Chapter 11
Interworking of IP Multimedia Subsystem and Vehicular Communication Gateway

Wei-Kuo Chiang
National Chung Cheng University, Chiaya, Taiwan, R.O.C.

An-Nie Ren
National Chung Cheng University, Chiaya, Taiwan, R.O.C.

ABSTRACT

In recent years, more and more people dream of experiencing various IP-based multimedia application services when they are driving through their car. However, those multimedia devices in the car may use different communication protocols such as X.10, Havi, Jini, UPnP and SIP. In order to provide a variety of IP-based multimedia services to those users in the car, the authors mainly investigate the issue of interworking between IP Multimedia Subsystem (IMS) and telematics of the vehicular industry. A service-integrated platform, Open Service Gateway Initiative Service Platform (OSGi SP), has been proposed to act as a Residential Gateway (RGW) and to administer the communication between the vehicular environment and Internet. Besides, a Home IMS Gateway (HIGA), which can be implemented on a NGN RGW, has been developed by Home Gateway Initiative (HGI) since 2005 to collect the relevant information of in-car users, devices and services and to manage the IMS sessions for the in-car devices that do not support IMS functions. With these techniques, the users can enjoy their digital life by interacting with the home/vehicular network from anywhere.

INTRODUCTION

Vehicular network has emerged as a hot research issue recently. More and more people want to experience a variety of IP-based multimedia application services when they are driving through their cars. However, those devices on the car may use different communication protocols. Due to the lack of interoperability between all devices on the car, a service-integrated platform is needed to provide the characteristic of interoperability. On the respect of home network environment, it will encounter this problem as well. With the wide spreading of the digital home products, Home Networking has gradually been becoming a popular issue in recent years. The Home Networking is a way to manage all

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kinds of network devices or home electrical appliances; it allows the users to operate and manage theses networking electrical appliances through a unified interface or platform. These electrical appliances represent all kinds of facilities that have specified functions and could be controlled or administered by using specified network media or technology, e.g., X.10 device, HAVi device, Jini device and UPnP device. One of the goals of the Home Networking is to control the in-house electrical appliances from the external network by using hand-held devices (such as mobile phone, PDA) to connect to the home gateway through the IP network, and thus to control the electrical appliances inside the Home Networking (e.g., lamps, air-conditioner, TV). Besides, if there happens any status changing to the in-house devices, it (the networking system) could notify the user immediately. In addition to the Home Networking technology, we could also treat a car/vehicle or any public transportation as a mobile home network to integrate the home network and telematics of the vehicle industry. In order to fulfill these goals, there are yet some issues necessary to be discussed, e.g., security, mobility, the interoperability among the communication protocols, etc.

In recent years, because the growth speed of the mobile devices and in-house network devices becomes very fast and the communication protocols and home network/vehicular communication technologies have undergone diversified changes, these have made the intercommunication among the-mentioned devices to be more difficult. For example, the communication protocols adopted by the in-house/in-car devices could probably be UPnP, IP and SIP; therefore, an Open Service Gateway Initiative (OSGi) has been proposed to construct a service-integrated platform among the Home Networking, vehicular communication environment and the Internet.

Because the SIP communication protocol possesses the capabilities of security mechanism, event notification, media streaming and mobility management among the terminals, so, concerning the applications of remote accessing the home/vehicular network, we will discuss how to support SIP on OSGi platform, how to utilize SIP as an unity way for message control, and we will further probe and discuss the mapping of control messages between SIP and UPnP in order to solve the interoperability problems among the devices that adopt different communication protocols.

Since the IP-based network technology has become more popular, the future communication network will move toward the service integration of the all-IP network and use the IP Multimedia Subsystem (IMS) as a core network to provide a variety of multimedia services. Therefore, integrating the IMS and the vehicular communication environment will be a developing trend for future network service providers. A user could then monitor the in-car devices or access the data in the multimedia storage device through his mobile device in anytime and anywhere, this will bring the user a richer experience in vehicular communication network.

RELATED WORKS

SIP (Session Initiation Protocol)

SIP (Session Initiation Protocol) (Rosen et al., 2002) is a communication protocol developed by the MMUSIC (Multiparty Multimedia Session Control) task group of IETF (Internet Engineering Task Force). SIP is an application layer protocol for session control and signaling control, it could be used to initiate, modify and terminate sessions. The SIP application range is very extensive, including voice and video calls over Internet, video conferencing, presence service, event subscription/notification and instant messaging. In November of year 2000, SIP has been accepted by (The Third Generation Partnership Project [3GPP], 2009) to become the protocol for conveying communication control _ignaling and has been applied in the IMS (IP Multimedia Subsystem) infrastructure of