

# SeCaS: Secure Capability Sharing Framework for IoT Devices in a Structured P2P Network

by

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*All interested are cordially invited.*

## **ABSTRACT:**

The emergence of the internet of Things (IoT) has resulted in the possession of a continuously increasing number of highly heterogeneous connected devices by the same owner. To make full use of the potential of a personal IoT network, there must be secure and effective cooperation between them. While application platforms (e.g., Samsung SmartThings) and interoperable protocols (e.g., MQTT) exist already, the reliance on a central hub to coordinate communication introduces a single-point of failure, provokes bottleneck problems and raises privacy concerns. In this paper we propose SeCaS, a Secure Capability Sharing framework, built on top of a peer-to-peer (P2P) architecture. SeCaS addresses the problems of fault tolerance, scalability and security in resource discovery and sharing for IoT infrastructures using a structured P2P network, in order to take advantage of the self-organised and decentralised communication it provides. SeCaS brings three main contributions: (i) a capability representation that allows each device to specify what services they offer, and can be used as a common language to search for, and exchange, capabilities, resulting in flexible service discovery that can leverage the properties on a distributed hash table (DHT); (ii) a set of four protocols that provides identification of the different devices that exist in the network and authenticity of the messages that are exchanged among them; and (iii) a thorough security and complexity analysis of the proposed scheme that shows SeCaS to be both secure and scalable.

## **BIOGRAPHY:**

Dr.Kübra Kalkan received her BSc and MSc degrees in Computer Science and Engineering department from Sabanci University in 2009 and 2011, respectively. She received her PhD degree from Bogazici University in 2016. After PhD, she worked as a post doctoral researcher in University of Oxford. She also worked as a visiting researcher at various institutions such as École Polytechnique Fédérale de Lausanne (EPFL), Microsoft Redmond and Northeastern University during her MSc and PhD. Her current research interests include network security, computer networks, wireless networks, IoT, P2P networks and software-defined networking (SDN).