

ETHAN KATZ-BASSETT
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Research Interests

networking: Internet reliability and performance, Internet-scale distributed systems, Internet measurement, routing, content delivery, system design and deployment

I design systems to improve the reliability and performance of Internet services. To understand the problems, I look to the needs of operators and providers, and I conduct measurements. Based on what I learn, I design deployable systems to improve the Internet and services that run over it.

Education

Ph.D., Computer Science and Engineering, University of Washington, Seattle, WA (March 2012)

Advisors: Tom Anderson and Arvind Krishnamurthy

Dissertation: *Systems for Improving Internet Availability and Performance*

Won the department's 2012 William Chan Memorial Dissertation Award

B.A., Computer Science & Mathematics, Williams College, Williamstown, MA (June 2001)

Magna Cum Laude

Employment

Associate Professor [tenure track but without tenure] (2017-current)

Department of Electrical Engineering, Columbia University, New York, NY.

Associate Professor [with tenure] (2018)

Andrew and Erna Viterbi Early Career Chair (2016-2017)

Assistant Professor (2012-2018)

Computer Science Department, University of Southern California, Los Angeles, CA.

Software Engineer (2011-2012)

Mobile performance, Google Inc., Seattle, WA.

Honors and Awards

- Best of SIGCOMM CCR, *Towards a Methodology for Measuring Adoption of RPKI*, 2018
- Andrew and Erna Viterbi Early Career Chair, 2016
- Facebook Faculty Award, 2016, 2017
- Google Faculty Research Award, 2013, 2014, 2015, 2016
- Applied Networking Research Prize, IRTF/IETF, *TCP Gentle Aggression*, 2014
- NSF CAREER Award, *Routing for the Emerging Topologies of Modern Internet Services*, 2014
- William Chan Memorial Dissertation Award, 2012
- Best Paper Award, *Reverse Traceroute*, NSDI 2010
- Best Paper Award, *Consensus Routing*, NSDI 2008
- Highest Rated Paper, *Hubble*, NSDI 2008

Honors and Awards Received by My Students

- Facebook Fellowship Finalist (top 40 of 800), Yi-Ching Chiu, 2017
- Facebook Fellow in Networking & Operating Systems, Brandon Schlinker, 2016

- Honorable Mention, CRA Outstanding Undergraduate Researcher Award, Colin Scott, 2011
- CRA Outstanding Female Undergraduate Researcher Award, Justine Sherry, 2010

Refereed Conference Publications

Note: The SIGCOMM and NSDI conferences are the leading venues (considering both conferences and journals) for publishing research on computer networks, with acceptance rates of 14%-20%. OSDI and SOSP play the same role for systems research. HotNets is the leading workshop for hot topics and new or controversial ideas across computer networks, with acceptance rates of 20%-22%. IMC is the leading venue focused specifically on Internet measurement, with acceptance rates of 22%-26%, while PAM is the next best venue on Internet measurement, with shorter papers and higher acceptance rates than IMC. Given my research areas, these conferences and workshops, rather than any journals, are the best places for me to publish my work, in terms of both prestige and dissemination. In computer networks, student authors are typically listed first in descending order of contribution. However, there are not consistent conventions for the order of faculty authors: sometimes they are alphabetical, sometimes they are in decreasing order of significance, and sometimes the last author was the leading faculty member. I underlined the senior author(s) of each publication. I put a * next to the names of students who I advise and italicized the names of students who conducted the project initiated and mentored by me while in one of my classes or while a visitor to my group. Citation counts from Google Scholar as of 6/1/2018.

