

ZESEN ZHANG

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EDUCATION

University of California, San Diego

Sep 2019 - Jan 2025 (expected)

Ph.D. in Computer Science and Engineering, SysNet Group

Supervisor: Prof. Aaron Schulman

University of California, San Diego

Sep 2019 - Jan 2022

Master of Science in Computer Science and Engineering.

Supervisor: Prof. Aaron Schulman

Shanghai Jiao Tong University

Sep 2015 - June 2019

Zhiyuan Honors Program of Engineering (Highly Seletive: **Top 5%**), School of Cyber Security

B.S in Information Security & Double Major in Accountancy

Supervisor: Prof. Xinbing Wang, Prof. Yiluo Fu

TECHNICAL STRENGTHS

Computer Languages

C/C++, Java, Python, JavaScript, html, Shell, GoLang, CSS

Data Analytics

MySQL workbench, SQL Server, MongoDB, PostgreSQL

Other Tools

VIM, GIT, UNIX, Spark, Docker, L^AT_EX, Palantir, Microsoft Office Tool

PUBLICATIONS

- [1] Tzu-Bin Yan, **Zesen Zhang**, Bradley Huffaker, Ricky Mok, kc claffy, Kirill Levchenko, “Marionette Measurement: Experimentally Testing the PacketLab Hypothesis” In Proceedings of *Passive and Active Measurement (PAM) 2025*
- [2] **Zesen Zhang**, Jiting Shen, Ricky Mok, “Empirical Characterization of Ookla’s Speed Test Platform: Analyzing Server Deployment, Policy Impact, and User Coverage” In Proceedings of *Computing and Communication Workshop and Conference(CCWC) 2024*
- [3] Tzu-Bin Yan, **Zesen Zhang**, Bradley Huffaker, Ricky Mok, kc claffy, Kirill Levchenko, “Poster: Empirically Testing the PacketLab Model”, In Proceedings of ACM *Internet Measurement Conference 2023 (IMC)*
- [4] **Zesen Zhang**, Leila Scola, Aaron Schulman, “Investigating the Sustainability of the 5G Base Station Overhaul in the United States” In Proceedings of the *ICT for Sustainability 2023. (ICT4S)*
- [5] Tzu-Bin Yan, Michael Chen, Anthea Chen, **Zesen Zhang**, Bradley Huffaker, Ricky Mok, Kirill Levchenko, kc claffy; “Poster: PacketLab - Tools Alpha Release and Demo” In Proceedings of ACM *Internet Measurement Conference 2022. (IMC)*
- [6] **Zesen Zhang**, Alexander Marder, Ricky Mok, Bradley Huffaker, Matthew Luckie, k claffy, Aaron Schulman, “Inferring Regional Access Network Topologies: Methods and Applications” In Proceedings of ACM *Internet Measurement Conference 2021. (IMC)*
- [7] Alexander Marder, **Zesen Zhang**, Ricky Mok, Ramakrishna Padmanabhan, Bradley Huffaker, Matthew Luckie, Alberto Dainotti, KC Claffy, Alex C. Snoeren, Aaron Schulman, “Access Denied: Assessing Physical Risks to Internet Access Networks” In Proceedings of *USENIX Security Symposium 2023*
- [8] Xiaoying Gan, **Zesen Zhang**, Luoyi Fu, Xinbing Wang “Unraveling Impact of Critical Sensing Range on Mobile Camera Sensor Networks” in *IEEE Transactions on Mobile Computing*, vol. 19, pp. 982-996, 2020.

- [9] Fu Luoyi, Fu Xinzhe, **Zhang Zesen**, Xu Zhiying, Wu Xudong, Wang Xinbing, Lu Songwu, “Joint Optimization of Multicast Energy in Delay-constrained Mobile Wireless Networks” in *IEEE/ACM Transactions on Networking*, vol. 26, pp. 633-646, Feb. 2018.
- [10] **Zesen Zhang**, Rohith Reddy Vennam, Maiyun Zhang, Yunxiang Chi, Dinesh Bharadia, Aaron Schulman. ”MobileSDR: A Mobile Programmable Platform for Wireless Field Tests and Diagnostics” Under Submission to Mobicom 2025.
- [11] **Zesen Zhang**, Jon Larrea, Haoran Wan, Wing Yin Chan, Ricky Mok, Bradley Huffaker, KC Claffy, Kyle Jamieson, Alexander Marder, Aaron Schulman. ”Different Policies for Different NodeBs: Comparing Downlink Schedulers of Cellular Base Stations” Under Submission to IMC 2025
- [12] **Zesen Zhang**, Ricky Mok, Aaron Schulman, “Understanding speed test infrastructure” Under Submission to CoNext 2025

SELECTED PROJECTS

Ph.D: Skatelab

Cooperated PIs: **Aaron Schulman, KC Claffy, Dinesh Bharadia**

SpecScope:Enabling Portable Wireless Measurement Ecosystem

Feb 2023 - Present

- Description: Developed the first mobile SDR platform that enables portable, scalable, crowd-sourced wireless network diagnostics and field testing using commercial off-the-shelf mobile devices with SDR. This platform addresses critical challenges such as limited CPU resources, battery constraints, and security risks in mobile-based SDR deployments.
- Achieved the first mobile SDR platform by integrating smartphones with external SDR hardware, enabling sophisticated signal processing tasks traditionally reserved for dedicated hardware platforms.
- Demonstrated the platform’s effectiveness through real-world case studies including diagnosing LoRa network interference and performing cellular base station data collection.
- Engineered robust system architecture that supports secure, programmable flowgraph deployment and dynamic power management to extend mobile deployment capabilities.
- Facilitated extensive data collection by separating signal processing from data collection. It enables remote experiment deployment and crowd-sourced data collection across diverse geographical locations.

