

# Tolga O. Atalay

Graduate Research Assistant  
Virginia Tech  
Department of Electrical and Computer Engineering

Virginia Tech Research Centre  
900 N Glebe Rd, VA 22305  
tolgaoa@vt.edu  
tolgao.github.io

## RESEARCH SUMMARY

---

- System design, implementation and evaluation of a novel discovery framework for the authentication and authorization of xApps in the O-RAN architecture. (<https://github.com/tolgaoa/xrfoauth>)
- Isolation of critical microservices (ARPF, SIDF, SEAF) for the 5G core control plane using different isolation strategies including Intel SGX. (**private repo**)
- Creating a distributed tracing framework for end-to-end 5G core deployments (OAI) by augmenting VNFs with Side Car Proxies that enable indirect communication. Collecting context spans using OpenTelemetry to forward to a Jaeger collector. (<https://github.com/tolgaoa/monitor5G>)
- 5G core deployments with different network slice topologies. User traffic recreation over AWS edge zones in 7 different countries and 18 different edge zones. Assessing the 5G control plane latency and user plane throughput for large scale network slice deployments. (<https://github.com/tolgaoa/devdep5g>)
- Design of a Service mesh Tailored for Rapid, Efficient and Authorized Microservices (STREAM) in a decentralized 5G core deployment to reduce control plane processing latency. Refactoring the monolithic 5G core VNFs to be deployed as finer-grained microservices in the public cloud. (**private repo**)

## EXPERIENCE

---

- 2021–MAY–DEC    **5G R&D Intern** at *Kryptowire Labs*
- 2022–MAY–AUG    **Project:** *DARPA Open, Programmable, Secure 5G (OPS-5G) - Technical Area 4 - Principled programmable defences*
- Construction of a state-of-the-art open source 5G testbed for integration and testing of cybersecurity primitives.
  - System design and evaluation of large-scale 5G deployments for DDoS mitigation and malware detection.
  - System design, implementation and evaluation of OpenRAN security frameworks for 5G integration.
  - Large scale 5G core deployments in the AWS public cloud to assess real-life performance of next generation infrastructure deployments.
  - Prepared/presented presentations and demos at DARPA PI meetings and site-visits.

## EDUCATION

---

- 2018 – Present    **Doctor of Philosophy** in Computer Engineering, *Virginia Tech*
- 2016 – 2018    **Master of Science** in Telecommunications, *Danmarks Tekniske Universitet (DTU)*
- 2012 – 2016    **Bachelor of Science** in Electrical and Electronics Engineering, *Bilkent University*

## SKILLS

---

**Programming:** C, C++, Go, Python  
**Platforms:** AWS, OpenStack, Kubernetes, Docker, Linux, shell scripting, OpenTelemetry, TTCN-3, Matlab  
**Background:** 5G/OpenRAN architecture, 3GPP/ETSI/O-RAN standardization, microservices, side car proxies, system design/architecture, networking, cybersecurity, software-defined radios, conformance testing

