CURRICULUM VITAE

CV SECTION 1: Employment History/Awards

NAME   Christos Papadopoulos

ADDRESS Department of Computer Science   **PHONE** (970) 491-3267

Colorado State University   Email: christos@colostate.edu

1873 Campus Delivery, Fort Collins CO 80523   URL: http://cs.colostate.edu/~christos/

EDUCATION

1999   D.Sc. in Computer Science, Washington University in St. Louis

1992.   M.S. in Computer Science, Washington University in St. Louis

1989   B.S. in Computer Science, Queens College (CUNY) New York

1983   Diploma of Technician Engineer, Higher Technical Institute, Cyprus

RESEARCH INTERESTS

Network Protocols, Network Security, Network Measurements, Internet Architecture

ACADEMIC POSITIONS

(2014-present) professor, computer science, Colorado State University

(2006-2014)   associate professor, computer science, Colorado State University

(1999-2006)   assistant professor, computer science, University of Southern California

SABATICALS

Fall 2015

OTHER POSITIONS

(1989–1999)   research assistant, computer science, Computer and Communications Research Center (CCRC) and Advanced Research Laboratory (ARL), Washington University in St. Louis MO

CURRENT JOB DESCRIPTION

40% Teaching, 53% Research/Creative Activity, 7% Service/Outreach, 0% Admin.

HONORS AND AWARDS

Career Award, NSF, 2002

CV SECTION 2: Publications/Scholarly Record

PUBLISHED WORKS

Books:

None

Refereed Journal Articles:

1. K. Gadkari, L. Weikum, D. Massey, C. Papadopoulos. Pragmatic Router FIB Caching. Computer Communications, Feb 2016. http://www.sciencedirect.com/science/article/pii/S0140366416300251

2. L. Zhang, KC Claffy, P. Crowley, C. Papadopoulos, L. Wang and B. Zhang. Named Data Networking. Computer Communications Review, July 2014.

3. J. Touch, I. Baldine, R. Dutta, G. Finn, B. Ford, S. Jordan, D. Massey, A. Matta, C. Papadopoulos, P. Reiher, G. Rouskas, "A Dynamic Recursive Unified Internet Design (DRUID)", *Computer Networks*, V55 N4, Mar. 2011, pp. 919–935

4. X. He, C. Papadopoulos, J. Heidemann, "Remote Detection of Bottleneck Links Using Spectral and Statistical Methods", Computer Networks, Volume 53 Issue, Feb 2009.

5. J. Mirkovic, P. Reiher, C. Papadopoulos, A. Hussain, M. Shepard, M. Berg and R. Jung, "Testings a Collaborative DDoS Defense in a Red Team/Blue Team Exercise," IEEE Transactions On Computers, v. 57, n. 7, July 2008.

6. K. Hwang, M. Cai, J. Pan, C. Papadopoulos, "WormShield: Fast Worm Signature Generation with Distributed Fingerprint Aggregation", IEEE Transactions on Dependable and Secure Computing, Volume 4, Issue 2, Pages 88-104, April 2007.

7. "A Framework for Incremental Deployment Strategies for Router-assisted Services," by Xinming He, Christos Papadopoulos, and Pavlin Radoslavov. IEEE/ACM Transactions on Networking. August 2006.

8. "NAM: A Network Adaptable Middleware to Enhance Response Time of Web Services," by S. Ghandeharizadeh, C. Papadopoulos, M. Cai, R. Zhou, P. Pol. International Journal of Web Services Research, 2(4), 1-20, October-December 2005.

9. "Distinguishing between Single and Multi-source Attacks Using Signal Processing," by Alefiya Hussain, John Heidemann, Christos Papadopoulos. Computer Networks Journal, Vol. 46, Issue 4, pp.479-503, November 2004.

10. "Performance of Networked XML-driven Cooperative Applications," by S. Ghandeharizadeh, C. Papadopoulos, M. Cai, and K. K. Chintalapudi. Journal of Concurrent Engineering: Research and Applications, Volume 12, Number 3, pp.195-204, September 2004.

11. "A Comparison of Application-level and Router-assisted Hierarchical Schemes for Reliable Multicast," by Pavlin Radoslavov, Christos Papadopoulos, Ramesh Govindan, and Deborah Estrin. IEEE/ACM Transactions on Networking, Vol. 12, No. 3, pp. 469-482, June 2004.

12. "LMS: A Router-assisted Scheme for Reliable Multicast," by Christos Papadopoulos, Guru Parulkar and George Varghese. IEEE/ACM Transactions on Networking, Vol. 12, No. 3, pp. 456-468, June 2004.

13. "Experimental Evaluation of SunOS IPC and TCP/IP Protocol Implementation," by Christos Papadopoulos and Guru Parulkar, ACM Transactions on Networking, Vol. 1, No. 2, pp.199 - 216, April 1993.

Accepted for Publication

Textbooks:

None

Refereed Chapters in Books:

1. "Performance of Networked XML-driven Cooperative Applications," by S. Ghandeharizadeh, C. Papadopoulos, M. Cai, and K. K. Chintalapudi. Kluwer Academic Publisher, 2002.