2018

1. **Oboe: Auto-tuning Video ABR Algorithms to Network Conditions.**
Z. Akhtar, Y. Nam, R. Govindan, S. Rao, J. Chen, **E. Katz-Bassett**, B. Ribeiro, J. Zhan, H. Zhang.
SIGCOMM 2018 (ACM Special Interest Group on Data Communication), (14% acceptance rate, 21.05 impact factor in 2010).
2. **Odin: Microsoft's Scalable Fault-Tolerant CDN Measurement System.**
M. Calder*, R. Gao, M. Schroder, R. Stewart, J. Padhye, R. Mahajan, G. Ananthanarayanan, E. **Katz-Bassett**.
NSDI 2018 (USENIX Symposium on Networked Systems Design & Implementation), (16% acceptance rate, 11.85 impact factor in 2010).
3. **Towards a Rigorous Methodology for Measuring Adoption of RPKI Route Validation and Filtering.**
A. Reuter, R. Bush, I. Cunha, **E. Katz-Bassett**, T. Schmidt, M. Wahlisch.
SIGCOMM Computer Communications Review (CCR).
Awarded Best of SIGCOMM CCR.

2017

4. **Engineering Egress with Edge Fabric: Steering Oceans of Content to the World.**
(12 citations)
B. Schlinder*, H. Kim, T. Cui, **E. Katz-Bassett**, H. Madhyastha, I. Cunha, J. Quinn, S. Hasan, P. Lapukhov, H. Zeng.
SIGCOMM 2017 (ACM Special Interest Group on Data Communication), (14% acceptance rate, 21.05 impact factor in 2010).
5. **The Record Route Option is an Option!**
*B. Goodchild**, Y. Chiu*, H. Lu, *R. Hansen*, M. Calder*, D. Choffnes, W. Lloyd, M. Luckie, **E. Katz-Bassett**.
IMC 2017 (Internet Measurement Conference), (23% acceptance rate).

2016

6. **An Internet-Wide Analysis of Traffic Policing.** (20 citations, plus 1 for tech report)
T. Flach*, P. Papageorge, A. Terzis, L. Pedrosa, Y. Cheng, T. Karim, **E. Katz-Bassett**,
R. Govindan.
SIGCOMM 2016 (ACM Special Interest Group on Data Communication), (17% acceptance rate,
21.05 impact factor in 2010).
7. **Sibyl: A Practical Internet Route Oracle.** (12 citations, plus 2 for preliminary version)
I. Cunha, *P. Marchetta*, M. Calder*, Y. Chiu*, B. Schlinker*, B. Machado, A. Pescapè,
V. Giotsas, H. Madhyastha, **E. Katz-Bassett**.
NSDI 2016 (USENIX Symposium on Networked Systems Design & Implementation), (20%
acceptance rate, 11.85 impact factor in 2010).
8. **Modeling HTTP/2 Speed from HTTP/1 Traces.** (14 citations)
K. Zarifis*, M. Holland, M. Jain, **E. Katz-Bassett**, R. Govindan.
PAM 2016 (Passive and Active Measurements Conference), (32% acceptance rate).

2015

9. **Condor: Better Topologies Through Declarative Design.** (13 citations)
B. Schlinker*, R. N. Mysore, S. Smith, J. C. Mogul, A. Vahdat, M. Yu, **E. Katz-Bassett**,
M. Rubin.
SIGCOMM 2015 (ACM Special Interest Group on Data Communication), (16% acceptance rate,
21.05 impact factor in 2010).
10. **Are We One Hop Away from a Better Internet?** (29 citations)
*Y. Chiu**, B. Schlinker*, A. B. Radhakrishnan*, **E. Katz-Bassett**, R. Govindan.
IMC 2015 (Internet Measurement Conference), (26% acceptance rate).
11. **Analyzing the Performance of an Anycast CDN.** (44 citations)
M. Calder*, A. Flavel, **E. Katz-Bassett**, R. Mahajan, J. Padhye.
IMC 2015 (Internet Measurement Conference), (26% acceptance rate).
12. **Investigating Interdomain Routing Policies in the Wild.** (21 citations)
R. Anwar, H. Niaz, D. Choffnes, I. Cunha, P. Gill, **E. Katz-Bassett**.
IMC 2015 (Internet Measurement Conference), (26% acceptance rate).
13. **Investigating Transparent Web Proxies in Cellular Networks.** (52 citations + 1 for poster)
X. Xu, *Y. Jiang*, *T. Flach**, **E. Katz-Bassett**, D. Choffnes, R. Govindan.
PAM 2015 (Passive and Active Measurements Conference), (27% acceptance rate).

