

TWC: Small: Safeguarding Mobile Cloud Services: New Challenges and Solutions

Challenge:

- Complicated and error-prone cloud-end-device management and interactions
- Lack of understanding and lack of systematic protection against potential security risks

Solution:

- Perform in-depth security analysis on mobile cloud services
- Develop systematic methodologies and automatic technique to protect these systems



Fine-grained Protection in HAN [1]
Smart Authentication [2]
Vulnerable Devices/Cloud Backend [8]
Security of Voice-Controlled Devices [6]

PHA Detection in Data Ocean [3]
Remote Attacks Towards Mobile Apps and Cloud [4]
Privacy Discovery in Mobile Apps [5]
Residential IP Proxy as A Dark Service [7]

Scientific Impact:

- In-depth understanding of fundamental security weaknesses in mobile cloud services
- Technical innovations for more effective protection of these services

Broader Impact:

- The project materials have been widely disseminated through publications at leading security venues
- The research findings have also been reported by the media
- Research outcomes have been used in course development
- Our collaboration with the industry (e.g., Symantec and Samsung) could lead to technical transfers
- We will get minor student involved in the project

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Publications

- **[1]** Demetriou, Soteris, Nan Zhang, Yeonjoon Lee, XiaoFeng Wang, Carl A. Gunter, Xiaoyong Zhou, and Michael Grace. "HanGuard: SDN-driven protection of smart home WiFi devices from malicious mobile apps." In *Proceedings of the 10th ACM Conference on Security and Privacy in Wireless and Mobile Networks*, pp. 122-133. ACM, 2017.
- **[2]** Tian, Yuan, Nan Zhang, Yueh-Hsun Lin, XiaoFeng Wang, Blase Ur, Xianzheng Guo, and Patrick Tague. "Smartauth: User-centered authorization for the internet of things." In *26th {USENIX} Security Symposium ({USENIX} Security 17)*, pp. 361-378. 2017.
- **[3]** Chen, Kai, Tongxin Li, Bin Ma, Peng Wang, XiaoFeng Wang, and Peiyuan Zong. "Filtering for Malice through the Data Ocean: Large-Scale PHA Install Detection at the Communication Service Provider Level." In *International Symposium on Research in Attacks, Intrusions, and Defenses*, pp. 167-191. Springer, Cham, 2017.
- **[4]** Li, Tongxin, Xueqiang Wang, Mingming Zha, Kai Chen, XiaoFeng Wang, Luyi Xing, Xiaolong Bai, Nan Zhang, and Xinhui Han. "Unleashing the walking dead: Understanding cross-app remote infections on mobile webviews." In *Proceedings of the 2017 ACM SIGSAC Conference on Computer and Communications Security*, pp. 829-844. ACM, 2017.
- **[5]** Nan, Yuhong, Zhemin Yang, Xiaofeng Wang, Yuan Zhang, Donglai Zhu, and Min Yang. "Finding Clues for Your Secrets: Semantics-Driven, Learning-Based Privacy Discovery in Mobile Apps." In *NDSS*. 2018.
- **[6]** Zhang, Nan, Xianghang Mi, Xuan Feng, XiaoFeng Wang, Yuan Tian, and Feng Qian. "Dangerous skills: Understanding and mitigating security risks of voice-controlled third-party functions on virtual personal assistant systems." In *Proceedings of the 40th IEEE Symposium on Security and Privacy (IEEE S&P)*, 2019.
- **[7]** Mi, Xianghang, Ying Liu, Xuan Feng, Xiaojing Liao, Baojun Liu, XiaoFeng Wang, Feng Qian, Zhou Li, Sumayah Alrwais, and Limin Sun. "Resident Evil: Understanding residential ip proxy as a dark service." In *Proceedings of the 40th IEEE Symposium on Security and Privacy (IEEE S&P)*, 2019.
- **[8]** Wang, Xueqiang, Yuqiong Sun, Susanta Nanda, and XiaoFeng Wang. "Looking from the mirror: evaluating IoT device security through mobile companion apps." In *28th {USENIX} Security Symposium ({USENIX} Security 19)*, pp. 1151-1167. 2019.