Refereed Proceedings/Transactions:

1. A. Shah, R. Fontugne, and C. Papadopoulos. Towards Characterizing International Detours. The 12th Asian Internet Engineering Conference (AINTEC) 2016, Bangkok, Thailand, Nov-Dec 2016 (best paper award).
2. S. DiBenedetto, and C. Papadopoulos. Mitigating Poisoned Content with Forwarding Strategy. The third Workshop on Name-Oriented Mobility: Architecture, Algorithms and Applications (NOM). San Francisco, CA, April 2016.
3. M. Gharaibeh, H. Zhang, C. Papadopoulos and J. Heidemann. Assessing Co-Locality of IP Blocks. Proceedings of Global Internet Symposium. San Francisco CA, April 2016.
4. H. Zhang, M. Gharaibeh, S. Thanasoulas and C. Papadopoulos. BotDigger: Detecting DGA Bots in a Single Network. The Traffic Monitoring and Analysis workshop (TMA), Louvain La Neuve, Belgium, April 2016.
5. Fan, C., Shannigrahi, S., DiBenedetto, S., Olschanowsky, C., Papadopoulos, C. and Newman, H. Managing scientific data with named data networking. In Proceedings of the Fifth International Workshop on Network-Aware Data Management (co-located with Supercomputing 2015), Austin, TX, November 2015.
6. H. Zhang and C. Papadopoulos. Early Detection of High-Entropy Traffic. IEEE Conference on Communications and Network Security (CNS) 2015. Florence, Italy, September 2015.
7. K. Gadkari, L. Weikum, D. Massey, and C. Papadopoulos. Pragmatic Router FIB Caching. IFIP Technical Committee on Communication Systems and IEEE Networking 2015, Toulouse, France, May 2015.
8. Gina Fisk, Calvin Ardi, Neale Pickett, John Heidemann, Mike Fisk and Christos Papadopoulos. Privacy Principles for Sharing Cyber Security Data. Proceedings of the IEEE International Workshop on Privacy Engineering, San Jose, California, USA, May 2015.
9. H. Zhang and C. Papadopoulos. BotTalker: Generating Encrypted, Customizable, C&C Traces. The 2015 IEEE Symposium on Technologies for Homeland Security (HST '15), Waltham MA, April 2015.
10. S. Shannigrahi, A. Barczuk, C. Papadopoulos, A. Sim, I. Monga, H. Newman, J. Wu, and E. Yeh. Named Data Networking in Climate Research and HEP Applications. 21st International Conference on Computing in High Energy and Nuclear Physics (CHEP2015), Okinawa Japan, April 2015.
11. J. Gersch, D. Massey and C. Papadopoulos. Incremental Deployment Strategies for Effective Detection and Prevention of BGP Origin Hijacks. ICDCS 2014, Madrid, Spain, July 2014.

12. C. Olschanowsky, S. Shannigrahi and C. Papadopoulos. Supporting Climate Research using Named Data Networking. LANMAN 2014, Reno NV, May 2014.

13. X, Hu, C. Papadopoulos, J. Gong, D. Massey. Not So Cooperative Caching in Named Data Networking. Globecom 2013, Atlanta GA, Dec 2013.

14. C. Olschanowsky, L. Weikum, J. Smith, C. Papadopoulos, D. Massey. BGP Data In Real-Time and With Multi-Format Archiving. The 13th annual IEEE Delivering Diverse Conference on Technologies for Homeland Security (HST '13), Waltham MA, November 2013.

15. H. Zhang, C. Papadopoulos, D. Massey. Detecting Encrypted Bot Traffic. Proceedings of Global Internet Symposium, (co-located with Infocom 2013), Turin, Italy, April 2013.

16. V. Kambhampati, C. Papadopoulos, D. Massey. Epiphany: A Location-Hiding Architecture for Protecting Critical Services from DDoS Attacks. Dependable Systems and Networks 2012, Boston MA, June 2012.

17. H. Yan, A. Flavel Z. Ge, A. Gerber, D.Massey, C. Papadopoulos, H. Shah, J. Yates. Argus: End-to-End Service Anomaly Detection and Localization from an ISP's Point of View. Infocom 2012 mini-conference, Orlando FL, March 2012.

18. E. Osterweil, D. McPherson, S. DiBenedetto, C. Papadopoulos, D. Massey. Behavior of DNS' Top Talkers, a .com/.net View. Proceedings of the 13th Passive and Active Measurement Conference, March 2012.

19. V. Kambhampati, D. Massey and C. Papadopoulos. A Taxonomy of Capabilities Based DDoS Defense Architectures. The 9th ACS/IEEE International Conference on Computer Systems and Applications (AICCSA 2011), Sharm El-Sheikh, Egypt, Dec 2011. Best paper award.

20. D. Massey, C. Papadopoulos, L. Wang, B. Zhang, L. Zhang. Teaching Network Architecture through Case Studies. SIGCOMM 2011 Education workshop, Toronto, Canada, Aug. 2011.

21. S. Dibenedetto, C. Papadopoulos and D. Massey. Routing Policies in Named Data Networking. ACM SIGCOMM Workshop on Information-Centric Networking (ICN 2011), Toronto, Canada, Aug. 2011.

22. G. Bartlett, J. Heidemann, and C. Papadopoulos. Low-Rate, Flow-Level Periodicity Detection. In Proceedings of the 14th IEEE Global Internet Symposium. Shanghai, China, IEEE. April, 2011.

23. H. Yan, B. Say, B. Sheridan, D. Oko, C. Papadopoulos, D. Pei, D. Massey. IP Reachability Differences: Myths and Realities. In Proceedings of the 14th IEEE Global Internet Symposium. Shanghai, China, IEEE. April, 2011.

24. K. Gadkari, D. Massey and C. Papadopoulos. Dynamics of Prefix Usage at an Edge Router. In PAM'11: Proceedings of the 12th Passive and Active Measurement Conference, March 2011.

25. S. DiBenedetto, K. Gadkari, N. Diel, A. Steiner, D. Massey, and C. Papadopoulos, "Fingerprinting Custom Botnet Protocol Stacks", NPSec, Japan Oct. 2010.

26. C. Wilcox, C. Papadopoulos, and J. Heidemann, "Correlating Spam Activity with IP Address Characteristics", Proceedings of 13th IEEE Global Internet Symposium (GI '10) in conjunction with IEEE INFOCOM 2010, San Diego, CA, Mar. 2010.