2014

14. **SDX: A Software Defined Internet Exchange.** (239 citations)
A. Gupta, L. Vanbever, M. Shahbaz, S. P. Donovan, B. Schlinker*, N. Feamster, J. Rexford,
S. Shenker, R. Clark, **E. Katz-Bassett**.
SIGCOMM 2014 (ACM Special Interest Group on Data Communication), (19% acceptance rate,
21.05 impact factor in 2010).
15. **DIBS: Just-in-time Congestion Mitigation for Data Centers.** (16 citations + 3 for poster)
K. Zarifis*, R. Miao, M. Calder*, **E. Katz-Bassett**, M. Yu, J. Padhye.
EuroSys 2014 (European Conference on Computer Systems), (18% acceptance rate).
16. **Diagnosing Path Inflation of Mobile Client Traffic.** (33 citations)
*K. Zarifis**, *T. Flach**, *S. Nori*, D. Choffnes, R. Govindan, **E. Katz-Bassett**, Z. M. Mao,
M. Welsh.
PAM 2014 (Passive and Active Measurements Conference), (32% acceptance rate).
17. **Peering at the Internet's Frontier: A First Look at ISP Interconnectivity in Africa.**
(60 citations)
A. Gupta, M. Calder*, N. Feamster, M. Chetty, E. Calandro, **E. Katz-Bassett**.
PAM 2014 (Passive and Active Measurements Conference), (32% acceptance rate).

18. **The Need for End-to-End Evaluation of Cloud Availability.** (17 citations)
Z. Hu, L. Zhu, C. Ardi, **E. Katz-Bassett**, H. Madhyastha, J. Heidemann, M. Yu.
PAM 2014 (Passive and Active Measurements Conference), (32% acceptance rate).
19. **Mobile Network Performance from User Devices: A Longitudinal, Multidimensional Analysis.** (52 citations)
A. Nikraves, D. Choffnes, **E. Katz-Bassett**, Z. M. Mao, M. Welsh.
PAM 2014 (Passive and Active Measurements Conference), (32% acceptance rate).
20. **Dissecting Round Trip Time on the Slow Path Using a One-Packet Approach.** (19 citations)
P. Marchetta, A. Botta, **E. Katz-Bassett**, A. Pescapé.
PAM 2014 (Passive and Active Measurements Conference), (32% acceptance rate).

2013

21. **Reducing Web Latency: the Virtue of Gentle Aggression.** (143 citations)
T. Flach*, N. Dukkupati, A. Terzis, B. Raghavan, N. Cardwell, Y. Cheng, A. Jain, S. Hao,
E. Katz-Bassett, R. Govindan.
SIGCOMM 2013 (ACM Special Interest Group on Data Communication), (16% acceptance rate,
21.05 impact factor in 2010).
Awarded Applied Networking Research Prize, IRTF/IETF, 2014.
22. **PoiRoot: Investigating the Root Cause of Interdomain Path Changes.** (47 citations)
U. Javed, I. Cunha, D. R. Choffnes, **E. Katz-Bassett**, A. Krishnamurthy, T. Anderson.
SIGCOMM 2013 (ACM Special Interest Group on Data Communication), (16% acceptance rate,
21.05 impact factor in 2010).
23. **SPANStore: Cost-Effective Geo-Replicated Storage Spanning Multiple Cloud Services.**
(144 citations + 3 for short version)
Z. Wu, M. Butkiewicz, D. Perkins, **E. Katz-Bassett**, H. Madhyastha.
SOSP 2013 (ACM Symposium on Operating Systems Principles), (19% acceptance rate, 18.91
impact factor in 2010).
24. **Mapping the Expansion of Google's Serving Infrastructure.** (129 citations)
*M. Calder**, *X. Fan*, Z. Hu, R. Govindan, J. Heidemann, **E. Katz-Bassett**.
IMC 2013 (ACM Internet Measurement Conference), (24% acceptance rate).

