

# Ying Zhang

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<b>Research Interests</b>	Networking and Systems: Internet and Cellular network management, Internet routing and measurement, Next generation routing design, network security.
<b>Education</b>	<b>University of Michigan</b> , Ann Arbor, Michigan, USA 2004 - 2009 Ph.D. in Computer Science and Engineering August 2009 Dissertation Title: "Effective Wide-Area Network Performance Monitoring and Diagnosis from End Systems" Advisor: Z. Morley Mao M.S. in Computer Science and Engineering May 2006  <b>Peking University</b> , Beijing, China 2000 - 2004 B.S. in Computer Science June 2004
<b>Honors and Awards</b>	<b>Patentable Invention Award, Ericsson Research</b> 2011 Awards for top inventions of the year  <b>Rackham Predoctoral Fellowship</b> Fall 2008 - Spring 2009 To top doctoral students with outstanding dissertation research in all departments under Rackham graduate school, University of Michigan.  <b>Third Place, Univ. of Michigan CSE Graduate Student Honors Competition</b> Fall 2007 For the best research and presentations among CSE graduate students.  <b>Beijing Outstanding Undergraduate Students Award</b> May 2004 To selected outstanding students from all undergraduates in all universities in Beijing.  <b>Mingde Scholarship</b> 2000 - 2004 To top 1 undergraduate student from each province with outstanding academic achievements, Peking University, China.
<b>Professional Experience</b>	<b>Ericsson Research</b> Research Associate San Jose, CA, USA August 2009 - present - Designed and implemented the separation between router control and forwarding plane. Demonstrated carrier-grade controller functionalities and MPLS based forwarding elements under the split architecture framework. Conducted both theoretical and practical studies on the scalability and resilience of Openflow based networks. - Designed and built end-to-end self-organizing network functionalities in mobile carrier networks. Demonstrated the self-organizing capabilities across radio access network, access and aggregation network, and the evolved packet core (EPC) networks, ranging from network monitoring, diagnosis, and resource management. - Studied the characteristics of cellular network voice and data traffic across regions, mobile devices, operator networks, and different radio technologies. Developed traffic profile modeling techniques for 3G and 4G cellular networks.  <b>Microsoft Research</b> Internship Redmond, WA, USA Summer 2008 Designed and built a "what-if" analysis tool for resource provisioning in the large data centers. I developed a capacity planning tool to optimize resource, performance, and energy consumption for large-scale multi-tier Internet services running in distributed data centers.  <b>AT&amp;T Labs-Research</b> Internship

Florham Park, NJ

Summer 2005, Summer 2006

- Designed and developed a troubleshooting system for layer-3 MPLS-VPN networks using association mining. The system is running in the operational network to detect anomalies and to infer root causes by exploring the correlation across layers and across geographic locations.

- Identified a security hole in the global BGP system vulnerable to low-rate TCP DoS attacks and proposed a solution and demonstrated its effectiveness. I demonstrated the impact of the attack and the effectiveness of the solution on real routers.

**Referred  
Conference  
Publications**

**A Comprehensive Long-Term Evaluation on BGP Performance.** Ying Zhang and Mallik Tatipamula, *Proceedings of IEEE International Conference on Communications (ICC), Kyoto, Japan, June 2011.*

**The Freshman Handbook: A Hint for the Server Placement of Social Networks.** Ying Zhang *Poster, The 20th International World Wide Web Conference (WWW 2011).*

**Design of A TCP Tunneling Framework for Tunable Transport in the LTE Networks.** Ying Zhang and Mallik Tatipamula, *in Submission.*

**Metering Re-ECN: Performance Evaluation and its Applicability in Cellular Networks.** Ying Zhang, Ingemar Johansson, Howard Green and Mallik Tatipamula, *in Submission.*

**OpenFlow Network Resilience to Failures: A Formal Analysis.** Ying Zhang, *in Submission.*

**Automated, Scalable, Decentralized Naming for the Data Center.** Meg Walraed-Sullivan, Radhika Niranjana, Malveeka Tewari, Amin Vahdat, Keith Marzullo, and Ying Zhang, *in Submission.*

**Enabling High-Performance, Energy-Efficient Internet Services.** Zhiyun Qian, Ying Zhang, Ming Zhang, Z. Morley Mao, *in submission.*

