Hyeonmin Lee

Network Security Researcher

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hyeonminlee1110

I am a postdoctoral researcher at Seoul National University. My research interests lie in network security, especially, DNS and Email security. I have published five papers, three of which were published in top-tier conferences including USENIX Security and The Web Conference (formerly WWW). Also, I have participated in (or led) more than ten research projects with institutions such as Virginia Tech, Rochester Institute of Technology, University of Twente, KAIST, SIDN Labs, NLnet Labs, etc. I have covered a variety of techniques in my research, such as DNS, DNS security (e.g., DNSSEC, DoT, DoH), SMTP, Email security (e.g., STARTTLS), PKI, DANE, TLS, IoT, and edge computing.

Professional Experience

Postdoctoral Researcher, Network Convergence and Security Lab — **Apr 2022 — Present**
Seoul National University — *Seoul, South Korea*

Visiting Student, The Center for Cybersecurity — **May 2019 — Aug 2019**
Rochester Institute of Technology — *Rochester, NY, United States*

Education

Ph.D., Computer Science and Engineering, Seoul National University, (Seoul, South Korea) — **Mar 2016 — Feb 2022**
- [Dissertation] "Understanding the DANE Ecosystem in Email: How Is It Deployed and Managed?"
- [Advisors] *Prof. Taekyoung "Ted" Kwon (Seoul National University)* and *Prof. Taejoong "Tijay" Chung (Virginia Tech)*

B.S., Computer Science and Engineering, Seoul National University, (Seoul, South Korea) — **Mar 2011 — Feb 2016**

Visiting Student, Information Technology, Uppsala University, (Uppsala, Sweden) — **Fall 2014**

Publications (Selected)

[C3] **ZTLS: A DNS-based Approach to Zero Round Trip in TLS handshake** (To appear) — **TheWebConf'23**
- Sangwon Lim, **Hyeonmin Lee**, Hyunsoo Kim, Hyunwoo Lee, Ted "Taekyoung" Kwon
- In Proceedings of the ACM Web Conference 2023, Austin, United States, Apr 2023

[C2] **Under the Hood of DANE mismanagement in SMTP** — **USENIX Security'22**
- **Hyeonmin Lee**, Md. Ishtiaq Ashiq, Moritz Müller, Roland van Rijswijk-Deij, Taekyoung "Ted" Kwon, Taejoong Chung
- In Proceedings of the 31st USENIX Security Symposium, Boston, United States, Aug 2022

[C1] **A Longitudinal and Comprehensive Study of the DANE Ecosystem in Email** — **USENIX Security'20**
- **Hyeonmin Lee**, Aniketh Gireesh, Roland van Rijswijk-Deij, Taekyoung "Ted" Kwon, Taejoong Chung
- In Proceedings of the 29th USENIX Security Symposium, Boston, United States, Aug 2020

[I-D] **DNSSEC Extension by Using PKIX Certificates** — **Internet-Draft**
- **Hyeonmin Lee**, Taekyoung Kwon
- Active Internet-Draft, Mar 2023

Research Project Experience (Selected)

Research on Secure DNS and Privacy aware Packet Filtering Technology — **Aug 2022 — Present**
(Funded by *Samsung Electronics*)
- [Keywords] Domain Name System, DNS over TLS (DoT), DNS over HTTPS (DoH), Packet filtering.
- [Roles] **System Designer, Programmer** - Investigate a way to filter packets using the information in DNS messages and implement it on BIND9.

Abnormal Detection and Forensic Techniques using IoT Network Traffic Analysis — **Mar 2021 — Nov 2021**
(Funded by *Korea Institute of Information Security & Cryptology (KIISC)*)
- [Keywords] Internet of Things (IoT), Machine learning, Abnormal detection.
- [Roles] **Project Manager, System Designer, Programmer** - Analyzed IoT network traffic to distinguish abnormal traffic from normal ones using an autoencoder.

Versatile Network System Architecture for Multi-dimensional Diversity — **Apr 2016 — Dec 2020**
(Funded by *Institute for Information and Communication Technology Promotion (IITP)*)
- [Keywords] Edge/Cloud computing, Mobility, In-network caching, Trustworthiness.
- [Roles] **Project Manager (Mar 2020 — Dec 2020), System Designer, Programmer** - Devised/implemented an ID Resolver that handles the mapping between IDs and resources in the edge network (e.g., ID allocation and mobility handling).

Skills

Tools and Languages	Python (proficient), C/C++, Java, Go, Spark, Hadoop, Git, LaTeX, Linux OS
Quantitative Research	DNS, DNS Security (i.e., DNSSEC, DoT, DoH), SMTP, Email Security (i.e., STARTTLS), PKI, DANE, TLS, IoT, Edge computing
Communication	English, Korean (native)