2012

25. **LIFEGUARD: Practical Repair of Persistent Route Failures.** (69 citations)
E. Katz-Bassett, C. Scott*, D. R. Choffnes, *I. Cunha*, V. Valancius, N. Feamster,
H. V. Madhyastha, T. Anderson, A. Krishnamurthy.
SIGCOMM 2012 (ACM Special Interest Group on Data Communication), (14% acceptance rate,
21.05 impact factor in 2010).
26. **Quantifying Violations of Destination-based Forwarding on the Internet.** (25 citations)
T. Flach*, **E. Katz-Bassett**, R. Govindan.
IMC 2012 (ACM Internet Measurement Conference), (25% acceptance rate).

Published before joining USC

27. **Reverse Traceroute.** (144 citations)
E. Katz-Bassett, H. V. Madhyastha, V. K. Adhikari, C. Scott*, J. Sherry*, *P. van Wesep*,
T. Anderson, A. Krishnamurthy.
NSDI 2010 (USENIX Symposium on Networked Systems Design & Implementation), (17%
acceptance rate, 11.85 impact factor in 2010).
Awarded Best Paper.
28. **Resolving IP Aliases with Prespecified Timestamps.** (39 citations)
J. Sherry*, **E. Katz-Bassett**, M. Pimenova*, H. V. Madhyastha, T. Anderson, A. Krishnamurthy.
IMC 2010 (ACM Internet Measurement Conference), (22% acceptance rate).

29. **iPlane Nano: Path Prediction for Peer-to-Peer Applications.** (116 citations)
H. V. Madhyastha, **E. Katz-Bassett**, T. Anderson, A. Krishnamurthy, A. Venkataramani.
 NSDI 2009 (USENIX Symposium on Networked Systems Design & Implementation), (20% acceptance rate, 11.85 impact factor in 2010).
30. **Studying Black Holes in the Internet with Hubble.** (146 citations)
E. Katz-Bassett, H. V. Madhyastha, J. P. John, A. Krishnamurthy, D. Wetherall, T. Anderson.
 NSDI 2008 (USENIX Symposium on Networked Systems Design & Implementation), (18% acceptance rate, 11.85 impact factor in 2010).
Highest Rated Paper in Conference, based on anonymized average ratings from conference reviews.
31. **Consensus Routing: The Internet as a Distributed System.** (156 citations)
 J. P. John, **E. Katz-Bassett**, A. Krishnamurthy, T. Anderson, A. Venkataramani.
 NSDI 2008 (USENIX Symposium on Networked Systems Design & Implementation), (18% acceptance rate, 11.85 impact factor in 2010).
Awarded Best Paper.
32. **Towards IP Geolocation using Delay and Topology Measurements.** (314 citations)
E. Katz-Bassett, J. P. John, A. Krishnamurthy, D. Wetherall, T. Anderson, Y. Chawathe.
 IMC 2006 (ACM Internet Measurement Conference), (22% acceptance rate).

Refereed Workshop / Short Publications and Presentations

2016

33. **BingeOn Under the Microscope: Understanding T-Mobile's Zero-Rating Implementation.** (15 citations)
 A. M. Kakhki, F. Li, D. Choffnes, A. Mislove, **E. Katz-Bassett**.
 ACM SIGCOMM Workshop on Internet Quality of Experience, (48% acceptance rate).
34. **DBit: Assessing Statistically Significant Differences in CDN Performance.** (4 citations)
Z. Akhtar, A. Hussain, **E. Katz-Bassett**, R. Govindan.
 TMA 2016 (Workshop on Traffic Monitoring and Analysis), (34% acceptance rate).

2015

35. **Assessing Affinity Between Users and CDN Sites.** (16 citations)
X. Fan, **E. Katz-Bassett**, J. Heidemann.
 TMA 2015 (Workshop on Traffic Monitoring and Analysis), (30% acceptance rate).