27. S. DiBenedetto, D. Massey, C. Papadopoulos, P. Walsh, "Analyzing the Aftermath of the McColo Shutdown", the Workshop on Trust and Security in the Future Internet (FIST) (held in conjunction with SAINT 2009), Seattle, WA, July 2009.

28. John Heidemann and Christos Papadopoulos. Uses and Challenges for Network Datasets. In Proceedings of the IEEE Cybersecurity Applications and Technologies Conference for Homeland Security (CATCH), Washington, DC, USA, IEEE. March, 2009.

29. John Heidemann, Yuri Pradkin, Ramesh Govindan, Christos Papadopoulos, Genevieve Bartlett, and Joseph Bannister. Census and Survey of the Visible Internet. In Proceedings of the ACM Internet Measurement Conference, p. 169-182. Vouliagmeni, Greece, ACM. October 2008.

30. "Understanding Passive and Active Service Discovery," by Genevieve Bartlett and John Heidemann and Christos Papadopoulos. Proceedings of the 6th AMC SIGCOMM Conference on Internet Measurement Conference (IMC), San Diego, CA, Oct 2007.

31. Inherent Behaviors for On-line Detection of Peer-to-Peer File Sharing," by Genevieve Bartlett, John Heidemann and Christos Papadopoulos. Proceedings of 10th IEEE Global Internet Symposium (GI '07) in conjunction with IEEE INFOCOM 2007. Anchorage, AK, USA, May 2007.

32. Urbashi Mitra, John Heidemann Antonio Ortega, and Christos Papadopoulos. Detecting and Identifying Malware: A New Signal Processing Goal. IEEE Signal Processing Magazine, 23 (5), pp. 107-111, September 2006.

33. "Identification of Repeated Denial of Service Attacks," by Alefiya Hussain, John Heidemann and Christos Papadopoulos. In Proceedings of the IEEE Infocom, Barcelona, Spain, IEEE. April, 2006.

34. "Experiences with a Continuous Network Tracing Infrastructure," by Alefiya Hussain, Genevieve Bartlett, Yuri Pryadkin, John Heidemann, Christos Papadopoulos, Joseph Bannister. MineNet-05: Workshop on Mining Network Data (MineNet 2005). Co-located with Sigcomm 2005. Philadelphia, PA, August 2005.

35. "A Second Report on the User Experiments in the Distributed Immersive Performance Project," by E. Chew, R. Zimmermann, A.A. Sawchuk, C. Papadopoulos, C. Kyriakakis, C. Tanoue, D. Desai, M. Pawar, R. Sinha, and W. Meyer. 5th Open Workshop of MUSICNETWORK: Integration of Music in Multimedia Applications. Vienna, Austria, July 2005.

36. "Distributed Immersive Performance," by Elaine Chew and Alexander Sawchuk, Roger Zimmermann, The Tosheff Piano Duo (Vely Stoyanova and Ilia Tosheff), Christos Kyriakakis, Christos Papadopoulos, Alexandre Francois and Anja Volk. Presented at the panel session on "The Internet for Ensemble Performance" at NASM (National Association of the Schools of Music) Annual Meeting, San Diego, CA December 2004.

37. "CyberSeer: 3D Audio-visual Immersion for Network Security and Management," by Christos Papadopoulos, Chris Kyriakakis, Alexander Sawchuk and Xinming He. CCS Workshop on Visualization and Data Mining for Computer Security (VizSec), Fairfax, VA, October 2004.

38. "Musical Interaction at a Distance," by Elaine Chew, Roger Zimmermann, Alexander A. Sawchuk, Chris Kyriakakis, Christos Papadopoulos, Alexandre R. J. Francois, Gerry Kim and Anja Volk. Accepted for publication at the 4th Open Workshop of MUSICNETWORK, Universitat Pompeu Fabra, Barcelona, Spain, September 2004.

39. "An Adaptive Multiple Retransmission Technique for Continuous Media Streams." Rishi Sinha and Christos Papadopoulos. In Proceedings of The 14th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV). Kinsale, County Cork, Ireland, June 2004.

40. "The Remote Media Immersion System," by Roger Zimmermann, Chris Kyriakakis, Cyrus Shahabi, Christos Papadopoulos, Alexander A. Sawchuk, Ulrich Neumann. Published in the IEEE MultiMedia Magazine, special issue on "Digital Multimedia on Demand," Vol.11(2):48-57, April-June 2004.

41. "From Remote Media Immersion to Distributed Immersive Performance." A.A. Sawchuk, E. Chew, R. Zimmermann, C. Papadopoulos and C. Kyriakakis. ACM SIGMM 2003 Workshop

on Experiential Telepresence (ETP 2003) November 7, 2003, Berkeley, California, USA. In conjunction with ACM Multimedia 2003.

42. "NAM: A Network Adaptable Middleware to Enhance Response Time of Web Services," by S. Ghandeharizadeh, C. Papadopoulos, P. Pol, R. Zhou. Proceedings of the 11th ACM/IEEE International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunications Systems (MASCOTS), Orlando, FL, October 2003.

43. "A Framework for Classifying Denial of Service Attacks," by Alefiya Hussain, John Heidemann, Christos Papadopoulos. In Proceedings of Sigcomm 2003, Karlsruhe, Germany, August 2003.

44. "Loss Concealment for Multi-channel Streaming Audio," by Rishi Sinha, Christos Papadopoulos, Chris Kyriakakis. In Proceedings of The 13th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV). Monterey, CA, June 2003.

45. "Proteus: A System for Dynamically Composing and Intelligently Executing Web Services," by Craig A. Knoblock, Christos Papadopoulos, Cyrus Shahabi, Esam Alwagait, Jose Luis Ambite, Min Cai, Ching-Chien Chen, Parikshit Pol, Rolfe Schmidt, Saihong Song, Snehal Thakkar, and Runfang Zhou. Proceeding of the First International Conference on Web Services (ICWS), Las Vegas, NV, June 2003.