**Detecting Traffic Differentiation in Backbone ISPs with NetPolice.** Ying Zhang, Z. Morley Mao and Ming Zhang, *Proceedings of ACM Internet Measurement Conference (IMC), Chicago, Illinois, November 2009.*

**HC-BGP: A Light-weight and Flexible Scheme for Securing Prefix Ownership.** Ying Zhang, Zheng Zhang, Z. Morley Mao and Y. Charlie Hu, *Proceedings of 39th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), June 2009.*

**Ascertaining the Reality of Network Neutrality Violation in Backbone ISPs.** Ying Zhang, Z. Morley Mao, and Ming Zhang, *Proceedings of the Seventh Workshop on Hot Topics in Networking (HotNets-VII), October 2008.*

**iSPY: Detecting IP Prefix Hijacking on My Own.** Zheng Zhang, Ying Zhang, Y. Charlie Hu, Z. Morley Mao, and Randy Bush, *Proceedings of ACM SIGCOMM, August 2008.*

**Effective Diagnosis of Routing Disruptions from End Systems.** Ying Zhang, Z. Morley Mao, and Ming Zhang, *Proceedings of 5th USENIX Symposium on Networked Systems Design and Implementation (NSDI), April, 2008.*

**A Measurement Study of Internet Delay Asymmetry.** Abhinav Pathak, Himabindu Pucha, Ying Zhang, Y. Charlie Hu, and Z. Morley Mao, *Proceedings of Passive and Active Measurement Conference (PAM), April 2008.*

**Practical Defenses Against BGP Prefix Hijacking.** Zheng Zhang, Ying Zhang, Y. Charlie Hu, and Z. Morley Mao, *Proceedings of 3rd International Conference on emerging Networking EXperiment and Technologies (CoNEXT), December 2007.*

**Internet Routing Resilience to Failures: Analysis and Implications.** Jian Wu, Ying Zhang, Z. Morley Mao, and Kang G. Shin, *Proceedings of 3rd International Conference on emerging Networking EXperiment and Technologies (CoNEXT), December 2007.*

**On the Impact of Route Monitor Selection.** Ying Zhang, Zheng Zhang, Z. Morley Mao, Y. Charlie Hu, and Bruce Maggs, *Proceedings of ACM Internet Measurement Conference (IMC), October 2007.*

**A Firewall for Routers: Protecting Against Routing Misbehavior.** Ying Zhang,

Zhuoqing Morley Mao, and Jia Wang, *Proceedings of 37th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, June 2007.

**Understanding Network Delay Changes Caused by Routing Events.** Himabindu Pucha, Ying Zhang, Z. Morley Mao, Y. Charlie Hu, *Proceedings of ACM SIGMETRICS*, June 2007.

**A Framework for Measuring and Predicting Impact of Routing Changes.** Ying Zhang, Z. Morley Mao, and Jia Wang, *Proceedings of the 26th Annual IEEE Conference on Computer Communications (INFOCOM)*, May 2007.

**Low-Rate TCP-Targeted DoS Attacks Disrupts Internet Routing.** Ying Zhang, Z. Morley Mao, and Jia Wang, *Proceedings of 14th Annual Network & Distributed System Security Symposium (NDSS)*, February 2007.

**Internet-scale Malware Mitigation: Combining Intelligence of the Control and Data Plane.** Ying Zhang, Evan Cooke, and Z. Morley Mao, *Proceedings of ACM CCS Workshop on Rapid Malcode (WORM)*, November 2006.

**Web Service Automated Composition in Digital Library.** Ying Zhang, Ming Zhang, and Shuan Wang, *Proceedings of National Database Conference, China*, 2004.

**Referred Journal Publications** **A Complementary and Contrast View of the China Internet Topology**  
Hao Yin, Fangming Liu, Tongyu Zhan, Heungsun Chang, Ying Zhang, Bo Li, and Chuang Lin, *In submission to ACM journal*

**Frontiers of Audiovisual Communications: New Convergences of Broadband Communications, Computing and Rich Media**  
Nimish Radio, Ying Zhang, Mallik Tatipamula, and Vijay Madiseti, *To appear in ACM/IEEE Special Issues on Rich Media*, 2011.

