

# Srini Seetharaman

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## Education

**Ph.D in Computer Science** 2002 - 2007  
GEORGIA INSTITUTE OF TECHNOLOGY Atlanta, GA  
Minor: Electrical Engineering  
Thesis title : Analyzing Cross-layer Interaction in Overlay Networks  
Advisor : Prof. Mostafa Ammar

**M.S in Computer and Information Science** 1999 - 2001  
THE OHIO STATE UNIVERSITY Columbus, OH  
Thesis title : Intelligent Forward Error Correction for Video Transmission over CDMA  
Advisor : Dr. Wu-chi Feng

**B.Eng in Electrical and Electronics** 1995 - 1999  
BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE Pilani, India

## Research Interests

Design, implementation and analysis of large-scale networked systems; with emphasis on network architecture, Internet economics, performance evaluation, network/traffic monitoring, networking protocols and green technologies.

## Professional Experience

**Technical Lead, Software-defined Networking** 09/2008 - Present  
*Deutsche Telekom Innovation Center, USA* Mountain View, CA

I work on architecting business-focused use-cases using OpenFlow/SDN as an enabler. Furthermore, I conduct research on designing a service-centric evolvable Internet, traffic monitoring, and data center network architectures.

**Researcher and Deployment Lead** 09/2008 - 09/2011  
*Clean Slate Lab, Stanford University* Stanford, CA

As a member of the OpenFlow group, I led OpenFlow GENI deployments in several institutions and collaborated with student researchers on topics like power conservation, load balancing, mobility.

**Postdoctoral Researcher** 12/2007 - 07/2008  
*Networking and Telecommunications Group, Georgia Tech* Atlanta, GA

I investigated into the redesign of network services in a multi-layer Internet architecture and in the investigation of cross-layer interaction in the wireless networking domain. I am also involved in the design of new application services. Funded by NSF grant CNS-0721559

**Research Assistant** 08/2003 - 12/2007  
*Networking and Telecommunications Group, Georgia Tech* Atlanta, GA

As a research assistant in the Networking group, I was primarily involved in two main projects: 1) Investigating the multi-layer interaction issues in overlay networks, and 2) Improving malware detection at both edge and core networks.

**Summer Intern** 06/2006 - 08/2006  
*Service Infrastructure Research Group, Bell Labs, Alcatel-Lucent* Holmdel, NJ

Developed certain preemptive strategies to mitigate the conflict between the selfish objective of the overlay and IP layer, caused due to bandwidth constraints in realistic scenarios (Patent applied for).

**Research Assistant** 08/2002 - 08/2003  
*Networking and Telecommunications Group, Georgia Tech* Atlanta, GA

Focused on the fault restoration issues in multi-segment optical networks, as part of a Sprint-funded project to analyze characteristics of their optical core. Specifically, I investigated the end-to-end protection of lightpaths in large-scale, interconnected optical networks with multiple heterogeneous segments.

**Software Engineer** 07/2001 - 07/2002  
*System Test, Atoga Systems Inc.* Fremont, CA

Developed test plans and conducted various tests for the Atoga Optical Application Router (OAR), which helps metropolitan service providers to enable per-user and per-channel service-level agreements through a converged platform. My focus was in testing L2 switching, L3 routing and QoS offerings.

**Trainee Software Engineer** 01/1999 - 06/1999  
*Multimedia Group, Motorola India Electronics pvt Ltd.* Bangalore, India

Designed and developed a H.323 - H.324 Videoconferencing Gateway software that successfully transcoded all multimedia calls (with signaling, audio, video) between LAN and PSTN. This product was later fine-tuned and marketed by Motorola India.