2014

36. **PEERING: An AS for Us.** (27 citations)
B. Schlinker*, K. Zarifis*, I. Cunha, N. Feamster, **E. Katz-Bassett**.
 HotNets 2014 (ACM Workshop on Hot Topics in Networks), (22% acceptance rate).
37. **Flexible Internet Routing for Cloud Tenants and Cloud Researchers.**
E. Katz-Bassett, B. Schlinker*.
 NSFCloud Workshop on Experimental Support for Cloud Computing, 2014.
38. **Impactful Routing Research with the PEERING Testbed.**
E. Katz-Bassett.
 NANOG 61 Lightning Talk, 2014 (North American Network Operators Group Conference).
39. **Try Before you Buy: SDN Emulation with (Real) Interdomain Routing.** (12 citations)
B. Schlinker*, K. Zarifis*, I. Cunha, N. Feamster, **E. Katz-Bassett**, M. Yu.
 ONS 2014 (Open Networking Summit).

2013

40. **Don't Trust Traceroute (Completely).** (22 citations)
P. Marchetta, V. Persico, **E. Katz-Bassett**, A. Pescape.
CoNEXT Student Workshop 2013 (ACM Conference on emerging Networking EXperiments and Technologies Student Workshop).
Awarded Best Paper.
41. **Towards Impactful Routing Research: Running Your Own (Emulated) AS on the (Real) Internet.**
B. Schlinker*, K. Zarifis*, I. Cunha, N. Feamster, **E. Katz-Bassett**, M. Yu.
CoNEXT Student Workshop 2013 (ACM Conference on emerging Networking EXperiments and Technologies Student Workshop).
42. **Diagnosing Slow Web Page Access at the Client Side.** (3 citations)
T. Flach*, **E. Katz-Bassett**, R. Govindan.
CoNEXT Student Workshop 2013 (ACM Conference on emerging Networking EXperiments and Technologies Student Workshop).

Published before joining USC

43. **Machiavellian Routing: Improving Internet Availability with BGP Poisoning.** (6 citations)
E. Katz-Bassett, D. R. Choffnes, *I. Cunha*, C. Scott*, T. Anderson, A. Krishnamurthy.
HotNets 2011 (ACM Workshop on Hot Topics in Networks), (20% acceptance rate).
44. **Measuring the Internet by Coordinating Distributed Vantage Points (extended abstract).**
E. Katz-Bassett.
SIGMETRICS 2009 Student Thesis Panel.
45. **Reverse Traceroute.**
E. Katz-Bassett.
RIPE 58, 2009 (Réseaux IP Européens Network Operator Conference).
46. **Practical Reverse Traceroute.** (7 citations)
E. Katz-Bassett.
NANOG 45, 2009 (North American Network Operators Group Conference).
47. **Real-time Blackhole Analysis with Hubble.**
E. Katz-Bassett.
NANOG 40, 2007 (North American Network Operators Group Conference).

Refereed Journal Publications

48. **Helping Conference Attendees Better Understand Research Presentations.** (2 citation)
E. Katz-Bassett, J. Sherry, T.-Y. Huang, M. Kazandjieva, C. Partridge, F. Dogar.
CACM 2016 (Communications of the ACM).
49. **Increasing Patient Safety and Efficiency in Transfusion Medicine Using Process Formalization.** (59 citations)
E. A. Henneman, R. Cobleigh, K. Frederick, **E. Katz-Bassett**, G. S. Avrunin, L. A. Clarke, L. J. Osterweil, C. Andrzejewski Jr., K. Merrigan, P. L. Henneman.
Transfusion Medicine Reviews, 21(1):49-57. January 2007.

