Chapter 4
IoT–IMS Communication Platform for Future Internet

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ABSTRACT

In recent years, Internet of Things (IoT) and Cloud Computing are the hottest issues of Future Internet. However, there is a lack of common fabric for integrating IoT and Cloud. In telecommunications, the IMS (IP Multimedia Subsystem), based on the All-IP and Open Services Architecture, has been regarded as the trend for Next Generation Network (NGN). The IMS communication platform is the most suitable fabric for integrating IoT and Cloud. This paper focuses on different aspects including Cloud Service Framework, Data Sensing and Communication Technology, Collaborative Authentication and Privacy Protection Mechanism, Operation, Administration, and Maintenance (OA&M), Mobility and Energy-Saving Management, and Application Services. This paper not only provides the discussion of open challenges, but also proposes a possible solution based on the above-mentioned aspects for Future Internet.

INTRODUCTION

Future Internet is a collection of data communication network technologies in the future. The IoT (Internet of Things) is the most important concept of Future Internet for providing a common global IT Platform to combine seamless networks and networked things. In the future, people will be connected Anytime, Anyplace, with Anything and Anyone, and appropriately utilizing Any network and Any Service. In other words, the IoT addresses the Convergence, Content, Collections, Computing, Communication, and Connectivity between people and things (CERP-IoT, 2009).

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Cloud Computing (Armbrust et al., 2010) is regarded as the backend solution for processing huge data streams and computations while facing the challenges of everything will be connected with seamless networks in the future. Cloud technologies can provide a virtual, scalable, efficient, and flexible data center for context-aware computing and online service to enable IoT.

Both the IoT and Cloud Computing are the trends of Future Internet. However, the developments of IoT technology are diversity and are not interoperable. On the other hand, the cloud computing solutions are depended on service providers. Since many international organizations are devoted to work out their specifications for providing a common architecture of networks and software. Under this consideration, we regard the IP Multimedia Subsystem (IMS) is the ideal solution for fulfilling the requirements. However, there are still many challenges for IMS being the network and software fabric between IoT and Cloud. In this paper, we will discuss the open challenges and propose the possible solutions for Future Internet.

DISCUSSION OF OPEN CHALLENGES

CERP-IoT has classified the IoT supporting technologies into 13 categories and discussed some possible technologies (CERP-IoT, 2009). However, the possible technologies for enabling IoT are diversity and are not interoperable. Hence we propose the IMS-based possible solutions to fulfill the requirement of these 13 IoT supporting technologies as in Table 1. Furthermore, we also discuss open challenges with different aspects including Cloud Service Framework, Data Sensing and Communication Technology, Collaborative Authentication and Privacy Protection Mechanism, Operation, Administration, and Maintenance (OA&M), Mobility and Energy-Saving Management, and Application Services.

Table 1. IoT supporting technologies and possible solutions

Supporting Technologies	Possible Solutions
Identification Technology	IMS/SIP URI
IoT Architecture Technology	IMS Architecture
Communication Technology	IMS-SIP Protocol
Network Technology	IMS All-IPv6 Transport
Network Discovery	IMS Service Discovery
Software and algorithms	IMS Service Architecture
Hardware	SDR (Software Defined Radio) and CR (Cognitive Radio)
Data and Signal Processing Technology	IMS and Cloud Computing
Discovery and Search Engine Technologies	IMS and Cloud Computing
Relationship Network Management	IMS Architecture
Power and Energy Storage Technologies	SDR, CR, and CN (Cognitive Network)
Security and Privacy Technologies	IMS Security Architecture
Standardization	3GPP (IMS)

Cloud Service Framework

Cloud Computing can be regarded as an enabling technology for processing IoT Services. As mentioned before, cloud computing solutions are depend on service providers and are not compatible with each other. Without a common service framework and communication interface, we will need to implement different access methods between different clouds on IoT. IMS has provided a common service framework based on All-IP transport and SIP (Session Initiation Protocol) for telecommunications. Cloud Computing technologies can be utilized to improve the scalability and efficiency of IMS architecture. However, in order to support IoT services, the following issue should be addressed.