## Teaching Experience

**OpenFlow/SDN Tutorial**

- *IEEE Hot Interconnects Symposium, Santa Clara, CA* 08/2012
- *Open Networking Summit, Santa Clara, CA* 04/2012
- *OFELIA Summer School, Berlin, Germany, CA* 11/2011
- *IEEE Hot Interconnects Symposium, Santa Clara, CA* 08/2011
- *GENI Engineering Conference 10, Puerto Rico* 03/2011
- *EU OpenFlow projects meeting, Berlin, Germany* 02/2011
- *GENI Engineering Conference 9, Washington DC* 11/2010
- *GENI Engineering Conference 8, San Diego CA* 07/2010

Conducted 5-hour tutorial on OpenFlow architecture, protocol, usage and potential to 40 attendees, including hands-on lab session where attendees build an OpenFlow-based virtualized learning-MAC controller.

<b>Guest lectures at University California Davis and Santa Cruz</b>	
- "OpenFlow/SDN"	02/2012
- "OpenFlow/SDN Introduction"	11/2011
- "OpenFlow for Network Programmability & Virtualization"	03/2010
- "Future Internet Design"	02/2009

**Teaching Assistant for CS6250** 08/2005 - 12/2005  
*College of Computing, Georgia Tech* Atlanta, GA

Assisted Prof. Mostafa Ammar in teaching a graduate level course on Computer Networks with an attendance of 40 students. I assisted in designing the homeworks and a term-long project of experimenting with TCP-Daytona. I also graded all homeworks, project submissions and exams conducted.

**Breakout Instructor for CS1322** 08/2004 - 12/2004  
*College of Computing, Georgia Tech* Atlanta, GA

Conducted one breakout lecture per week for two sections of an undergraduate course on Java programming. During the breakout sessions, I primarily taught all language specifics and conducted demonstrations of their functionality.

**Instructor for CIS201** 09/1999 - 06/2001  
*Department of Computer and Information Sciences, The Ohio State University* Columbus, OH

For 7 quarters at Ohio State Univ., I independently taught an introductory course on programming, involving 3 hours of lecture and 1 hour of lab each week, to a class of 40 students. My duties involved designing the course content, homeworks and two exams, and grading all involved components.

## Mentoring Experience

I supervised/mentored the internship of the following graduate students at Deutsche Telekom:

**Marc Mendonca** (Ph.D. student at University of California Santa Cruz) on 01/2011 - 06/2011  
his project of building an OpenFlow-based in-network traffic anonymization service.

**Dan Levin** (Ph.D. student at Technische Universitat Berlin) on his project 08/2010 - 11/2010  
of analyzing OpenFlow control traffic to estimate optimal controller reactivity.

**Guanyao Huang** (Ph.D. student at Univ. of California Davis) on his 01/2010 - 03/2010  
project of building a dynamic MeasuRouting prototype based on OpenFlow.

**Andreas Wundsam** (Ph.D. student at Technische Universitat Berlin) on 09/2009 - 11/2009  
his project of building a replay-based network debugging mechanism using OpenFlow.

**Mariyam Mirza** (Ph.D. student at Univ. of Wisconsin) on her project of 09/2009 - 12/2009  
building a wireless monitoring service for improving TCP throughput.

**Apurv Bhartia** (Ph.D. student at Univ. of Texas Austin) on his project of 06/2009 - 09/2009  
building Monitoring as a service over NetSerV architecture.

**Sourabh Jain** (Ph.D. student at Univ. of Minnesota-Twin Cities) on his 05/2009 - 08/2009  
project of building a Content Distribution service over the NetSerV architecture.