46. "Cossack: Coordinated Suppression of Simultaneous Attacks," by Christos Papadopoulos, Robert Lindell, John Mehringer and Alefiya Hussain. Proceedings of DISCEX 3, Arlington, VA, April 2003.

47. "A Framework for Incremental Deployment Strategies for Router-assisted Services," by Xinming He, Christos Papadopoulos, and Pavlin Radoslavov. In Proceedings of IEEE Infocom 2003.

48. "Eliminating Steganography in Internet Traffic with Active Wardens," by Gina Fisk, Mike Fisk, Christos Papadopoulos and Joshua Neil. In Proceedings of the 5th International Workshop on Information Hiding. Noordwijkerhout, The Netherlands, Oct. 7-9 2002, pp. 17-33.

49. "Using ns in the Classroom and the Lab," by Christos Papadopoulos and John Heidemann. Sigcomm Educational Workshop, Pittsburg, PA, August 2002.

50. "Performance of Networked XML-driven Cooperative Applications," by S. Ghandeharizadeh, C. Papadopoulos, M. Cai, K. K. Chintalapudi. In Proceedings of Second International Workshop on Cooperative Internet Computing (CIC, held in conjunction with VLDB), August 2002.

51. "A Comparison of Application-level and Router-Assisted Hierarchical Schemes for Reliable Multicast," by Pavlin Radoslavov, Christos Papadopoulos, Ramesh Govindan, and Deborah Estrin. Proceedings of IEEE Infocom 2001, Anchorage, Alaska, April 2001.

52. "Incremental Deployment of a Router-assisted Reliable Multicast Scheme," by Christos Papadopoulos and Emanouil Laliotis, Proc. of Networked Group Communications (NGC2000), Stanford University, Palo Alto, CA. November 2000.

53. "An Error Control Scheme for Large-scale Multicast Applications," by Christos Papadopoulos, Guru Parulkar and George Varghese, IEEE Infocom '98, March 1998. Also appeared as a Brief Announcement at Proc. of Principles of Distributed Computing (PODC), June 28-July 2, 1998, Puerto Vallarta, Mexico.

54. "Retransmission-based Error Control for Continuous Media Applications," by Christos Papadopoulos and Guru Parulkar, Proc. of the Sixth International Workshop for Network and

Operating Systems Support for Digital Audio and Video, NOSSDAV '96, Zushi, Japan, April 23-26, 1996.

55. "Implosion Control in Multipoint Transport Protocols," by Christos Papadopoulos and Guru Parulkar, Tenth Annual IEEE Workshop on Computer Communications, Eastsound, Washington, September 1995.

56. "The 3M Project: Multipoint Multimedia Applications on Multiprocessor Workstations and Servers," by Guru Parulkar, Milind Buddhikot, Charles Cranor, Zubin Dittia and Christos Papadopoulos, Proc. of IEEE Workshop on High Performance Communication Systems, September 1993.

57. "Experimental Evaluation of SunOS IPC and TCP/IP Protocol Implementation," by Christos Papadopoulos and Guru Parulkar, IEEE Infocom '93, April 1993.

Non-Refereed Journal Articles/Chapters/Proceedings/Transactions:

1. Named data networking (ndn) project, by Lixia Zhang, Deborah Estrin, Jeffrey Burke, Van Jacobson, James D Thornton, Diana K Smetters, Beichuan Zhang, Gene Tsudik, Dan Massey, Christos Papadopoulos, Tarek Abdelzaher, Lan Wang, Patrick Crowley, Edmund Yeh. Relatório Técnico NDN-0001, Xerox Palo Alto Research Center-PARC, Oct 2010.

2. Genevieve Bartlett, John Heidemann, and Christos Papadopoulos. Using Low-Rate Flow Periodicities for Anomaly Detection: Extended. Technical Report ISI-TR-2009-661, USC/Information Sciences Institute, August, 2009.

3. Diel N., Gadkari K., Steiner A., DiBenedetto S., Papadopoulos C., "Characterizing TCP Resets in Established Connections". Colorado State University Technical Report, CS-08-102.

4. John Heidemann, Yuri Pradkin, Ramesh Govindan, Christos Papadopoulos, Genevieve Bartlett, and Joseph Bannister. Census and Survey of the Visible Internet (extended). Technical Report ISI-TR-2008-649b, USC/Information Sciences Institute, February 2008. Updated August 2008.

5. "Exploring Visible Internet Hosts through Census and Survey," by John Heidemann, Yuri Pryadkin, Ramesh Govindan, Christos Papadopoulos, and Joseph Bannister. Technical Report ISI-TR-2007-640, USC/Information Sciences Institute, May, 2007.

6. Genevieve Bartlett, John Heidemann, and Christos Papadopoulos. Inherent Behaviors for On-line Detection of Peer-to-Peer File Sharing. Technical Report ISI-TR-2006-647, USC/Information Sciences Institute, December 2006.

7. "Internet Packet Size Distributions: Some Observations," by Rishi Sinha, Christos Papadopoulos, and John Heidemann. Technical Report ISI-TR-2007-643, USC/Information Sciences Institute, May, 2007. Originally released October 2005 as web page: http://netweb.usc.edu/ rsinha/pkt-sizes/.

8. Xinming He, Christos Papadopoulos, John Heidemann, Urbashi Mitra, Usman Riaz, and Alefiya Hussain. Spectral Analysis of Bottleneck Traffic. Technical Report USC-CSD-TR-05-854, University of Southern California Computer Science Department, May, 2005.