AVOID: Automatic Verification of Internet Data-paths

Feb 2023 - June 2024

- Description: This research provided an in-depth comparative analysis of proprietary downlink scheduling algorithms across different cellular base station vendors. It highlighted significant differences in scheduling behavior among vendors, which could impact network performance and user experience.
- Conducted strictly controlled experiments to measure and compare the performance of downlink schedulers from major base station vendors like Ericsson and Samsung, under a variety of network conditions. This included over 500GB of downlink traffic through over 30 base stations.
- Demonstrated how different scheduling strategies affect data throughput and fairness in resource allocation, thus challenging assumptions about base station behavior used in theoretical models.
- The findings contribute to a better understanding of the dynamic behavior of schedulers in LTE and 5G networks, revealing both consistent and differing patterns across vendors and conditions.

PacketLab

Jan 2022 - June 2023

- Description: PacketLab is a new measurement endpoint interface designed to facilitate endpoint sharing among the network measurement research community. By constraining experimenter activities through pre-designed certificates, users at the endpoint can securely provide their network environments to experimenters, allowing for the collection of critical network data. This project is aiming to build a crowd sourcing strategy for Internet measurement for wireline network. Website: <https://packetlab.github.io/>.
- Contribution: Developed the rendezvous server in PacketLab to authenticate controllers and endpoints, as well as assign tasks to endpoints based on controller certificates and requirements.
- Built proxy sever to enable controllers without public IP addresses to connect to endpoints.

- Deployed PacketLab endpoints on various cloud platforms, including AWS, EdgeNet and Ark.
- Conducted complex measurement experiments on PacketLab to validate the platform's hypothesis.

Investigating regional access network topology and physical risks *Mar 2020 - Oct 2021*

- **Description:** In this project, we demonstrated the capability of a third-party team to unveil the wireline and wireless regional access network topologies of major Internet Service Providers (ISPs) in the United States. This was achieved through the utilization of public networks and mobile devices. By leveraging these topologies, we were able to identify the root causes and assess the impact of large-scale access network outages in real-world scenarios.
- We Strategically designed experiments to uncover ISPs' regional access network by using fast food restaurants' Wi-Fi ("McTraceroute") and shipping active probing mobile devices ("ShipTraceroute"). We Showed three major wireline ISPs and three major wireless ISPs' regional access network topology.
- We Identified threats in major ISP's regional access networks by using active probing and historical datasets. We revealed 27 major ISPs' network outages during 2020-2021. We reviewed five typical examples of risk to regional network deployments, possible mitigations, and the trade-offs of undertaking such mitigations. We showed the possibility of figuring out the physical central office building through network topology and the hints in DNS name.

WORK EXPERIENCE

AT&T Lab, Network Resiliency and Reliability Team. – Student Intern - Technical II

Manager: Deon Whitlock

June 26th - Sep 3rd, 2023

Downstream Effects Analysis Tool

- Designed and implemented an automated analysis tool aimed at visualizing secondary and subsequent consequences arising from a single point of failure within the entire AT&T network.
- Leveraged PySpark to analyze the entire AT&T network's equipment and generated a dataset that outlines the child effects based on logical circuit.
- Utilized Palantir platform to develop a self-contained system for presenting downstream effects associated with individual network components.
- Collaborated with internal clients to seamlessly integrate the tool into their projects.

AT&T Lab, Network Resiliency and Reliability Team. – Student Intern - Technical II

Manager: Deon Whitlock

June 27th - Sep 16th, 2022

Risk Aggregation Framework

- Developed Risk Aggregation Framework to assess the underlying risk caused by network design and critical environment activities.
- Wrote a whitepaper for the framework and proposed the framework to be a five year project.
- Applied an AT&T pattern for the project (Under review).

SERVICES

Reviewer of: China Communications, Wireless Network, Transaction on Sensor Network

Secretary of Cuhural and Sports Center, Student Union, SJTU

Secretary of the Ministry of Coach, Table Tennis Association, SJTU

LEADERSHIP

Minister of Student union, SJTU

June 2016 - May 2017

- Got more than ten thousands fundings from sponsors to support our union
- Designed the school's New Year Party

Minister of table tennis association, SJTU.

June 2016 - May 2017

- Won the Third prize, National college student pingpong competition, 2017
- Opened up an class to teach the union member play pingpong from July 2016- Aug 2016.