**Saqib Raza** (Ph.D. student at Univ. of California Davis) on his project of building a wide-area routing-assisted monitoring framework that improves monitoring utility for traffic sub-population. 03/2009 - 06/2009

I mentored the graduate research of the following students at Georgia Tech:

**Samantha Lo** (Ph.D. student at Georgia Tech) on her research project of identifying and resolving overlaps and conflicts in the policy of tenant virtual networks (Partly undertaken at Stanford University). 06/2009 - 08/2009

**Mehmet Demirci** (Ph.D. student at Georgia Tech) on his research project, which aims to infer overlay layer characteristics using native layer measurements and vice-versa. 05/2007 - 07/2008

**Ahmed Mansy** (Ph.D. student at Georgia Tech) on his CS7001 project of implementing a multi-layer testbed over VINI, for verifying various cross-layer interaction issues. 09/2006 - 12/2006

**Kaushik Bhandarkar** (M.S. student at Georgia Tech) on research that involved implementing an overlay network assignment tool called *NetFinder*. 08/2006 - 01/2007

## Grants

I am a co-PI on the following externally-funded grants:

**NSF NeTS Future Internet Design** *Deutsche Telekom*  
Title: NetSerV - Architecture of a Service-Virtualized Internet 01/2009  
Investigators: H. Schulzrinne, S. Seetharaman, V. Hilt  
Status: Approved \$1,050,000 (CNS-0831912)

I contributed to the technical content of the following grant proposal:

**NSF NeTS Networking Broadly Defined (NBD)** *Georgia Tech*  
Title: Routing in Multi-Layered Networks 08/2007  
Investigator: Mostafa Ammar  
Status: Approved \$375,000 (CNS-0721559)

## Refereed Journal Publications

1. S. Raza, G. Huang, C-N. Chuah, S. Seetharaman and J. Singh, "MeasuRouting: A Framework for Routing Assisted Traffic Monitoring," *ACM/IEEE Transactions of Networking*, 2011.
2. G. Huang, S. Raza, S. Seetharaman, C-N. Chuah, "Dynamic Measurement-Aware Routing in Practice," *IEEE Network Special Issue on Network Traffic Monitoring and Analysis*, May, 2011.
3. S. Seetharaman, V. Hilt, M. Hofmann, M. Ammar, "Resolving Cross-layer Conflict between Overlay Routing and Traffic Engineering," *ACM/IEEE Transactions of Networking*, 2009.
4. S. Seetharaman and M. Ammar, "Inter-domain Policy Violations in Multi-hop Overlay Routes: Analysis and Mitigation," in *COMPUTER NETWORKS (Elsevier) journal*, 2009.

## Refereed Conference Publications

1. M. Mendonca, S. Seetharaman, K. Obraczka, "A Flexible In-Network IP Anonymization Service," *Proceedings of the IEEE ICC Workshop on Software-Defined Networks*, June, 2012.

