Chapter 3
Security Issues in Fog Computing for Internet of Things

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ABSTRACT

The inherent features of internet of things (IoT) devices, like limited computational power and storage, lead to a novel platform to efficiently process data. Fog computing came into picture to bridge the gap between IoT devices and data centres. The main purpose of fog computing is to speed up the computing processing. Cloud computing is not feasible for many IoT applications; therefore, fog computing is a perfect alternative. Fog computing is suitable for many IoT services as it has many extensive benefits such as reduced latency, decreased bandwidth, and enhanced security. However, the characteristics of fog raise new security and privacy issues. The existing security and privacy measures of cloud computing cannot be directly applied to fog computing. This chapter gives an overview of current security and privacy concerns, especially for the fog computing. This survey mainly focuses on ongoing research, security challenges, and trends in security and privacy issues for fog computing.

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INTRODUCTION

The Internet of Things (IoT) is one of the trending innovations that has the potential to provide enormous benefits to the society. The development of the IoT is reaching a stage at which many of the things around us will be able to connect to the Internet to communicate with each other (Atlam et al., 2017). During the inception, the IoT was intended to reduce human efforts and use different types of actuators and sensors to collect data from the environment and allow automatic storage and processing of these data (Giang et al., 2014; Atlan et al., 2018).

IoT market is expected to grow from more than 15 billion devices three years ago to more than 75 billion in 2025 (Friedman, 2018). IoT requires a robust technological foundation for its swift development and acceptance from the scientific community. Hence, the fog computing is a very strong candidate to provide this foundation for IoT. Because of several advantages, fog computing is expected to be one of the main backbone of the IoT in terms of computational support.

As shown in Figure 1, from a conceptual point of view, we are predicting fog computing to serve as an intermediate level of service for seamlessly handshaking the protocols of cloud computing and IoT. This will bring many benefits: 1) Cloud Computing servers are super fast in contrast to the IoT devices. Fog computing devices will provide an interface between the two far set of devices. 2) This intermediate layer of fog computing will allow several fixes (such as patch updates, etc.) to be done easier. Instead of making changes on IoT devices, software updates can be pushed on to the fog device(s). 3) Fog computing will bring all the advantages of edge-computing, such as the agility, scalability, decentralization, etc.

As cloud being a centralized resource out of users control, it represents every possible opportunity to violate privacy. Unfortunately, privacy has become a luxury today, a situation that will be exacerbated in the IoT (Zhang et al., 2015). Hence, a remedy is necessary to enhance the privacy needs of the users in these services and fog computing is a strong candidate to provide this.

Figure 1. Fog computing proposed as a gateway in between cloud computing and IoT