

Lu Ruan

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RESEARCH INTERESTS

- WDM optical networks.
- Network survivability.
- Wireless networking.

EDUCATION

Ph.D. 2001 Computer Science, University of Minnesota, Twin Cities.
M.S. 1999 Computer Science, University of Minnesota, Twin Cities.
B.E. 1996 Computer Science, Tsinghua University, Beijing, China.

PROFESSIONAL EXPERIENCE

Aug 2009 – present Associate Professor
Department of Computer Science, Iowa State University, Ames, IA.

Aug 2001 – Aug 2009 Assistant Professor
Department of Computer Science, Iowa State University, Ames, IA.

Aug 1997 – May 2001 Teaching Assistant
Department of Computer Science & Engineering
University of Minnesota, Twin Cities, MN.

May 2000 – Aug 2000 Intern
Microsoft Corporation, Redmond, WA.

Aug 1996 – Jun 1997 Software Design Engineer
Beijing EPSON Electronics Corporation, Beijing, China.

I. RESEARCH AND SCHOLARSHIP

Journal Publications (in reverse chronological order)

1. M. X. Cheng, **L. Ruan**, and W. Wu. Coverage Breach Problems in Bandwidth Constrained Sensor Networks. *ACM Transactions on Sensor Networks*, 3(2):Article 12, June 2007.
2. C. Liu and **L. Ruan**. A New Survivable Mapping Problem in IP-over-WDM Networks. *IEEE Journal on Selected Areas in Communications*, 25(4):25-34, April 2007.

3. **L. Ruan**, F. Tang, and C. Liu. Dynamic Establishment of Restorable Connections Using p-Cycle Protection in WDM Networks. *Optical Switching and Networking*, 3(3+4):191-201, 2006.
4. **L. Ruan** and F. Tang. Survivable IP Network Realization in IP-over-WDM Networks under Overlay Model. *Computer Communications*, 29(10):1772-1779, June 2006.
5. C. Liu and **L. Ruan**. p-Cycle Design in Survivable WDM Networks with Shared Risk Link Groups (SRLGs). *Photonic Network Communications*, 11(3):301-311, May 2006.
6. **L. Ruan** and W. Wu. Broadcast Routing with Minimum Wavelength Conversion in WDM Optical Networks. *Journal of Combinatorial Optimization*, 9(2):223-235, March 2005.
7. **L. Ruan**, S. Han, D. Li, Hung Q. Ngo, and S. Huang. Transmission Fault-Tolerance of Iterated Line Digraphs. *Journal of Interconnection Networks*, 5(4):475-487, December 2004.
8. **L. Ruan**, H. Du, X. Jia, W. Wu, Y. Li, and K. Ko. A Greedy Approximation for Minimum Connected Dominating Sets. *Theoretical Computer Science*, 329(1-3):325-330, December 2004.
9. **L. Ruan**, H. Luo, and C. Liu. A Dynamic Routing Algorithm with Load Balancing Heuristics for Restorable Connections in WDM Networks. *IEEE Journal on Selected Areas in Communications*, 22(9):1823-1829, November 2004.
10. X. Cheng, X. Du, M. Min, H. Q. Ngo, **L. Ruan**, J. Sun, and W. Wu. Super Link-Connectivity of Iterated Line Digraphs. *Theoretical Computer Science*, 304(1-3):461-469, July 2003.
11. X. Jia, X. Hu, **L. Ruan**, and J. Sun. Multicast Routing, Load Balancing and Wavelength Assignment on Tree of Rings. *IEEE Communications Letters*, 6(2):79-81, February 2002.
12. **L. Ruan**, D-Z. Du, X. Hu, X. Jia, D. Li, and Z. Sun. Converter Placement Supporting Broadcast in WDM Optical Networks. *IEEE Transactions on Computers*, 50(7):750-758, July 2001.
13. B. Lu and **L. Ruan**. Polynomial Time Approximation Scheme for the Rectilinear Steiner Arborescence Problem. *Journal of Combinatorial Optimization*, 4(3):357-363, September 2000.
14. D. Li, X. Du, X. Hu, **L. Ruan**, and X. Jia. Minimizing Number of Wavelengths in Multicast Routing Trees in WDM Networks. *Networks*, 35(4):260-265, July 2000.