9. Rishi Sinha, Christos Papadopoulos, and John Heidemann. Fingerprinting Internet Paths using Packet Pair Dispersion. Technical Report 06-876, University of Southern California Computer Science Department, February 2005.

10. "Spectral Characteristics of Saturated Links." Xinming He, Christos Papadopoulos, John Heidemann and Alefiya Hussain. Technical Report USC-TR-04-827, University of Southern California Computer Science Department, 2004.

11. "Identification of Repeated Attacks Using Network Traffic Forensics." Alefiya Hussain, John Heidemann and Christos Papadopoulos. Technical Report, ISI-TR-2003-577b, USC/Information Sciences Institute, 2003.

12. "A Framework for Classifying Denial of Service Attacks - Extended version," by Alefiya Hussain, John Heidemann, and Christos Papadopoulos. Technical Report, ISI-TR-2003-569b, USC/Information Sciences Institute, June, 2003.

CONTRACTS & GRANTS

Pending

1. (2017-19) CC* Integration: SciNet: A Secure Science Data Infrastructure with Named Data Networking. PIs: Christos Papadopoulos, Lixia Zhang and David Randall. Total requested award: $1M.

2. (2017-27) DHS Center of Excellence on Quantitative Data Analysis. Christos Papadopoulos, director. Total requested award: $40M. http://www.grants.gov/web/grants/view-opportunity.html?oppId=286805

Awarded

1. (2015-18) CSU PI: Christos Papadopoulos. "Netbrane: A Software-Defined DDoS Protection Platform for Internet Services." Funding Agency: Department of Homeland Security. Total award: $2.7M.

2. (2015) Cablelabs gift award, $50K.

3. (2014-16) CSU PI: Christos Papadopoulos. "Australian WIT, Phase 2: Monitoring Australian Critical Infrastructure." $163K, Funding Agency: Department of Homeland Security.

4. (2014-2016) CSU PI: Christos Papadopoulos. "FIA-NP: Collaborative Research: Named Data Networking Next Phase (NDN-NP)". Funding agency: NSF. Total award: $300K.

5. (2013-16) CSU PI: Christos Papadopoulos. Co-PIs: Cathie Olschanowsky and David Randall. " CC-NIE Integration: Supporting Climate Modeling Over Named Data Networking (NDN)". Funding agency: NSF. Total award: $1M.

6. (2013-16) CSU PI: Christos Papadopoulos. Co-PI: Dan Massey. Collaborative Research: CI-ADDO-EN: Making Internet Routing Data Accessible To All. Funding agency: NSF. Total award: $599,684.00. CSU portion: $436K.

7. (2012-17) Joint ISI/CSU award. CSU PI: Christos Papadopoulos. ISI PI: John Heidemann. "Los Angeles/Colorado Research Exchange for Network Data (LACREND)." Total grant award: $3M. Colorado sub-award: $475K. Funding Agency Department of Homeland Security. September 2012 – September 2017.

8. (2012-15) CSU PI: Christos Papadopoulos. CSU co-PI: Dan Massey. ISI PI: John Heidemann. LANL PI: Mike Fisk. "The Retrospective Future in the Internet (Retro-Future)." Joint ISI/CSU/LANL award. Total grant award: $3M. Colorado sub-award: $733K. Funding Agency: Department of Homeland Security. November 2012 – November 2016.

9. (2011-2012) CSU PI: Dan Massey. CSU co-PI: Christos Papadopoulos. "Australian WIT: Monitoring Australian Critical Infrastructure." $150K, Funding Agency: Department of Homeland Security. September 2011-September 2012.

10. (2010-2013) CSU PI: Dan Massey. CSU co-PI: Christos Papadopoulos. "Named Data Networking." Colorado State subcontract: $722K. Funding Agency: NSF. August 2010 – July 2013.

11. (2007-2012) Joint CSU/ISI award. CSU PI: Christos Papadopoulos. ISI PI: John Heidemann. "LANDER-2007: Los Angeles Network Data Exchange Repository." Total award: $3M. Colorado State subcontract: $420K. Funding Agency: HSARPA. August 2007 - July 2012.

12. (2006-9) John Heidemann, Christos Papadopoulos, Urbashi Mitra, Antonio Ortega. "Maltraffic Analysis and Detection in Challenging and Aggregate Traffic (MADCAT)." $896K. Funding Agency: NSF. October 2006 – September 2009. Colorado State subcontract: $223.7K. No cost extension through September 2010.

13. (2006-2009) Boris Rozovsky, I. Cohen (USC), A.L. Bertozzi (UCLA), C. Papadopoulos (USC), P.J. Brantingham (UCLA), A. Tartakovsky (USC), T. Chan (UCLA), V.V. Veeravalli (UIUC), H.V. Poor (Princeton). "Spatio-temporal Nonlinear Filtering with Applications to Information Assurance and Counter Terrorism." $5M. Program: Multidisciplinary Research Program of the URI (MURI). Funding Agency: Office of Naval Research. May 2006 – November 2009. Colorado State subcontract: $123K for three years (option years TBD).

14. (2006-2006) Christos Papadopoulos, John Heidemann, Urbashi Mitra, Antonio Ortega. "Spectral Analysis Techniques to Identify Security Problems in Aggregate Network Traffic." $83K. Funding Agency: Cisco. January – December 2006.

15. (2006-2008)　　　Christos Papadopoulos, "CAREER: NetSams: Network Assistance for the Internet". $363,163. Funding Agency: NSF, No-cost extension to February 2008. Transfer to Colorado State: $116.7K

16. (2004-2006) Leana Golubchik, B. Clifford Neuman, Christos Papadopoulos (co-PI), Gerard G. Medioni, and Nenad Medvidovic. "Collaborative Project: An Innovative Information Assurance and Security Technology Capacity Development and Outreach Program." $300K. Funding Agency: NSF. August 2004 – July 2006.