2. A. Wundsam, D. Levin, S. Seetharaman, A. Feldmann, "OFRewind: Enabling Record and Replay Troubleshooting for Networks," *Proceedings of the USENIX Annual Technical Conference (ATC)*, June, 2011.
3. M. M. Mudigonda, T. Kanipakam, A. M. Dutko, M. Bathula, N. Sridhar, S. Seetharaman, J. O. Hallstrom, "A Mobility Management Framework for Optimizing the Trajectory of a Mobile Base-Station Virtualization," *Proceedings of the 8th European Conference on Wireless Sensor Networks (EWSN'11)*, February, 2011.
4. S. Seetharaman, "Energy Conservation in Multi-Tenant Networks through Power Virtualization," *Proceedings of USENIX Workshop on Power Aware Computing and Systems (HotPower)*, October, 2010.
5. N. Handigol, M. Flajslik, S. Seetharaman, R. Johari and N. McKeown, "Aster\*x: Load-Balancing as a Network Primitive," *Poster in Architectural Concerns in Large Datacenters (ACLD) conference*, June, 2010.
6. B. Heller, S. Seetharaman, P. Mahadevan, Y. Yiakoumis, P. Sharma, S. Banerjee and N. McKeown, "ElasticTree: Saving Energy in Data Center Networks," *Proceedings of USENIX NSDI*, April, 2010.
7. S. Raza, G. Huang, C-N. Chuah, S. Seetharaman and J. Singh, "MeasuRouting: A Framework for Routing Assisted Traffic Monitoring," *Proceedings of IEEE INFOCOM*, March, 2010.
8. S. Srinivasan, J. W. Lee, E. Liu, M. Kester, H. Schulzrinne, V. Hilt, S. Seetharaman and A. Khan, "NetServ: Dynamically Deploying In-network Services," in *Proceedings of ACM Workshop on Re-Architecting the Internet (ReArch)*, December, 2009.
9. KK. Yap, M. Kobayashi, D. Underhill, S. Seetharamam, P. Kazemian and N. McKeown, "The Stanford OpenRoads Deployment," in *Proceedings of ACM Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH)*, September, 2009.
10. N. Handigol, S. Seetharaman, M. Flajslik, N. McKeown and R. Johari, "Plug-n-Serve: Load-Balancing Web Traffic using OpenFlow," *Demonstration in ACM SIGCOMM conference*, August, 2009.
11. B. Heller, D. Underhill, S. Seetharaman, N. McKeown, "ElasticTree: Reducing Energy in Data Center Networks," *Poster in Architectural Concerns in Large Datacenters (ACLD) conference*, June, 2009.
12. M. Demirci, S. Lo, S. Seetharaman, M. Ammar, "Multi-layer Monitoring of Overlay Networks," in *Proceedings of Passive and Active Measurement Workshop (PAM)*, April, 2009.
13. A. Ramachandran, S. Seetharaman, N. Feamster and V. Vazirani, "Fast Monitoring of Traffic Subpopulations," in *Proceedings of ACM Internet Measurement Conference (IMC)*, Vouliagmeni, Greece, October 2008.
14. S. Seetharaman and M. Ammar, "Managing Inter-domain Traffic in the Presence of BitTorrent File-Sharing," *Poster in Proceedings of ACM SIGMETRICS*, Annapolis, Maryland, June 2008.
15. S. Seetharaman and M. Ammar, "Exit Policy Violations in Multi-hop Overlay Routes: Analysis and Mitigation," in *Proceedings of IEEE Global Telecommunications Conference (GLOBECOM)*, Washington, D.C., November 2007.
16. S. Seetharaman, V. Hilt, M. Hofmann and M. Ammar, "Preemptive Strategies to Improve Routing Performance of Native and Overlay Layers," in *Proceedings of IEEE Conference on Computer Communications (INFOCOM)*, Anchorage, Alaska, May 2007.
17. S. Seetharaman and M. Ammar, "Characterizing and Mitigating Inter-domain Policy Violations in Overlay Routes," in *Proceedings of IEEE International Conference on Network Protocols (ICNP)*, Santa Barbara, California, November 2006.

18. S. Seetharaman and M. Ammar, "On the Interaction between Dynamic Routing in the Overlay and Native Layers," in *Proceedings of IEEE Conference on Computer Communications (INFOCOM)*, Barcelona, Spain, April 2006.
19. S. Seetharaman and M. Ammar, "Overlay-friendly Native Network: A Contradiction in Terms?" in *Proceedings of ACM Workshop on Hot Topics in Networking (HOTNETS)*, College Park, Maryland, November 2005.
20. S. Seetharaman, A. Durresi and Raj Jain, "Signaling protocols for lightpath provisioning," in *Proceedings of 26th Annual IEEE Conference on Local Computer Networks (LCN)*, Tampa, Florida, pages 82–88, November 2001.
21. N. Chandok, A. Durresi, Raj Jain, R. Jagannathan, S. Seetharaman and K. Vinodkrishnan, "IP over all-optical networks - issues," in *Proceedings of IEEE Global Telecommunications Conference (GLOBECOM)*, San Antonio, Texas, Vol. 4, pages 2144–2149, December 2001.
22. K. Vinodkrishnan, N. Chandok, A. Durresi, Raj Jain, R. Jagannathan and S. Seetharaman, "Survivability in IP over WDM networks," in *Journal of High Speed Networks (JHSN)*, Special issue on Survivable Optical Networks, Vol. 10 Issue 2, pages 79–91, February 2001.