Refereed Conference Publications (in reverse chronological order)

15. R. Koshy and **L. Ruan**. A Joint Radio and Channel Assignment (JRCA) Scheme for 802.11-based Wireless Mesh Networks, accepted by *5th IEEE Broadband Wireless Access Workshop*, Honolulu, Hawaii, Dec 2009.
16. V. Srinivas and **L. Ruan**. An Efficient Reliable Multicast Protocol for 802.11-based Wireless LANs, in *Proc. of WoWMoM 2009*, Kos Greece, June 2009.
17. T. Feng and **L. Ruan**, A Multi-layer Adaptive Protection Scheme for IP-over-WDM networks, in *Proc. of CHINACOM 2009*, Xi'an China, Aug 2009.

18. T. Feng and **L. Ruan**. Design of Survivable Hybrid Wireless-Optical Broadband-Access Network, in *Proc. of the IEEE International Conference on Communications 2009 (ICC'09)*, Dresden, Germany, June 2009.
19. A. Dhananjay and **L. Ruan**. PigWin: Meaningful Load Estimation in IEEE 802.11 Based Wireless LANs. In *Proc. of the IEEE International Conference on Communications 2008 (ICC'08)*, pages 2541-2546, Beijing, China, May 2008.
20. T. Feng, **L. Ruan**, W. Zhang. Intelligent p-Cycle Protection for Multicast Sessions in WDM Networks. In *Proc. of the IEEE International Conference on Communications 2008 (ICC'08)*, pages 5165-5169, Beijing, China, May 2008.
21. T. Feng, C. Wang, W. Zhang, and **L. Ruan**. Confidentiality Protection Schemes for Data Aggregation in Sensor Networks. In *Proc. of the 27th IEEE Conference on Computer Communications (INFOCOM'08)*, pages 475-483, Phoenix, AZ, April 2008.
22. **L. Ruan** and Z. Liu. A Capacity Efficient Local Protection Scheme for Bandwidth Guaranteed Connections. In *Proc. of the IEEE International Conference on Communications 2007 (ICC'07)*, pages 6368-6373, Glasgow, Scotland, June 2007.
23. C. Liu and **L. Ruan**. Dynamic Provisioning of Survivable Services Using Path-Segment Protecting p-Cycles in WDM Networks. In *Proc. of 15th Int'l Conf. on Computer Communications and Networks (ICCCN'06)*, pages 275-280, Arlington, VA, October 2006. **Best paper candidate.**
24. C. Liu and **L. Ruan**. Logical Topology Augmentation for Survivable Mapping in IP-over-WDM Networks. In *Proc. of IEEE Global Communications Conference 2005 (Globecom'05)*, volume 4, pages 1885-1889, St. Louis, MO, November/December 2005.
25. **L. Ruan** and Chang Liu. A Heuristic Algorithm for Survivable Mapping in IP-over-WDM Networks. In *Proc. of 3rd IASTED Int'l Conf. on Communications and Computer Networks*, pages 164-170, Marina del Rey, CA, October 2005.
26. Z. Liu and **L. Ruan**. Reducing Restoration Blocking in WDM Optical Networks. In *Proc. of 14th Int'l Conf. on Computer Communications and Networks (ICCCN'05)*, pages 323-330, San Diego, CA, October 2005.
27. C. Liu and **L. Ruan**. p-Cycle Design in Survivable Networks with Shared Risk Link Groups (SRLGs). In *Proc. of 5th Int'l Workshop on Design of Reliable Communication Networks (DRCN'05)*, pages 207-212, Island of Ischia, Italy, October 2005.
28. **L. Ruan** and F. Tang. Dynamic Establishment of Restorable Connections using p-Cycle Protection in WDM Networks. In *Proc. of 2nd Int'l Conf. on Broadband Networks (Broadnets'05)*, pages 147-154, Boston, MA, October 2005.
29. F. Tang and **L. Ruan**. A Protection Tree Scheme for First-Failure Protection and Second-Failure Restoration in Optical Networks. In *Proc. of 3rd Int'l Conf. on Computer Networks and Mobile Computing (Lecture Notes in Computer Science 3619)*, pages 620-631, Zhangjiajie, China, August 2005.
30. **L. Ruan** and Z. Liu. Upstream Node Initiated Fast Restoration in MPLS Networks. In *Proc. of the IEEE International Conference on Communications 2005 (ICC'05)*, pages 959-964, Seoul, Korea, May 2005.

