583,617 “**Method for Building Virtual Private Networks using Routers,**” issued September 1, 2009.

- (5) E. Rosenberg, U.S. Patent #7,532,632 "**Method for Controlling Memory Consumption in Router-Based Virtual Private Networks,**" issued May 12, 2009.
- (4) E. Rosenberg, U.S. Patent #7,453,813 "**Methods for Constructing PNNI Networks with Optimized Architecture,**" issued November 18, 2008.
- (3) E. Rosenberg, U.S. Patent #7,403,485 "**Optimum Construction of a Private Network-to-Network Interface,**" issued July 22, 2008.
- (2) E. Rosenberg, U.S. Patent #7,313,607 "**Method and Apparatus of Hierarchical Node Partitioning for Address Planning in PNNI Networks,**" issued December 25, 2007.
- (1) E. Rosenberg, U.S. Patent #7,010,471 "**Hierarchical Topological Network Designing System and Method,**" issued March 7, 2006.

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