**iSPY: Detecting IP Prefix Hijacking on My Own**  
Zheng Zhang, Ying Zhang, Y. Charlie Hu, Z. Morley Mao, and Randy Bush, *In ACM/IEEE Transactions on Networking (ToN)*, Vol. 18 (6), pp. 1815–1828, December 2010.

**Internet Traffic and Multiresolution Analysis**  
Ying Zhang, Zihui Ge, Suhas Diggavi, Z. Morley Mao, Matthew Roughan, Vinay Vaishampayan, Walter Willinger, and Yin Zhang, */Markov Processes and Related Fields: A Festschrift in Honor of Thomas G. Kurtz/, S. N. Ethier, J. Feng and R. H. Stockbridge (eds.)*, IMS Lecture Notes–Monograph Series, 2007.

**Patents** **Localized Congestion Exposure**, Ying Zhang, Howard Green, and Ingemar Johansson, Docket Number 12/976067, filed in October, 2010.

**Capacity Planning for Data Center Services**, Ming Zhang, Paramvir Bahl, Ying Zhang, and Z. Morley Mao, MS1-4760US, filed in August, 2009.

**RouteNormalizer: a Firewall for Routers**, Zhuoqing Morley Mao, Jia Wang, and Ying Zhang, Docket Number 2005-0294, filed on December 28, 2005.

**A Scalable and Robust Troubleshooting Framework for VPN Backbones**, Zhuoqing Morley Mao, Dan Pei, Jia Wang, and Ying Zhang, Docket Number 2006-1607, filed on December 16, 2007.

**Professional Services** Technical Program Committee Member, 23rd International Teletraffic Congress (ITC), 2011.

Technical Program Committee Member, Next-Generation Networking and Internet Symposium (NGNI) in IEEE International Conference on Communications, 2011.

Guest Reviewer, Sensors, ISSN 1424-8220.

**Selected Projects** **End-to-end self-organizing functionalities in carrier network** Mobile networks are experiencing a traffic boom. While voice continues to ramp up linearly, data is growing ex-

ponentially. To meet the bandwidth demand, operators need to seek for new technologies to efficiently utilize the available network resources while reducing capital expenditures and operational expenditures. The Self Organizing Network (SON) functionalities in the Long Term Evolution (LTE) network are of significant importance to improve the automation of operation and management process. I extended the current self-organizing functionalities to end-to-end perspectives. Existing proposals on SON functionalities are all *limited to the radio access networks*, in particular, between the user terminals (UEs) and the base stations (eNodeB). However, the user perceived application performance are affected by the network conditions on the whole end-to-end path beyond the path segment between UE and eNodeB. I built self-organizing functionalities from the end-to-end perspectives, ranging from the UE to the mobile network backbone, including self-configuration, self-optimization, self-healing functions.

**End-system based distributed monitoring system.** Real-time monitoring in large-scale distributed systems is indispensable for enabling quick identification of any performance problems so that mitigation response can be undertaken. I have designed and built the first end-system based monitoring system to scalably and accurately diagnose causes for routing events associated with large ISPs without requiring access to any proprietary data. The system consists of 300 machines geographically distributed, monitoring 19 ISPs simultaneously.

**Detecting traffic differentiation inside ISP networks.** The monitoring system needs to be designed differently for different purpose. Given the increasing concerns on “net neutrality violations”, I developed to detect traffic differentiation which may result in performance difference, dependent on various factors such as network paths, congestion degrees, or traffic types. I have designed a novel application content-aware probing technique to monitor the service provided for diverse applications and customers.

**Router firewall: Protecting Against Routing Misbehavior.** Routing security is very important for the well-being of the global Internet. However, today’s routing infrastructure is vulnerable to various types of attacks. I have built a system to help routers detect anomalies and protect routers from attacks by malicious peers, which is one step towards achieving better routing security. I developed a router firewall to detect and stop any unwanted routing traffic from reaching the local routers with low false-positives and low-overhead.

**Teaching Experience**

Teaching Assistant, EECS 489: Computer Networks Winter 2007  
Designed two project assignments, graded homework and exams, and led a weekly 1-hour discussion section.

Teaching Assistant, EECS 108: Introduction to Computer Systems Winter 2006  
Designed all homework and project assignments, graded homework and exams, and led two 3-hour laboratory sections weekly.

**References**

Prof. Z. Morley Mao	Prof. Y. Charlie Hu
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