Invited Presentations

- **Teaching Old Protocols New Tricks:
A Measurement-Driven Approach to Improving the Internet.**
University of Pennsylvania, 2018
Pomona College, 2017.
Northwestern University, 2016.
University of California, Berkeley, 2016.
Cornell University, 2016.
Columbia University, 2016.
University of Utah, 2016.
Rutgers University, 2016.
Microsoft Research, Redmond, 2016.
Microsoft Research, NYC, 2016.
- **Towards Impactful Internet Measurement.**
Keynote, IRTF & ISOC Workshop on Research and Applications of Internet Measurements (RAIM), 2015.
- **PEERING: An AS for Us.**
National Institute of Standards and Technology, 2015.
University of Washington, 2014.
- **Sibyl: A Practical Internet Route Oracle.**
Microsoft Research, 2015.
Princeton University, 2015.
- **Making the Internet Fast.**
University of California, Riverside, 2014.
University of California, San Diego, 2014.
- **How I Will Measure Routes in 2014.**
Workshop on Critical Internet Infrastructure, Dagstuhl, Germany, 2013.
- **Reverse Traceroute.**
Microsoft, 2014.
EdgeCast, 2013.
Williams College, 25th Anniversary of Computer Science Department, 2013.
- **Systems for Improving Internet Availability and Performance.**
Montana State University, 2013.
- **LIFEGUARD: Practical Repair of Persistent Route Failures.**
Google, 2012.
- **Reverse Traceroute & Hubble: Systems to Troubleshoot Internet Performance and Reliability.**
Laboratoire d'informatique de Paris 6, University Pierre et Marie Curie, 2009.
University of Massachusetts, 2008.
- **How I Learned to Stop Worrying and Love to Spoof.**
ISMA AIMS 2009 (Internet Statistics and Metrics Analysis Workshop on Active Internet Measurements).
- **Measuring Reverse Paths.**
10th CAIDA-WIDE Workshop, August 2008.

- **Hubble: Monitoring Internet Reachability in Real Time.**
RIPE 56, 2008 (Réseaux IP Européens Network Operator Conference).
10th CAIDA-WIDE Workshop, 2008.
Gnomedex 2008 (Technology Conference).

Graduated PhD Students

Tobias Flach (co-advised with Ramesh Govindan), 2016. First job: Google.

Current PhD Students

Matt Calder: started 2012, dissertation proposal 2016.

Kyriakos Zarifis (co-advised with Ramesh Govindan): started 2012, dissertation proposal 2016.

Brandon Schlinker: started 2013.

Yi-Ching Chiu (co-advised with Ramesh Govindan): started 2014.

Chris Hodsdon (co-advised with Wyatt Lloyd): started 2016.

Theano Stavrinou (co-advised with Wyatt Lloyd): started 2016.

Aqib Nisar (co-advised with John Heidemann): started 2016.

Brian Goodchild (co-advised with Roxana Geambasu): started 2017.

Todd Arnold: started 2017.

Graduated Masters Students

Mohsin Ali (co-advised with Wyatt Lloyd), 2016. First job: Facebook.

Graduated Undergraduate Students

Justine Sherry (University of Washington). Winner CRA Outstanding Researcher Award 2010. PhD, Berkeley. First job: Assistant Professor, CMU.

Colin Scott (University of Washington). Honorable Mention CRA Outstanding Researcher Award 2011. PhD, Berkeley. First job: Microsoft Research India.

Ashoat Tevosyan (University of Washington). First job: Facebook.

Mary Pimenova (University of Washington). First job: Facebook.

Brian Goodchild (Rutgers, Camden). Pursuing PhD at Columbia University.