17. (2004-2006) John Heidemann and Christos Papadopoulos, "LANDER: Los Angeles Network Data Exchange Repository." $2.2M. Funding Agency: HSARPA. July 2004 - December 2006.

18. (2003-2005) Alexander Sawchuk, Christos Papadopoulos, Leana Golubchick, Roger Zimmerman, and Chris Kyriakakis. "Acquisition of Equipment for Distributed Immersive Performance." $400K. Funding Agency: NSF. Duration: Sept. 2003 – August 2005.

19. (2003-2003) Shahram Ghandeharizadeh, Craig Knoblock, Christos Papadopoulos and Cyrus Shahabi, "Web Services". $250K. Funding Agency: Microsoft Corporation. January - December 2003.

20. (2002-2003) John Heidemann and Christos Papadopoulos, "SAMAN-DDoS." 470K. Funding Agency: DARPA. November 2002.

21. (2000-2003) Deborah Estrin, John Heidemann, Christos Papadopoulos, and Jong-suk Ahn, "Collaborative Simulation for Education and Research (*CONSER*)", Funding agency: NSF $1.5M. May 2000 - April 2003.

22. (2004-2004) Christos Papadopoulos. Pratt and Whitney Institute for Collaborative Engineering. $17,340. Funding agency: InHa University, South Korea. June 2004 – December 2004.

23. (2002-2003) Christos Papadopoulos, "Looking for DDoS: Trace Analysis of Internet Traffic," $45K. Funding Agency: Los Alamos National Laboratory June 2002 - Jan 2003.

24. (2001-2003) Christos Papadopoulos, Ramesh Govindan and Bob Lindell, "Coordinated Suppression of Simultaneous Attacks (*COSSACK*)." Funding agency: DARPA, $1.2M. July 2001 - June 2003.

25. (2002-2007) Christos Papadopoulos, "CAREER: NetSams: Network Assistance for the Internet". $363,163. Funding Agency: NSF, March 2002 - February 2007.

26. (2000-2001) Christos Papadopoulos, "Router Assisted Internet Multicast Services (*RAIMS*)". Funding agency: Cisco, $65K. October 2000.

PAPERS PRESENTED/SYMPOSIA/INVITED LECTURES/PROFESSIONAL MEETINGS/WORKSHOPS

1. "WIT: A Watchdog for Internet Routing." DHS Showcase presentation, Feb 2016.

2. "Netbrane: A Software Defined DDoS Protection Platform for Internet Services." DHS technical workshop, February 2016.

3. "Future Internet Security and Architecture." WESTCON Beyond Security, Jan 2016.

4. "Named Data Networking: An Internet Architecture for the Future." Invited talk, ESGF meeting, Monterey CA, Dec 2015.

5. "Named Data Networking: An Internet Architecture for the Future." Invited talk, LHCOPN-LHCONE meeting, Amsterdam NL, Oct 2015.

6. "Named Data Networking: An Internet Architecture for the Future." Invited talk, University of Memphis, Oct 2015.

7. "Named Data Networking: An Internet Architecture for the Future." Keynote presentation, NSF SwitchOn Workshop, Sao Paolo, Brazil, Oct 2015.

8. "Managing Scientific Data with Named Data Networking." NSF PI meeting, Austin TX, Sept 2015

9. "Beyond the Firewall: Observing Global Internet Dynamics." FORTH, Crete, Sept 2015.

10. "Netbrane: A software Defined DDoS Protection Platform for Internet Services." DHS kick-off meeting, Fort Collins, CO, Aug 2015.

11. "A Catalog for Scientific Data." CERN, Switzerland, July 2015.

12. "WIT-II: A Watchdog for Internet Routing." DHS PI meeting, San Diego, CA, June 2015.

13. "WIT-II and BGPmon." Presentation to the Australian Government (DSTO), Australia, April 2015.

14. "Named Data Networking in Climate Science and HEP Applications." CHEP 2015, Okinawa, Japan, April 2015.

15. "BGPMon: The next Generation" AIMS workshop, San Diego CA, April 2015.

16. "Internet Security: Life beyond my Firewall". WESTCON security event, Park City, UT, Feb 2015.

17. "Named Data Networking' NSF SwitchOn workshop, Florida, Jan 2015.

18. "Supporting Climate applications with NDN." Invited presentation, CMMAP retreat, Jan 2014.

19. "Supporting Climate applications with NDN." Invited presentation, The Third International Workshop on Network-Aware Data Management, SC 2013, Nov 2013.

20. "Supporting Climate applications with NDN." Invited presentation, Project retreat, San Diego CA, Nov 2013.

21. "A Fresh Look at Scalable Forwarding Through Router FIB Caching." NANOG 57, Orlando FL, Feb 2013.

22. "Content Auditing in ICN." CCW, Nov 2012, Sedona, AZ.

23. "Scaling and Security in NDN." Invited panel presentation. ICCCN 2012, Munich, Germany, July 2012.

24. "What is Measured Can be Improved: Adventures in Internet Measurements", invited keynote speech, AICCSA 2011, Dec 2011.

25. "A Taxonomy of Capabilities Based DDoS Defense Architectures", AICCSA 2011, Dec 2011.

26. "Challenges in Large Data Capture and Research", Dartmouth workshop on traffic generators, Nov 2010.

27. "Named Data Networking", CCW Oct 2010.

28. "Lander-CSU Project", PerfSonar, July 2010.

29. "Census and Survey of the Visible Internet." University of Cyprus, December 2009.

30. "Lander Progress Report." FRGP Engineers, July 2009.

31. "Towards Best Practices for Active Network Measurements." AIMS 2009, San Diego CA, February 2009.

32. "Coffee with CSU." IsTec IAB meeting, Boulder CO, November 2008.

