A Method for Providing Remote Access Functions and Home Media Sharing Services in Cloud Environment

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Abstract. Because of the increasing number of multimedia files, the storage ability and computing resources of a single computer are no longer sufficient for satisfy the demand of home networks. With respect to providing home media services, home network technologies have a limitation in that the technologies work only in a home network. Therefore, in this paper, we propose an efficient method that uses cloud computing to store, process and manage a large amount of multimedia content, as well as a remote access technology to receive home media services in WLAN and in a home network. For exchanging information between a cloud and a home network, Assist Gateway is proposed. Assist Gateway can obtain information of multimedia content from a cloud and provide it to the users. Moreover, the users can control the media devices deployed in their home network through Assist Gateway; this is the most important advantage of the proposed method.

Keywords: UPnP, Cloud Computing, Remote Access, Home Network, Assist Gateway

1 Introduction

UPnP (Universal Plug and Play) is the most important protocol in a home network. It is a technology used for sharing device functions and services. Further, DLNA is an international standard for the home network technology supported by a collaboration of major companies. These are efficient technologies for sharing and using multimedia content between various heterogeneous devices in a home network. However, the limitation of these technologies is that they work only in a home network. The function of remote access is not efficiently used and has been studied only to a limited extent. To solve this problem, many studies that aimed at supplement multimedia sharing and playing technology with remote access functions in UPnP were conducted [1] [2]. Because of the increasing number of multimedia files, the storage ability and the processing power of a single computer are no longer sufficient for satisfying the demand for processing large amounts of media content for mobile media services. To solve this problem, we propose an efficient method that uses cloud computing to store, process, and manage a large amount of multimedia content, as
well as a remote access technology to receive home media services in WLAN and in a
home network. The proposed method consists of four components—namely, Cloud
Computing, Assist Gateway, Media Device, and UI—for providing optimized home
network service.

The remainder of this paper is organized as follows: Section 2 discusses the related
work for a better understanding of the proposed method. Section 3 describes the
proposed method and explains its main functions. Finally, Section 4 concludes the
paper.

2 Related Work

Nowadays, many researchers are studying the sharing of multimedia content and the
communication between home networks. In [1], a new service for multimedia sharing
was proposed. This service provided a content exchange between users’ homes as
well as access to its own content in a nomadic situation. In [2], the researchers
proposed the architecture to provide an efficient in-home media content distribution
mechanism associated with a home gateway in order to enable local and P2P content
sharing on home networks.

All the cited research related to home networks focus on the efficiently
transmission and sharing of multimedia content between home networks. However,
the main drawback of all the above mentioned approaches is their inability to ensure
scalability and safety for storing multimedia content in the proposed systems.
Therefore, in this paper, we propose a method to solve the above mentioned problems.

3 Proposed Method

In the system model of proposed method, we assume that all the multimedia content is
stored and managed in cloud server. Cloud computing technology is a scalable and
efficient solution for storing and managing huge amounts of multimedia content. For
obtaining information of multimedia content from cloud and providing it to the users,
we designed Assist Gateway for a home network. Assist Gateway is similar to the
remote access server offered by the UPnP Remote Access Architecture and the media
server proposed by the UPnP AV Architecture. The UI of a mobile device installed
with UPnP has a control point function of UPnP. Further, it performs the function of a
remote access client of the UPnP Remote Access Architecture that connects with
Assist Gateway using a VPN tunnel. By using the VPN tunnel, the UI can
communicate with Assist Gateway and obtain information of multimedia content from
it. Assist Gateway must obtain and store the information of multimedia content from
cloud. The stored information is managed by a Content Directory Service for
providing the information to users by functioning as the Media Server of the UPnP
AV Architecture.

The multimedia content is stored and managed in the cloud server in order to make
it accessible for Assist Gateway. In order to improve the adaptability and
practicability of the proposed method, we designed a multimedia transcoding module
in cloud. The transcoding module can convert the stored multimedia content in the cloud into a uniform format and size. The converted multimedia content is played on various heterogeneous devices. In order to facilitate personalization, the Xen technology is used for offering a virtualization service to the users. Moreover, the OAuth technique is implemented for supporting user authentication in the cloud environment.

![Architecture of the proposed method](image)

**Fig. 1.** Architecture of the proposed method

4 Conclusions

In this paper, we proposed a method for providing personal multimedia service in WLAN as well as in a home network. We utilized cloud computing technologies to store and manage the multimedia content. By using the proposed method, the users could utilize the multimedia service commodiously and securely.

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**References**