## Non-refereed Publications

23. A. Wundsam, D. Levin, S. Seetharaman, and A. Feldmann, "OFRewind for Troubleshooting Networks," *Technical Report*, <http://www.openflow.org/wk/index.php/OFRewind>, September, 2010.
24. S. Seetharaman, "Analyzing Cross-layer Interaction in Overlay Networks," *Ph.D. Thesis*, Georgia Institute of Technology, Atlanta, Georgia, October 2007.
25. A. Ramachandran, S. Seetharaman, N. Feamster and A. Lakhina, "Monitoring Stealthy Network Conversations with Sampled Traffic," *Technical Report*, College of Computing, Georgia Institute of Technology, November 2006.
26. M. Ammar and S. Seetharaman, "Routing in Multiple Layers: Challenges and Opportunities," *Invited paper*, Workshop on Internet Routing Evolution and Design (WIRED), Atlanta, Georgia, October 2006.
27. S. Seetharaman, A. Jukan and M. Ammar, "End-to-End Dedicated Protection in Multi-Segment Optical Networks," *Technical Report*, <http://www.stanford.edu/~seethara/papers/e2eprot.pdf>, March 2003.
28. S. Seetharaman, "Intelligent Forward Error Correction for Video over CDMA," *Masters Thesis*, The Ohio State University, June 2001.
29. N. Chandok, A. Durresi, Raj Jain, R. Jagannathan, S. Seetharaman and K. Vinodkrishnan, "IP over Optical Networks: A Summary of Issues," *Internet Draft draft-osu-ipo-mpls-issues-02.txt*, Work in progress, April 2001.
30. S. Seetharaman and R. Jain, "IP over DWDM," *Survey paper*, [http://www.cs.wustl.edu/~jain/cis788-99/ftp/ip\\_dwdm/index.html](http://www.cs.wustl.edu/~jain/cis788-99/ftp/ip_dwdm/index.html), November 1999.

## Patents

- A. Wundsam, S. Seetharaman, A. Feldmann, "Virtualization and Replay-based System for Network Debugging," *Patent applied for*, Aug 2010.
- S. Seetharaman, G. Huang, S. Raza, C. Chuah, J. Singh, "A Method for Routing Assisted Traffic Monitoring," *Patent applied for*, Mar 2010.
- S. Seetharaman, A. Bhartia, S. Jain, "Providing Network Services from Building Blocks," *Patent applied for*, Mar 2010.

- S. Seetharaman, V. Hilt and I. Rimac, “Price-aware Neighborhood Selection for Peer-to-peer Networks,” *Patent applied for*, Feb 2010.
- S. Seetharaman, V. Hilt and M. Hofmann, “Preemptive Strategies to Improve Routing Performance of Native and Overlay Layers,” *Patent applied for*, Aug 2006.