33. "Spectral Approaches to DDoS Attacks." MURI PI Meeting, Brown University, September 2008.

34. "Census and Survey of the Visible Internet." *Invited presentation*. FORTH-ICS, Crete, May 2007.

35. "Spectral Approaches to DDoS Attacks." MURI PI Meeting, Brown University, November 2006.

36. "Fingerprinting Internet Paths Using Packet-Pair Dispersion." *Invited presentation*. University of Toronto, March 2006.

37. "Fingerprinting Internet Paths Using Packet-Pair Dispersion." *Invited presentation*. Colorado State University, February 2006.

38. "Defending Against DDoS Attacks." *Invited presentation*. Colorado State University, November 2005.

39. "Investigating Spectral Analysis for Network Traffic." *Invited presentation*. Intel Research, London England. September 2005.

40. "Cossack: Coordinated Suppression of Simultaneous Attacks, and ANT: Analysis of Network Traffic." *Invited presentation*. Georgia Tech, GA. August 2004.

41. "Cossack: Coordinated Suppression of Simultaneous Attacks, and ANT: Analysis of Network Traffic." *Invited presentation*. Massachusetts Institute of Technology, MA. August 2004.

42. "Cossack: Coordinated Suppression of Simultaneous Attacks, and ANT: Analysis of Network Traffic." *Invited presentation*. Columbia University, NY. July 2004.

43. "Cossack: Coordinated Suppression of Simultaneous Attacks, and ANT: Analysis of Network Traffic." *Invited presentation*. University of Virginia, VA. July 2004.

44. "Spectral Techniques for Internet Traffic." *Invited presentation*. Data Catalog Workshop, CAIDA, San Diego, CA. June 2004.

45. "Spectral Techniques for Analyzing Internet Traffic." *Invited presentation*. ICSI Center for Internet Research, Berkeley, CA. March 2004.

46. "Spectral Analysis: New Techniques for Characterizing Internet Traffic." *Invited presentation*. NSF, Arlington VA. February 2004.

47. "Characterizing DDoS Attacks." *Invited presentation*. Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, NC. October 2003.

48. "Cossack: Coordinated Suppression of Simultaneous Attacks." *Invited presentation*. CERT, Carnegie Melon University, Pittsburgh, PA. August 2002.

49. "Distributed Immersive performance." *Invited presentation*. The 2nd International Workshop on Information Technology, Nicosia, Cyprus. May 2002.

50. "Networking Issues in MIE." IMSC Annual NSF Site visit. USC. June 2001.

51. "Cossack: Coordinated Suppression of Simultaneous Attacks." *Invited presentation*. Los Alamos National Laboratories. March 2002.

52. "Networking Issues in MIE." IMSC Annual NSF Site visit. USC. June 2000.

53. "RAIMS: an Architecture for Router-assisted Internet Multicast Services." *Invited presentation*. ETH, Zurich, Switzerland. October 2000.

54. "LMS Performance and Applications." Fifth Reliable Multicast Research Group meeting, Arlington VA. December 3-4 1998.

55. "Performance Comparison of LMS and PGM using NS." Fourth Reliable Multicast Research Group meeting, London UK. July 6-7 1998.

56. "An Error Control Scheme for Large-scale Multicast Applications." IEEE Infocom '98, San Francisco, CA. March 1998.

57. "Comparison of LMS, AIM and PGM," Third Reliable Multicast Research Group meeting, Orlando, FL. February 1998.

58. "An Error Control Scheme for Large-scale Multicast Applications." Second Reliable Multicast Research Group meeting, Cannes France. September 1997.

59. "Experimental Evaluation of SunOS IPC and TCP/IP Protocol Implementation." IEEE Infocom '93, San Francisco, CA. April 1993.

OTHER ACTIVITIES/ACCOMPLISHMENTS – PUBLICATIONS/SCHOLARLY RECORD

2008-9: Helped organize the annual security exercise (CANVAS) that includes students are Colorado State University, US Air Force Academy, Denver University and other Colorado universities.

Involved in an ongoing effort to publish network traces through the DHS-funded program PREDICT, to benefit the community of security resesearchers.

CV SECTION 3: EVIDENCE OF TEACHING AND ADVISING EFFECTIVENESS

TEACHING:

Year	Semester	Course No/Title	Cr. Hours	Enrollment
2006	Fall	CS457 - Computers/Internet	4	33
2007	Spring	CS680 - Adv Networking	4	9
2007	Fall	CS370 - Operating Systems	4	42
2008	Spring	CS680 - Adv Networking	4	4
2008	Fall	CS457- Computers/Internet	4	14
2009	Fall	CS657 - Adv Networking	4	3
2010	Spring	CS557 - Computer Networks	4	14
2010	Fall	CS457 - Computers/Internet	4	30
2011	Spring	CS451 - Operating Systems	4	47
2011	Fall	CS657 - Advanced Topics	4	3
2012	Spring	CS657 - Computer Networks	4	3
2012	Fall	CS457 - Computers/Internet	4	29
2013	Spring	CS370 - Operating Systems	4	66
2013	Fall	CS457 – Computer Networks	4	42
2014	Spring	CS557 - Adv Networking	4	14
2015	Spring	CS557 - Adv Networking	4	17
2016	Spring	CS557 – Adv Networking	4	10

Development of New Courses

CS680, Spring 2007. This is a seminar course with emphasis on systems security, where students created their own network with Cisco routers and real services (mail, DNS, web, SSH, ftp) and staged attacks and defenses.

