Mingming Chen

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Research Interest

- **Software-Defined Networking Security**
- **Optimization for Security**
- **P4 Programming**
- **Machine Learning-Assisted Security**

Education

- **The Pennsylvania State University, University Park** **Ph.D.**
  Department of Computer Science and Engineering *Sep. 2018 - May 2025*
  Evolving Network Security in the Era of Network Programmability Advisors: Tom La Porta, Trent Jaeger

- **Beijing University of Posts and Telecommunications** **M.E.**
  School of Information and Communication Engineering (Outstanding Graduate) *Sept. 2013 – Apr. 2016*
  School of Ethnic Minority Education *Sept. 2012 – Jun. 2013*

- **North China Institute of Science and Technology** **B.E.**
  Department of Communication Engineering *Sept. 2008 – Jun. 2012*

Publications

- Evolving Network Security in the Era of Network Programmability.
  Mingming Chen.
  In Proceedings of the ACM SIGSAC Conference on Computer and Communications Security (CCS) Doctoral Symposium, 2024

- Manipulating OpenFlow Link Discovery Packet Forwarding for Topology Poisoning.
  Mingming Chen, Thomas La Porta, Teryl Taylor, Frederico Araujo, Trent Jaeger.
  In Proceedings of the ACM SIGSAC Conference on Computer and Communications Security (CCS), 2024
  Artifact Badges: Available, Functional, Results Reproduced

- OPTISAN: Using Multiple Spatial Error Defenses to Optimize Stack Memory Protection within a Budget.
  Rahul George, **Mingming Chen**, Kaiming Huang, Zhiyun Qian, Thomas La Porta, Trent Jaeger.
  In 33rd USENIX Security Symposium (USENIX Security), 2024

- Lightweight Coordinated Sampling for Dynamic Flows under Budget Constraints.
  Mingming Chen, Thomas La Porta, Trent Jaeger, Srikanth Krishnamurthy.
  In 33rd international conference on computer communication and networks (ICCCN), 2024

- Enabling Software Defined Optical Networks based on OpenFlow Extension.
  Mingming Chen, Guochu Shou, Yihong Hu, Zhigang Guo, Guoying Zhang, Hui Ding.
  In Opto-Electronics and Communications Conference (OECC), 2015

Vulnerability Disclosures

- **CVE-2024-37018**

  The flow entries designed for traffic routing can alter the topology view of the controllers, including OpenDaylight, ONOS, floodlight, ONOS, and Pox.

- **CVE-2024-46942**

  A follower controller can configure flow entries in an OpenDaylight/ONOS clustering deployment due to privilege neglect in cluster datastore synchronization.

- **CVE-2024-46943**

  A rogue controller can join a cluster to impersonate an offline peer, even if this rogue controller does not possess the complete cluster configuration information.

Service & Activity

- **Reviews**
  - IEEE/ACM Transactions on Networking (ToN), 2025
  - IEEE Security & Privacy (IEEE S&P), 2025
  - IEEE Transactions on Dependable and Secure Computing (TDSC), 2025
  - IEEE Conference on Computer Communications (INFOCOM), 2025
  - IEEE Transactions on Network and Service Management (TNSM), 2024
- **Program Committee**
  - USENIX Security 2025 Artifact Evaluation Committee
  - IEEE/ACM Workshop on the Internet of Safe Things (SafeThings 2025)
- **Presentations**
  - Manipulating OpenFlow Link Discovery Packet Forwarding for Topology Poisoning (CCS'24, Oct. 17, Salt Lake City, UT, US)
  - Evolving Network Security in the Era of Network Programmability (Travel Grant; CCS'24, Oct. 14, Salt Lake City, UT, US)
  - Lightweight Coordinated Sampling for Dynamic Flows under Budget Constraints (ICCCN'24, Jul. 29, Big Island, HI, US)
- **Volunteer**
  - Posters Presentation at Penn State Industry Day *Oct. 9, 2024*
  - CSE Summer Camp Counselor *Jun. 10 - 14, 2024*
  - Girls Who Code Instructor *Mar. 14 - April 25, 2021*
- **OpenDaylight Community**
  - Invited Speaker of OpenDaylight (ODL) Summit 2016 *Sept.26 - 29, 2016*
  - Invited Speaker of ODL meetup in Shenzhen/Shanghai *Jun. 16, 2016*
  - Invited Speaker of Online SDN Technical Sharing *Nov.18, 2015*
  - Student Representative of SDN Training-cum-Expert Symposium *Oct.18 - 20, 2015*
    - ODL Chinese Community Contribution Award in 2015
  - Invited Speaker of SDN Technical Conference in Nanjing *Jul. 11, 2015*

Experience

- Army Research Lab CRA Program - Deception *Jan. 2021 – Sep. 2023*
  - Discovered an overlooked vulnerability (CVE-2024-37018) of SDN discovery protocol such that the flow entries can precisely influence link discovery results.
  - Designed a Reinforcement Learning method to compute a stealthy deceptive topology to mislead legitimate controllers, demonstrating the severity of this vulnerability.
  - Demonstrated the experiments at yearly PI meetings and the Capstone Event.
- Army Research Lab CRA Program - Defense *Sep. 2018 – Sep. 2023*

  - P4-enabled Coordinated Sampling
    * Completed Intel P4 Programming Online Course with hands-on lab homework.
    * Proposed and deployed a Coordinated Sampling Algorithm on real P4 switches (Arista 7170-34CD).
    * Demonstrate the NP-complete Budgeted maximum k-coverage problem on practical networks is pseudo-polynomial solvable with experiments and theoretical analysis.
    * Demonstrated the experiments at yearly PI meetings and the Capstone Event.
  - Optimizing Stack Memory Protection With a Budget
    * Developed a mixed-integer non-linear programming (MINLP) formulation to calculate an optimal placement utilizing multiple defenses.
    * Implemented the MINLP formulation in Gurobi with indicator constraint to model the non-linearity.

- Engineer of Tongji-Yale Joint Laboratory (Y. Richard Yang) *Apr. 2016 – Nov. 2016*
  - Implemented the latest rate-limiting function in physical SDN switches branded Pic8 and Dell.
  - Proposed Maple-based Service Function Chain to facilitate the integration between Maple and NFV.

- Intern of Cisco System (Beijing) / ODL contributor *Jun. 2015 – Dec.2015*
  - Contributed code to bgpcep "labeled-unicast" project and it was released to ODL Lithium.
  - Verified labeled-unicast project with physical BGP device "ASR9K" and ODL Lithium, and configured ASR9K to establish ibgp and ebgp connection to generalize the testbed situation.

- Intern of China Academy of Information and Communication Technology *Jun. 2014 – Jun. 2015*
  - Build Software Defined Optical Networking (SDON) project based on ODL Hydrogen.
  - Configured physical SDN switch "Centec v350" to connect with ODL.

Skills

Programming	Python, P4, Java, Yang Model, C(C++), MATLAB
Operating System	Linux, MacOS, Hardware (P4-programmable, OpenFlow) Switch Architecture
Software & Library	SDN controllers (ODL, ONOS, Floodlight, RYU, Pox), Mininet, Wireshark, Snort, Stable-Baselines3 (Reinforcement Learning)

References

- Thomas La Porta (Advisor): tfl12@psu.edu — Director of EECS, Penn State University
- Trent Jaeger (Co-advisor): trentj@ucr.edu — Professor of CSE, UC Riverside
- Teryl Taylor: terylt@ibm.com — Staff Research Scientist, IBM Research
- Fred Araujo: frederico.araujo@ibm.com — Senior Research Scientist & Manager, IBM Research