Teaching

Fall 2017 (Columbia) Undergrad/Masters Course: Computer Networks
(*instructor rating 3.82/5*)

Fall 2016 (USC)
• Masters Course: Computer Networking (*instructor rating 4.67/5*)
• PhD Course: Advanced Computer Networking (*instructor rating 4.33/5*)

Fall 2014 (USC)
• PhD Seminar: Reading, Writing, and Reviewing Systems Papers
(*instructor rating 4.50/5*)
• Masters Course: Computer Networking (*instructor rating 4.80/5*)
• PhD Course: Advanced Computer Networking (*instructor rating 4.13/5*)

Fall 2013 (USC)
• Masters/PhD Seminar: Delivering Services on Today's Internet
(*instructor rating 4.75/5*)
• Masters Course: Computer Networking (*instructor rating 4.46/5*)
• NSDI Shadow Program Committee, informal seminar

Spring 2013 (USC) PhD Seminar: Internet Measurement, (*instructor rating 4.75/5*)

Fall 2012 (USC) NSDI Shadow Program Committee, informal seminar

Professional Service

Technical Program Committee Co-Chair: IMC 2018

Technical Program Committee Member: NSDI 2013-2015; SIGCOMM 2014-2016; IMC 2013, 2015-2017; NSF NeTS Early Career Workshop 2017; PAM 2015; MobiSys 2014 (external review committee); AIMS 2014; SIGCOMM 2013 Posters and Demos; COST TMA 2011

General Co-Chair: HotNets 2014

Topic Preview Lectures Chair: SIGCOMM 2015-2017

Shadow PC Co-Chair: IMC 2017 (50+ PC members around the world)

Shadow PC Coordinator: NSDI 2014 (organized 6 shadow PCs around the world)

Mentor, N2Women SIGCOMM 2014, mentoring four junior scholars

Session Chair and Discussion Leader: AIMS 2013

External Reviewer: NSDI 2008-2010, SIGCOMM 2010-2011, IEEE/ACM Transactions on Networking, Computer Networks Journal, ACM SIGCOMM Computer Communications Review

Departmental Service

Member, Departmental Fellowship Committee: 2013

Member, Departmental Admissions Committee: 2012, 2013

Member, Departmental Faculty Evaluation Committee: 2014

Member, Department Systems Hiring Committee: 2016, 2017

Organizer, Departmental Colloquium and Distinguished Lecture Series: 2012-2013

Grants (\$3.4M individual share, \$7M total budget including collaborators)

- 1. NSF EAGER: USBRCCR: Researching Internet Routing Security in the Wild.**
\$300,000. 2017-2019. CNS-1740883. PI (planned 0.6 month average effort per year).
With Italo Cunha, UFMG, Brazil (\$600K total budget).
Summary: The Internet routing protocols lack authentication, so hosts can claim that their traffic came from a different source (source spoofing), and networks can claim ownership of routes to other networks' addresses in order to siphon traffic (hijacking). However, researchers struggle to perform routing security experiments that are both realistic and controlled, as both measurements and simulations have serious limitations. This project aims to (1) enable classes of security-focused routing research, via extending our PEERING testbed, and to (2) develop techniques that use it to identify which networks allow unauthorized traffic or routes.
- 2. NSF CSR: NeTS: Medium: Collaborative Research: Cloud Support for Latency-Sensitive Web Services.**
\$475,094. 2016-2020. CNS-1564242. PI (0.25 month effort per year).
With Harsha Madhyastha, University of Michigan (\$875K total budget).
Summary: Many web services deploy in the cloud and use content delivery networks (CDNs), yielding access to servers around the world that can serve clients locally. However, these services struggle to realize the potential of this infrastructure because the shared nature of the infrastructure limits their visibility and control. We are developing solutions that a cloud platform can deploy to aid tenant applications in minimizing user-perceived latency.