STUDENT ADVISING/GRADUATE SUPERVISION

UNDERGRADUATE STUDENTS

Nick Diel (graduated)

David Kapp (graduated)

Kathrine Shubert (graduated)

Andrea Steiner

Tyler Scott (graduated)

GRADUATE STUDENTS

Current Graduate Advisees:

Han Zhang (PhD) (estimated graduation Jan 2017, accepted offer at SalesForce)

Anant Shah (PhD) (estimated graduation Fall 2017)

Susmit Shannigrahi (PhD) (estimated graduation Fall 2017)

Chengyu Fan (PhD) (estimated graduation Spring 2016)

Manaf Gharaibeh (PhD) (estimated graduation Fall 2017)

Dan Rammer (PhD) (estimated graduation Fall 2018)

Kaustubh Gadkari (PhD) (on hold)

Current Graduate Committee Membership:

8, Plan A

Graduate Committee memberships (for the past 5 years)

11 PhD

Graduate Degrees Completed Under My Supervision

Steve DiBenedetto (MS) now at Google

Vamsi Kambhampati, 2012 PhD (advisor)

He Yan, 2012 PhD (co-advisor)

Mengran Hu, MS 2010 (advisor)

Genevieve Bartlett, 2010 PhD (co-advisor) (USC student)

Rishi Sinha 2006, PhD (advisor) (USC student)

Xinming He, 2006 PhD (co-advisor) (USC student)

Alefiya Hussain, 2005, PhD (co-advisor) (USC student)

Adnan Mahmud, 2004, MS (advisor) (USC student)

Emmanuil Laliotis, 2000, MS (advisor) (USC student)

Descriptions of Mentoring Activities

Helped develop the NetSec Lab, with Prof. Massey. Supervised several undergraduates and one graduate student in network administration, web page development, machine configuration, etc.

CV SECTION 4: Evidence of Outreach/Service

INTERNAL COMMITTEES

Faculty Council, CNS At-Large Representative, July 1 2013 – June 30 2016

Department Graduate Admissions Committee, 2012, 2013

Department Graduate Program committee, 2011

Department Operations Committee, 2010

Coffee with CSU, Coordinator, IsTec, 2008-11

Department Undergraduate Committee, 2008-9

Department Graduate Admissions Committee, 2007

Department Research Committee, 2006

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Professional Memberships: ACM, IEEE.

TPC Co-chair, Networking, 2016

TPC Co-chair, ICCCN, NACSD track, 2013

TPC Co-chair, Global Internet, 2008.

Chair, Computer Communications Workshop, Fall 2008.

Treasurer, Sigcomm 2005.

Student Travel Awards committee member, Sigcomm 2004.

TPC Co-chair, NOSSDAV 2003.

Panel Chair, ACM OpenSig 2002, Lexington, KY. Theme: "Extensible Networks."

Chair, Student Travel Awards, Sigcomm 2001.

Program Committee member, Cyber & Information Security Research Conference (Oak ridge National Labs) 2017

Program Committee member, INFOCOM 2017.

Program Committee member, International Teletraffic Congress (ITC) 29 Area 2, 2017

Program Committee member, ACM WISCS 2014

Program Committee member, ACM ICN, 2014, 2015, 2016, 2017

Program Committee member, Networking 2010-16

Program Committee member, ICN Workshop, 2013

Program Committee member, ICN Workshop, 2013

Program Committee member, ICCCN, 2012

Program Committee member, Global Internet 2010-13

Program Committee member, IMC 2009

Program Committee member, Sigcomm 2009

Program Committee member, Global Internet, 2007.

Program Committee member, Sigcomm 2007.

Program Committee member, Networking 2006.

Program Committee member, Infocom 2006.

Program Committee member, Comsware 2006.

Program Committee member, Networking 2005.

Program Committee member, Sigcomm 2004.

Program Committee member, Infocom 2004.

Program Committee member, NGC 2003.

Program Committee member, Infocom 2003.

Program Committee member, NGC 2002.

Program Committee member, NOSSDAV 2002.

Grant Proposal Reviewer: National Science Foundation. External reviewing and panel reviews. 2000 – present.

Conference and Journal Reviewer: Transactions on Computers, IEEE/ACM Transactions on Networking, Computer networks, ACM Sigcomm, ACM Sigmetrics, IEEE Infocom, ICDCS, ICMCS, IZS, SPIE/ACM MMCN, NOSSDAV, IEEE RTTAS, HIPPARCH, LCN, IEEE Magazine, and more.

OTHER ACTIVITIES/ACCOMPLISHMENTS – SERVICE/OUTREACH

Member of the Internet 2 CEO search committee 2017 (https://www.internet2.edu/news/detail/12842/)

h-index (as of Dec 2016): 25

Paper Citations (papers with over 100 citations as of Oct 2015, source: Google Scholar)

- A Framework for Classifying Denial of Service Attacks (2003): 543 citations.
- An Error Control Scheme for Large-Scale Multicast Applications (1998): 300 citations.
- Retransmission-Based Error Control for Continuous Media Applications (1996): 163 citations.
- Named data networking (ndn) project (2010): 401 citations
- Eliminating steganography in Internet traffic with active wardens (2003) 183 citations
- Cossack: Coordinated suppression of simultaneous attacks (2003) 166 citations
- Internet packet size distributions: Some observations (2007) 123 citations

Contributed Software

- LMS simulation software: contributed software module to ns. Available at http://www.isi.edu/ns/
- PGM simulation software: contributed software module to ns. Available at http://www.isi.edu/ns/
- Cossack: Coordinated Suppression of Simultaneous Attacks. Available at http://www.isi.edu/cossack
- With Dan Massey: BGPmon: software to monitor BGP activity in the Internet bgpmon.netsec.colostate.edu
- With John Heidemann: The ANT project www.isi.edu/ant

External Evaluations

The Cossack software was selected to undergo Red Team Evaluation at a DARPA testing facility in Arlington, VA. Oct 2002 – April 2003. DARPA selects only a handful of projects from each program for Red Team evaluation.