## PUBLICATIONS (\* DENOTES CO-PRIMARY AUTHORSHIP)

---

14. [JSAC '24] Alireza Famili, Tolga O. Atalay, Angelos Stavrou, Haining Wang “**Si-Fi: Collaboration of 6G and Wi-Fi for Seamless Geolocation in Metaverse.**” *Journal on Selected Areas in Communication Special Issue on 5G/6G Precise Positioning on Cooperative Intelligent Transportation Systems (C-ITS) and Connected Automated Vehicles (CAV)*.
13. [ICNC '24] Alireza Famili, Tolga O. Atalay, Angelos Stavrou. “**5GPS: 5G Femtocell Placement Strategies for Ultra-Precise Indoor Localization in the Metaverse.**” *IEEE International Conference on Computing, Networking and Communications*. (In Submission)
12. [INFOCOM '24] Pragya Sharma, Tolga O. Atalay, Dragoslav Stojadinovic, Hans Andrew Gibbs, Angelos Stavrou, Haining Wang. “**5G WAVE: A Core Network Framework with Decentralized Authorization for Network Slices.**” *IEEE Conference on Computer Communications*. (In Submission)
11. [ASIACCS '24] \*Sudip Maitra, \*Tolga O. Atalay, Angelos Stavrou, Haining Wang. “**P-AKA: Security Platform for Isolating Critical 5G Core Microservices.**” *European Symposium on Research in Computer Security*. (In Submission)
10. [NSDI '24] Tolga O. Atalay, Dragoslav Stojadinovic, Alireza Famili, Angelos Stavrou, Haining Wang. “**A First Look At 5G Core Deployments on Public Cloud: Evaluating the Control and User Plane.**” *USENIX Networked System Design and Implementation*. (In Submission)
9. [TDSC '24] \*Tolga O. Atalay, \*Sudip Maitra, Dragoslav Stojadinovic, Angelos Stavrou, Haining Wang. “**An OpenRAN Security Framework for Scalable Authentication, Authorization and, Discovery of xApps with Isolated Critical Services.**” *IEEE Transactions on Dependable and Secure Computing*. (In Submission)
8. [JSAC '23] Alireza Famili, Tolga O. Atalay, Angelos Stavrou, Haining Wang, Jung-min (Jerry) Park “**OFDRA: Optimal Femtocell Deployment for Accurate Indoor Positioning of RIS-Mounted AVs.**” *Journal on Selected Areas in Communication Special Issue on 5G/6G Precise Positioning on Cooperative Intelligent Transportation Systems (C-ITS) and Connected Automated Vehicles (CAV)*.
7. [GLOBECOM '23] Tolga O. Atalay, Alireza Famili, Dragoslav Stojadinovic, Angelos Stavrou, Haining Wang. “**Demystifying 5G Traffic Patterns with an Indoor RAN Measurement Campaign.**” *IEEE Global Communications Conference*.
6. [METACOM '23] Alireza Famili, Tolga O. Atalay, Angelos Stavrou, Haining Wang. “**Wi-Six: Precise Positioning in the 2023 IEEE Metaverse via Optimal Wi-Fi Router Deployment in 6G Networks.**” *IEEE Metaverse Computing, Networking and Applications*. (BEST PAPER AWARD)
5. [VTC '23] Alireza Famili, Tolga O. Atalay, Angelos Stavrou, Haining Wang. “**Wi-Five: Optimal Placement of Wi-Fi Routers in 5G Networks for Indoor Drone Navigation.**” *IEEE Vehicular Technology Conference*.
4. [INFOCOM '23] Tolga O. Atalay, Sudip Maitra, Dragoslav Stojadinovic, Angelos Stavrou, Haining Wang. “**Securing 5G OpenRAN with a Scalable Authorization Framework for xApps.**” *IEEE Conference on Computer Communications*.
3. [GLOBECOM '22] Tolga O. Atalay, Dragoslav Stojadinovic, Alireza Famili, Angelos Stavrou, Haining Wang. “**Network-Slice-as-a-Service Deployment Cost Assessment in an End-to-End 5G Testbed.**” *IEEE Global Communications Conference*.

2. [LATINCOM '22] Alireza Famili, Mahsa Foruhandeh, Tolga O. Atalay, Angelos Stavrou, Haining Wang. “GPS Spoofing Detection by Leveraging 5G Positioning Capabilities.” *IEEE Latin-American Conference on Communications*.
1. [WCNC '22] Tolga O. Atalay, Dragoslav Stojadinovic, Angelos Stavrou, Haining Wang. “Scaling Network Slices with a 5G Testbed: A Resource Consumption Study.” *IEEE Wireless Communications and Networking Conference*.

## SERVICE

---

2024	IEEE Conference on Dependable Systems and Networks (DSN)	<i>Artifact Eval. Committee</i>
2023	ACM ASIA CCS	<i>External Reviewer</i>
2023	IEEE Open Journal of the Communications Society	<i>Reviewer</i>
2023	Journal of Computer Security	<i>Reviewer</i>
2023	Computer Networks Journal	<i>Reviewer</i>
2023	iMETA	<i>Program Committee</i>
2021	IEEE Transactions on Cloud Computing	<i>Reviewer</i>
2021	USENIX Security Symposium	<i>External Reviewer</i>
2020	IEEE Transactions on Information Forensics and Security	<i>Reviewer</i>

## INVITED TALKS

---

1. [August 2023], IEEE Standards Association OpenRAN Rapid Reaction Standardization Activities, **OpenRAN Security Standardization Efforts for xApp Security**