3. **NSF CI-New: Collaborative Research: An Open Platform for Internet Routing Experiments.**
 \$887,347. 2015-2018. CNS-1406042. PI (0.5 month effort per year).
 With Nick Feamster, Princeton; David Choffnes, Northeastern University (\$1.3M total budget).
Summary: Routing is central to the Internet’s functioning, but available testbed vantage points provide little visibility into how the Internet’s independently operated networks interconnect, making it difficult to assess factors including the resilience and performance of Internet paths. Further, researchers lack the control to change actual routing to experiment with alternate paths, topologies, and business models in situ. To address this need, in this infrastructure project, we are building (1) an open testbed for Internet routing experiments that alter real Internet routes to explore alternate paths; and (2) measurement systems that capture the resulting routes.
4. **NSF NeTS: Large: Collaborative Research: Programmable Inter-domain Observation and Control.**
 \$599,496. 2014-2018. CNS-1413978. PI (0.5 month effort per year).
 With Ramesh Govindon, USC; Minlan Yu, Yale; Nate Foster, Cornell University; Arjun Guha, UMass (\$3M total budget).
Summary: This project proposes a unified interface for network operators to make observations about Internet paths and topology, and a rich control interface that allows cooperating participants to issue requests to steer traffic along preferred paths. The proposed system will collect information from participating networks and make active measurements from distributed vantage points, without requiring “forklift” upgrades to existing infrastructure. It will encourage operators to share network information by providing mechanisms that enable controlled sharing.
5. **NSF CAREER: Routing for the Emerging Topologies of Modern Internet Services.**
 \$622,959. 2014-2019. NSF CNS-1351100. Single PI (1 month effort per year).
Summary: This project aims to provide unprecedented visibility into the topologies of major content providers by developing techniques to map their serving infrastructures and interconnections to other networks, then using those techniques to quantify inefficiencies in current routing and characterize opportunities for improvement. The project is also designing a testbed for routing experiments that capture important aspects of these providers.
6. **Google Chrome University Research Program: Speeding the Web by Anticipating Client Content Requests.**
 \$0 (all budget with my co-PI at USC, where we co-advise students). 2017. Co-PI.
 With Ramesh Govindan, USC (\$92K total budget).
7. **Facebook Faculty Award.**
 \$50,000. 2017. Single PI.
8. **Comcast Innovation Fund Research Award.**
 \$73,786. 2016. PI.
 With Italo Cunha, UFMG, Brazil (\$100K total budget).
9. **Facebook Faculty Award.**
 \$30,000. 2016. Single PI.
10. **Google Faculty Research Award: Longitudinal Study of RPKI-Based Route Filtering.**
 \$59,726. 2016. Single PI.
11. **Google Faculty Research Award: Flexible Internet Routing for Cloud Tenants.**
 \$53,945. 2015. Single PI.
12. **Google Faculty Research Award: Measuring and Improving Web Performance.**
 \$54,322. 2014. Single PI.
13. **Google Faculty Research Award: Mapping Today’s Internet.**
 \$53,934. 2013. Single PI.

- 14. Google/M-Lab Network Research Grant: Disentangling the Causes of Mobile Network Performance.**
\$99,690. 2013. PI.
With David Choffnes, Northeastern University (\$99,690 total budget, all at USC).
- 15. Google Cloud Credits: The Rich Interdomain Connectivity of Modern Clouds.**
\$5000 in credits. 2014. Single PI.
- 16. Microsoft Azure: Evaluating Availability in the Cloud.**
Azure cloud credits. 2014.

Selected Press

Microsoft Shines at NSDI '18.

Victor Bahl, Microsoft Research Blog. April 2018.

<https://www.microsoft.com/en-us/research/blog/microsoft-shines-nsdi-18/>

Making Facebook Faster.

Kieran Sweeney, USC Viterbi News. February 2018.

<https://viterbischool.usc.edu/news/2018/02/making-facebook-faster/>

Improving Internet performance in an open, collaborative environment.

Facebook Research Blog. September 2017.

<https://research.fb.com/the-2017-facebook-phd-fellows-workshop/>

Study: T-Mobile's Binge On not what it seems.

Truman Lewis, ConsumerAffairs. June 2016.

<https://www.consumeraffairs.com/news/study-t-mobiles-binge-on-not-what-it-seems-061716.html>

Facebook Fellow Works on Upgrading the Internet. [about my student Brandon Schlinker]

Daniel Druhora, USC Viterbi News. April 2016.

<http://viterbi.usc.edu/news/news/2016/facebook-awards-graduate-fellowship.htm>

Fixing the Internet.

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