How Inadequate Specification, Buggy Implementation, and Deficient Platform-Support Hinder Security

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ABSTRACT

Developing a secure system (or, protocol) in general boils down to having a correct and robust specification which developers faithfully implement with the available platform support. Vulnerabilities can thus crop up due to inadequate specification, buggy implementations, or the lack of appropriate security constructs in the platform. In this talk, I will present examples of insecurity due to inadequate specification, wrong implementations, and deficient platform support. I will particularly focus on how automated reasoning and formal verification techniques can greatly contribute towards detecting vulnerabilities.

In the first example, I will show how 4G LTE telecommunication protocol specification lacks security considerations which can be exploited by adversaries to have catastrophic impacts [2]. Next, I will present how incorrect X.509 certificate validation implementations in open-source SSL/TLS libraries leave users prone to impersonation attacks [1]. Finally, I will conclude my talk with a discussion of how lack of hardware support makes enforcing Digital Rights Management (DRM) policies infeasible for mobile devices.

CCS CONCEPTS

• **Security and privacy** → **Logic and verification**; **Security protocols**; **Mobile and wireless security**; *Mobile platform security*;

KEYWORDS

Implementation bugs; Inconsistent Specification; X.509 Public-key Infrastructure; 4G LTE; Digital Rights Management; Inadequate platform constructs

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BIOGRAPHY

Dr. Omar Haider Chowdhury is an Assistant Professor of Computer Science at the University of Iowa. Dr. Chowdhury's research

focuses on leveraging formal machinery and techniques to solve practically-relevant security and privacy problems of emerging systems and protocols. At Iowa, Dr. Chowdhury currently co-directs the Computational Logic Center (CLC) and is also an active member of the Informatics Initiative (UI3).

Before joining the University of Iowa, he held post-doctoral researcher positions at Carnegie Mellon University and Purdue University. He received his Ph.D. in Computer Science from the University of Texas at San Antonio. Dr. Chowdhury's research is currently supported by the National Science Foundation (NSF) and Defense Advanced Research Projects Agency (DARPA).

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