## Talks

Update on OpenFlow Campus Trials	
– <i>GENI Engineering Conference 10, Puerto Rico</i>	03/2011
– <i>GENI Engineering Conference 9, Washington DC</i>	11/2010
– <i>GENI Engineering Conference 8, San Diego CA</i>	07/2010
– <i>GENI Engineering Conference 7, Durham NC</i>	03/2010
Energy Conservation in Multi-Tenant Networks through Power Virtualization	
– <i>USENIX HotPower workshop, Vancouver, Canada</i>	10/2010
Integration & Meso-Scale - OpenFlow-PlanetLab	
– <i>GENI Engineering Conference 6, Salt Lake City UT</i>	11/2009
OpenFlow/Software-Defined Networks	
– <i>OFC/NFOEC tutorial talk, Los Angeles CA</i>	03/2012
– <i>University of California Davis, CA</i>	02/2012
– <i>University of California Santa Cruz, CA</i>	11/2011
– <i>Quilt GENI Workshop, San Diego CA</i>	07/2010
– <i>ESCC/Internet2 JointTechs workshop, Columbus OH</i>	07/2010
– <i>University of California Davis, CA</i>	03/2010
– <i>University of California Davis, CA</i>	03/2009
Managing Cross-layer Interaction in a Multi-layered Internet	05/2008
– <i>Washington State University, Pullman, WA</i>	
– <i>Vrije Universiteit Amsterdam, Netherlands</i>	
– <i>Delft University of Technology, Netherlands</i>	
Exit Policy Violations in Multi-hop Overlay Routes: Analysis and Mitigation	11/2007
– <i>IEEE GLOBECOM, Washington, D.C.</i>	
Cross-layer Interaction in Overlay Networks	08/2007
– <i>Indian Institute of Technology, Madras, India</i>	
– <i>Birla Institute of Tech. and Science, Pilani, India</i>	
Preemptive Strategies to Improve Routing Performance of Native and Overlay Layers	
– <i>IEEE INFOCOM, Anchorage, AK</i>	05/2007
Routing over Multiple Layers	03/2007
– <i>Case Western Reserve Univ, Cleveland, OH</i>	
Characterizing and Mitigating Inter-domain Policy Violations in Overlay Routes	
– <i>IEEE ICNP, Santa Barbara, CA</i>	11/2006
Tutorial on common tools for Networking research	09/2006
– <i>College of Computing, Georgia Tech</i>	
Overlay networking research @ NTG	08/2006
– <i>Networking Seminar, Georgia Tech</i>	

On the Interaction between Dynamic Routing in the Overlay and Native Layers – <i>IEEE INFOCOM, Barcelona, Spain</i>	04/2006
“Dynamic Topology Configuration in Service Overlay Networks: A Study of Reconfiguration Policies” – <i>Proxy presentation of Dr.Jinliang Fan’s work, IEEE INFOCOM</i>	04/2006
Overlay-friendly Native Network: A Contradiction in Terms? – <i>ACM HotNets, College Park, MD</i>	11/2005
Optical Components and Testbeds – <i>NetLab Seminar, Ohio State Univ</i>	02/2000

## Service, Activities and Memberships

• Member of IEEE, IEEE COMSOC	2008–Present
• Member of ACM, ACM SIGCOMM	2006–Present
• TPC Reviewer for ICNC Internet Services and Applications track	2013
• TPC Reviewer for ICNC Green Computing track	2013
• Research Sandbox Committee Member for SuperComputing’12	2012
• TPC Reviewer for ICNC Green Computing track	2012
• TPC Reviewer for ICCCN	2012
• TPC Reviewer for ICC Workshop on SDN	2012
• Research Sandbox Committee Member for SuperComputing’11	2011
• Chaired the Pronto switch distribution award at Stanford University <a href="http://www.openflow.org/foswiki/bin/view/OpenFlow/Deployment/CallForProposals2010">www.openflow.org/foswiki/bin/view/OpenFlow/Deployment/CallForProposals2010</a>	12/2010
• Reviewer for Austrian funding agency WWWF	2010
• TPC Reviewer for ICC Next-Gen Networking & Internet Symposium	2010
• TPC Reviewer for ICC Next Generation Networking Symposium	2009
• Reviewer for SPIE (2003), IWQoS (2004), Networking (2004), ISCC (2005, 2006), GLOBECOM (2007), JHSN (09/2007), Tridentcom (2008), CCR (01/2008), TNSM (02/2008), HiPC (2008), NSDI (2009), SIGCOMM (2009), ToN (2009), TSNM (2009), COMCOM (2008, 2010), Networking 2012, COMNET (2012), IEEE TC (2012)	
• Lab manager, Klaus move coordinator, and web administrator for the Networking and Telecommunications group	08/2006-07/2008
• President of the Atlanta chapter of the Association for India’s Development	09/2004-04/2007

## References

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