31. M. X. Cheng, **L. Ruan**, and W. Wu. Achieving Minimum Coverage Breach under Bandwidth Constraints in Wireless Sensor Networks. In *Proc. of the 24th IEEE Conference on Computer Communications (INFOCOM'05)*, pages 2638-2645, Miami, FL, March 2005.
32. C. Liu and **L. Ruan**. Finding Good Candidate Cycles for Efficient p-Cycle Network Design. In *Proc. of 13th Int'l Conf. on Computer Communications and Networks (ICCCN'04)*, pages 321-326, Chicago, IL, October 2004.
33. **L. Ruan** and H. Luo. Dynamic Routing of Restorable Lightpaths: A Tradeoff Between Capacity Efficiency and Resource Information Requirement. In *Proc. of the 7th IFIP Working Conference on Optical Network Design and Modeling (ONDM'03)*, pages 537-548, Budapest, Hungary, February 2003.
34. H. Luo and **L. Ruan**. Load Balancing Heuristics for Dynamic Establishment of Restorable Lightpaths. In *Proc. of 11th Int'l Conf. on Computer Communications and Networks (ICCCN'02)*, pages 472-477, Miami, FL, October 2002.
35. **L. Ruan** and H. Luo. A Fast Lightpath Restoration Method Using Two Backup Paths in WDM Networks. In *Proc. of 2002 Int'l Conf. on Parallel Processing Workshops*, pages 183-189, Vancouver, Canada, August 2002.
36. X. Jia, X. Hu, **L. Ruan**, and J. Sun. Multicast Routing, Load Balancing and Wavelength Assignment on Tree of Rings. In *Proc of 2001 IASTED Int'l Conf. on Wireless and Optical Communications*, pages 239-244, Banff, Canada, June 2001.

Invited Papers

37. **L. Ruan**, D-Z. Du, X. Hu, X. Jia, and D. Li. Approximations for Color-Covering Problems. Presented at *1st Int'l Congress of Chinese Mathematicians*, Beijing, China, December 1998. Published in *AMS/IP Studies in Advanced Mathematics*, 20:503-507, June 2001.

Edited Books

38. **L. Ruan** and D-Z. Du (eds.). *Optical Networks-Recent Advances*. Kluwer Academic Publishers, 2001.

Talks

- Protecting Multicast Sessions in WDM Optical Networks. University of California, Los Angeles, CA, April 9, 2009.

Submitted Papers

- S1. T. Feng, L. Long, A. E. Kamal, and **L. Ruan**. Two-Link Failure Protection in WDM Mesh Networks with p-Cycles. Submitted to *Elsevier Computer Networks*.
- S2. T. Feng, **L. Ruan**, and W. Zhang. Intelligent p-Cycle Protection for Dynamic Multicast Sessions in WDM Networks. Submitted to *IEEE Journal on Selected Areas in Communications*.

Grants

- “Resilience Schemes for Survivable IP over WDM Networks”
National Science Foundation CAREER Award #0237592, PI, \$447,403
August 15, 2003 to July 31, 2009.

II. PROFESSIONAL PRACTICE

Proposal Review Panel

- National Science Foundation, 2003.

