Chapter 5
Security in Mobile Cloud Computing

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ABSTRACT

Cloud computing is a new and promising technology that is transforming the paradigm of traditional Internet computing and probably the whole IT industry. Cloud computing is predicted to expand in the mobile environment leveraging on the rapid advances in wireless access technologies. These mobile applications are built around mobile cloud computing techniques and models. In the Mobile Cloud environment, users can remotely store their data as well as enjoy high quality on-demand cloud applications without the limitations of having to purchase and maintain their own local hardware and software. However, data security is still a major concern and is the main obstacle preventing cloud computing from being more widely adopted. This concern originates from the fact that sensitive data stored in the public clouds is managed by commercial service providers who might not be totally trustworthy. As such, there are several security and privacy issues that need to be addressed. This chapter gives an overview on the cloud computing concept followed by a description on mobile cloud computing and the different security issues pertinent to the mobile cloud computing environment.

1. INTRODUCTION

Cloud computing has grown rapidly in the past few years in tandem with the increase in the network bandwidth, mature virtualization techniques, and emerging cloud-based business demands. Mobile devices will overtake the PCs as the most common web access entities worldwide by 2013. Thus, the future Internet work environment will be a mix of cloud computing with mobile technologies. Mobile Cloud Computing (MCC) refers to an infrastructure where both data storage and data processing are done outside of the mobile devices from which an application was launched. In addition, a mobile entity is limited not only to a mobile device, but more importantly; it encompasses

the cloud resources, infrastructure, services, and the users. In the same context, MCC is a cloud system where mobility involves the infrastructure, resources, services, user devices, and even people. Unlike standard computing, MCC has given rise to several issues which evoke reluctance and fear on the part of the users. Some of these issues include concerns privacy, data ownership, and security. Many of these concerns are highly relevant, especially, to mobile devices (Alizadeh, Hassan, Behboodian, & Karamizadeh, 2013; Khorshed, Ali, & Wasimi, 2012; Ko, Lee, & Kim, 2012; Popa, Cremene, Borda, & Boudaoud, 2013; Singh & Shrivastava, 2012). The primary focus of this work is an overview of security in MCC, but it is important to have a complete understanding of Cloud Computing in order to fully grasp the concept of MCC and security in MCC.

The rest of the chapter is organized as follows: Section 2 presents an overall look at the Cloud Computing, in the following section 3 we will focus on Mobile Cloud Computing. Section 4 includes the Mobile Cloud Computing Security. Section 5 will discuss about existing works in securing Mobile Cloud Computing. Finally we will conclude in section 6.

2. CLOUD COMPUTING

Cloud Computing has greatly facilitated the sharing of resources and common infrastructure. This had made it possible to provide on-demand services over the network to fulfil a wide range of today's business needs. In this type of dynamic business environment, the last user has no knowledge about the location of accessible physical resources and tools. Evolving, utilizing, and managing their applications 'on the cloud' involve virtualization of resources that keeps and directs itself are conducted by available facilities to users. The description of Cloud Computing by scientists at the U.S. National Institute of Standards and Technology (NIST) was influenced by an earlier guideline of the Cloud Security Alliance. Researchers have collaborated with the NIST to come out with the Working Definition of cloud computing, and generally, it has been well accepted. Thus, there was coherence and unanimity around a common language, and we can pinpoint on applicable cases rather than semantic nuance. As a result, organizations world-wide used and applied this guide. The NIST, however, is a US government organization, and the wide acceptance of this definition should not suggest that differing view's or views of other countries are ignored. The NIST definition of Cloud Computing comprised five essential qualities, three cloud service models, and four cloud deployment models. Table 1 shows a schematic representation of the definition, and further explained in the following subsections (Brunette & Mogull, 2009; Mell & Grance, 2011; Mirzaei, 2008; Subashini & Kavitha, 2011).

2.1. Service Models

Software as a Service (SaaS), sometimes introduced as a Service or Application Clouds, a particular cloud is responsible for a particular business function and business activities, that is,

Table 1. NIST visual model of cloud computing definition

Essential Characteristics	Broad Network Access	Rapid Elasticity	Measured Service	On-Demand Self-Service
	Resource Pooling			
Service Models	Software as a Service (SaaS)	Platform as a service (PaaS)	Infrastructure as a Service (IaaS)	
Deployment Models	Public	Private	Community	Hybrid

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