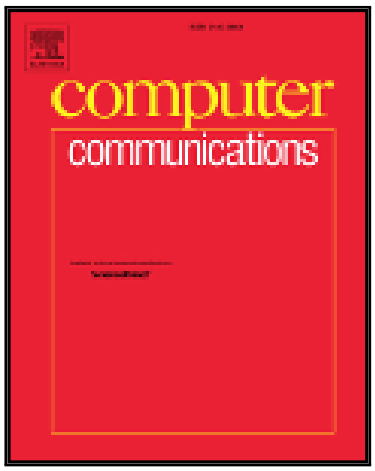

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A Survey of Trust Computation Models for Service Management in Internet of Things Systems

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Abstract

In this paper we survey trust computation models for Internet of things (IoT) systems for the purpose of service management, i.e., whether or not to select an IoT device as a service provider. Future IoT systems will connect the physical world into cyberspace everywhere and everything via billions of smart objects, and are expected to have a high economic impact. To date there is little work on trust computation in IoT environments for service management, especially for dealing with misbehaving owners of IoT devices that provide services to other IoT devices in the system. Our approach is to classify existing trust computation models for service management in IoT systems based on five essential design dimensions for a trust computation model: trust composition, trust propagation, trust aggregation, trust update, and trust formation. We summarize pros and cons of each dimension's options, and highlight the effectiveness of defense mechanisms against malicious attacks. We also summarize the most, least, and little visited trust computation techniques in the literature and provide insight on the effectiveness of trust computation techniques as applying to IoT systems. Finally, we identify gaps in IoT trust computation research and suggest future research directions.

Keywords: Internet of things; service-oriented computing; service management; trust; classification.

1 INTRODUCTION

It is envisioned that a future Internet of Things (IoT) system will connect a great amount of smart objects in the physical world, including radio frequency identification (RFID) tags, sensors, actuators, PDAs, and smartphones, as well as virtual objects in cyberspace such as data and virtual desktops on the cloud [26] [52] [57] [59]. The emerging paradigm of IoT has attracted a wide variety of applications running on top of it, including e-health [33], smart-home, smart-city, and smart-community [65].

A service-oriented IoT system can be viewed as a peer-to-peer (P2P) owner-centric community with devices (owned by humans) requesting and providing services on behalf of the owners, and with devices establishing social relationships autonomously with other devices based on social rules set by their owners, as well as