Program Committees

- International Conference on Combinatorial Optimization and Application (COCOA) 2009.
- IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS) 2008.
- IEEE International Conference on Communications (ICC) 2003, 2008.
- IEEE Global Communications Conference (Globecom) 2007, 2010.
- International Conference on Computer Communications and Networks (ICCCN) 2004, 2005, 2007, 2008, 2009.
- International Conference on Broadband Communications, Networks, and Systems (Broadnets) 2004, 2005, 2006.
- International Conference on Communications and Networking in China (CHINACOM) 2006, 2007.
- Optical Networking and Communications Conference (OptiComm) 2001, 2003.

Referee for Journals

- IEEE/ACM Transactions on Networking.
- IEEE Journal on Selected Areas in Communications.
- International Journal of Sensor Networks.
- IEEE Communications Magazine.
- Computer Networks.
- Journal of Wireless Communications and Mobile Computing.
- Theoretical Computer Science.
- ACM Baltzer Wireless Networks Journal.
- IEEE Communications Letters.
- OSA Journal of Optical Networking.

III. TEACHING AND ADVISING

Courses Taught

Com S 228 Introduction to Data Structures
Spring 2003, Fall 2003.

Com S 330	Discrete Computational Structures Spring 2008.
Com S 352	Introduction to Operating Systems Fall 2004, Fall 2005.
Com S 586	Computer Network Architectures Fall 2001, Fall 2002, Fall 2003, Fall 2006, Fall 2007, Fall 2008, Fall 2009.
Com S 652	Advanced Topics in Distributed Operating Systems Fall 2009
Com S 686	Advanced Topics in High-Speed Networks Spring 2005, Spring 2009.

Ph.D. Students Advised

1. Chang Liu completed in Spring 2007.
2. Taiming Feng in progress.

M.S. Students Advised

1. Sangil Choi completed in Summer 2009.
2. Ronnie Koshy completed in Spring 2009.
3. Varun Srinivas completed in Spring 2009.
4. Aditya Dhananjay completed in Spring 2008.
5. Zhi Liu completed in Spring 2005.
6. Fangcheng Tang completed in Spring 2005.
7. Haibo Luo completed in Spring 2003.
8. Vineeth Kisara in progress.

Ph.D. Committees

- | | | |
|------------------------------|-------|--------------------------|
| 1. Srivatsan Balasubramanian | Cpr E | completed in Spring 2007 |
| 2. Wensheng He | Cpr E | completed in Summer 2006 |
| 3. Jing Fang | Cpr E | completed in Fall 2004 |
| 4. Cien Shen | Cpr E | completed in Summer 2004 |
| 5. Haoli Wang | Cpr E | completed in Spring 2004 |
| 6. Zakhia Abichar | Cpr E | in progress |
| 7. Haithem Al-Mefleh | Cpr E | in progress |
| 8. Chang-Ling Huang | CprE | in progress |
| 9. Jinsook Kim | Com S | in progress |
| 10. Ye Lin | Com S | in progress |
| 11. Long Long | Cpr E | in progress |
| 12. Mohammad Saleh | Cpr E | in progress |
| 13. Nalin Subramanian | Com S | in progress |
| 14. Bin Tong | Com S | in progress |

M.S. Committees

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|----------------|-------|--------------------------|
| 1. Yana Ong | Cpr E | completed in Summer 2005 |
| 2. Yanmei Wang | Com S | completed in Summer 2005 |
| 3. Chen Yu | E M | completed in Spring 2004 |
| 4. Weiyi Chen | Com S | completed in Fall 2001 |
| 5. Hua Qin | Com S | in progress |

IV UNIVERSITY SERVICE

- 2009-2010 Colloquium Committee Chair, Department of Computer Science.
- 2009-2010 P&T Committee, Department of Computer Science.
- 2007-2010 Graduate Committee, Department of Computer Science .
- 2005-2010 Scholarship/ Awards Committee, Department of Computer Science.
- 2002-2005 Graduate Admissions Committee, Department of Computer Science.
- 2003-2004 Faculty Search Committee, Department of Computer Science.
- 2002-2003, 2006-2008 Grievance Committee, Department of Computer Science.
- 2004-2010 Upsilon Pi Epsilon (UPE) Advisor, Department of Computer Science.
- 2007-2010 Liaison for Women in Science and Engineering, Department of Computer Science.