Chapter 17
An OMA DM Based Framework for Updating Modulation Module for Mobile Devices

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ABSTRACT

Due to the rapid advancement of mobile communication technologies, the demands for managing mobile devices effectively to fulfill various functionalities are on the rise. It is well known that mobile devices make use of different kinds of modulation approaches to adapt to various channel conditions. Therefore, in this paper, the authors propose a framework of Modulation Module Update (MMU) for updating the modulation module on the mobile device based on OMA DM. The management object for updating modulation module and the parameters associated with it are defined in the framework, and three operation phases are defined in this framework as well.

INTRODUCTION

Mobile wireless technology has gained tremendous popularity due to its ability to provide ubiquitous information access to users on the move (Sandeep et al., 2004; Siddiqui & Zeadally, 2006). With the rapid advancement of the mobile communication technologies, mobile device gains more functionalities and higher intelligence. However, the development of these technologies has also raised a range of requirements such as the firmware update over-the-air (OTA) (Hoffmeyer et al., 2004). Furthermore, as the demand of high quality services in next generation wireless communication systems increases, high performance of data transmission requires an increase of spectrum

efficiency and an improvement of error performance in wireless communication systems (Choi & Lajos, 2001; Seshadri Sastry & Prasad Babu, 2010). Generally, mobile devices make use of different kinds of modulation approaches to adapt to channel conditions. Therefore, update of the modulation module by downloading modulation modules over-the-air can be an effective way to satisfy the requirement. In this paper, we propose a framework for the update of the modulation module on the mobile devices based on Open Mobile Alliance Device Management (OMA DM) (http://www.openmobile alliance.org).

The remainder of this paper is arranged as follows. First we describe the OMA DM standards and latest developments of applying OMA DM in updating software in mobile devices. Next we present the design of a framework to update the modulation module based on OMA DM. Finally we show the details of the design and implementation of the framework and conclude this paper.
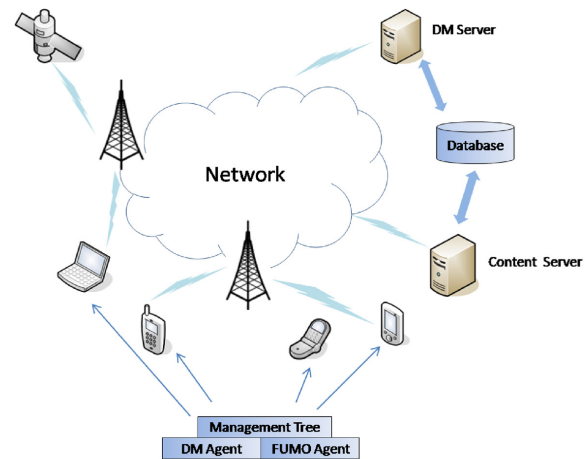
OMA DEVICE MANAGEMENT

OMA DM is developed by Open Mobile Alliance (OMA) primarily to standardize the device management functions, which is intended to support the typical uses, such as configuring devices, enabling and disabling features, updating software packages or fixing bugs, reporting error of the device, and so on (Steinke & Strohmenger, 2007; Lim et al., 2008; Ma et al., 2008). The DM working group of OMA is mainly responsible for the revision and publication of OMA DM specifications (Husain et al., 2008).

OMA DM Architecture and FUMO

A simple architecture of OMA DM for firmware update is shown in Figure 1. As shown in Figure 1, DM Server is the server-side implementation of the OMA DM protocol. Its task is to manage OMA DM compliant devices using different management operations, e.g., provisioning, con-

Figure 1. OMA DM architecture

figuration of device, updating software, and fault management (Shi et al., 2007). Content Server is in charge of providing and managing the software packages and multi-media contents for the software upgrades and bug fix of the mobile device.

The device to be managed is composed of hardware components, software modules for managing the hardware components, and device management agent that performs software updates/managements and firmware updates by connecting to the OMA DM server (State et al., 2004).

Each device that supports OMA DM contains a Management Tree. The Management Tree organizes all available management objects in the device in a hierarchical tree structure where all nodes can be uniquely addressed with a Uniform Resource Identifiers (URI) (OMA, 2008; IETF, 1998). DM Server realizes the management actions by manipulating the nodes in a device management tree.

DM Agent is a software component that resides in the mobile device. It is used to process the messages received from the DM Server, including parsing messages from DM Server, interpreting OMA DM commands, and executing relevant actions in the device. In addition, the DM agent can also generate relevant responses and send them back to the DM Server.

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