

A New Service Based on CDMA Short Message System—Roaming Advertisement

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Abstract:

Through the comparison of the features of GSM and CDMA short message services, the paper shows that the CDMA short message center has stronger service capability and provides more value-added services.

As the forerunner of the wireless data service, the short message influences people's daily life more and more. In 2001, the quantity of GSM short message reached 5 billion. Leading operators have aimed at this market and developed the roaming greeting service based on GSM short message centers. If the user roams into another city, he will receive a roaming greeting message from the city. But to offer this function, the mobile switching system (MSS) and short message system (SMS) need to be modified, and the GSM short message center can only serve users roaming into the local area and offer a single service.

At present, China Unicom (CU) has constructed CDMA short message centers in all provinces and cities around China. So relying on the center, CU will definitely offer more value-added services for users.

1 Service Description

In a CDMA system, the advertisement services realized by the CDMA short message center include the service area broadcast function and the all-user broadcast service.

But the service area broadcast function can only send advertisements to the users in the

service covered areas and can't offer roaming and tracing services for the users in the local provinces and cities served by the short message center. All-user broadcast can't provide the service information aiming at areas where the user is located at present and can't offer advertisements based on roaming function or other service information.

A new service based on CDMA short message system—roaming advertisement service possesses tracking service function for the users in home cities. If the user obtains the required information from Internet service provider/Internet content provider (ISP/ICP), she or he can receive special information about the location at present whether he is in the local area or in a roaming area. The contents of the advertisement information are provided by ISP and ICP, including the local news, tour information, discount information of hotels, shopping information of marketplaces, etc. At the same time, when the user roams into other provinces and cities, he can receive information such as the news from the home area. Of course it can provide advertisement information and content by extended short message entity (ESME).

Roaming advertisement service is put forward on the base of the roaming greeting and moreover, it can change the roaming greetings into roaming advertisement information. The following illustrates the application of the roaming advertisement service with greetings, suppose the CDMA short message center that the user belongs to is located in Anhui Province.

(1) When the user roams outside, and arrives at the roaming area just now, he can receive roaming advertisement or a piece of roaming greeting short message. For example: if the user of Huangshan roams into Shanghai, he will receive: “You have arrived in the Chinese financial center—Shanghai. The people of Huangshan are missing you!”

(2) When the roaming user changes the roaming area, he can also receive a roaming advertisement or roaming greeting short message. When the user of Huangshan comes to Beijing from Shanghai, he will receive such a roaming greeting short message as soon as he arrives in Beijing: “You have arrived in the Chinese political, economic and cultural center—capital Beijing. The people of Huangshan hope you enjoy your stay in Beijing!”

(3) When a user roams into another province or city, he can also receive a roaming greeting short message. For example: arriving in Huangshan of Anhui province, the Beijing user can receive a roaming greeting short message: “Welcome to our guest from Beijing! Huangshan is a world famous scenic spot, where the famous ‘welcoming-guest pine’ is located.”

(4) Users roaming among the different service areas of Anhui Province can also enjoy a roaming greeting short message service. The service areas are divided according to the districts in the province. If mobile switching center (MSC) service covers several districts of regions or cities, virtual mobile switching center (VMSC) must be adopted to differentiate the districts and each VMSC serves a district. The following is accomplished according to the division of different districts within the province through VMSC.

In the time of roaming advertisement service, the advertisement information renewal can be sent for the users to obtain the in-time service. When the service is used as roaming greeting and if the roaming user can't be contacted (e.g., telephone powered off or the calling channel has no response), the same roaming greeting short message should not appear when the user is contacted later.

2 Service Implementation

The service flow of roaming advertisement ser-

vice is divided in two stages: service content formation and advertisement sending. The latter is the same as sending common short messages, that is to say, the service content of ISP/ICP is sent to mobile station (MS) by CDMA short message center through short message gateway. However the former has distinctiveness—the formation of content is associated with the roaming of MS. Mobile center (MC) provides transparent channel, then service providers decode and translate according to the information of special service code, and then combine the data of decoding and translation with the contracted contents of the requirement information registered by users in ISP/ICP location to form into advertisement and greetings. Therefore operators can provide ISP/ICP with the corresponding database of the actual district name about MSC identity (MSCID) and home location register (HLR) number.

The following discusses the implementation scheme of roaming advertisement in three instances: roaming out (roaming out of the province), roaming in (roaming into the province) and roaming around the province, with emphasis on the formation of service contents.

(1) Roaming out

For the instance of roaming out, HLR of home location distinguishes the roaming location according to the roaming location renewal information and constructs the information contained destination address to send to home MC. According to registered information flow, the new service system visited location register (VLR) provides MSC number of the new service system and users' directory number (DN) for the registered information regnot of home HLR; the home HLR conserves the numbers of MSCID and DN, and at the same time, when sending register and notifying information to VLR of the new service system and receiving the returned result regot, triggers home HLR to construct short message (SM) based on MSCID, DN and destined address; after transparent transmission of MC according to the destined address, the SM gateway adopts SMPP protocol to send the information to ISP/ICP and according to the translation of MSCID, ISP/ICP combines the service classes

of the users' contract to form corresponding roaming advertisement information and accomplish the whole sending process of SM.

(2) Roaming in

In the case of roaming in, the roaming VLR obtains globe title (GT) number according to the roaming information to distinguish the user's home HLR, and the MSC in roaming area constructs a corresponding short message with special service code to send to the MC of the roaming area.

According to registered message flow, when the home HLR of the original service system returns and registers message register to the new service system, the processing flow is as follows:

It will offer the home HLR number and DN number (the home HLR can compute the home HLR according to the signaling link GT and user's DN number);

MSC/VLR of the new service system conserves the home HLR and DN numbers;

At the same time, the triggered MSC constructs SM according to the home HLR number, DN and the service code roaming advertisement service code (OPNO);

After transparent transmission of MC according to the destined address, the short message gateway adopts SMPP protocol to send the information to ISP/ICP;

According to the translation of MSCID combines the service classes of the users' contract to form corresponding roaming advertisement information and accomplish the whole sending process of short message.

In the same manner the news of hometown and local cities can be formed.

(3) Roaming Among the Service Areas Within MSC

In the case of roaming into and roaming among the districts of a province, the virtual mobile switching control (VMSC) mode can be adopted. In a CDMA network, the MSS systems from various manufacturers can provide the VMSC function. Because of the corresponding relationship between VMSC and districts, the system can adopt the inner register information flow of roaming among VMSCs.

First, HLR receives the inner register information sent by MS when roaming into new VMSC, then triggers the home HLR to form

short message according to virtual MSC number (VMSCID), DN and destination address.

After transparent transmission of MC according to the destined address, the short message gateway adopts SMPP protocol to send the information to ISP/ICP and according to the translation of MSCID forms corresponding roaming advertisement information and accomplishes the whole sending process of SM.

(4) Roaming Users Cannot Be Contacted

When the advertisement information is used as roaming greetings, if the condition appears that the roaming user can't be contacted in a roaming area (the user powers off telephone or the calling channel has no response), and if the user doesn't change his location, when the user can be contacted again, he will not receive any roaming greetings. So, when registering information, the system must register MSCID (or CMSCID) of roaming MSC (or roaming VMSC). When MS can't be contacted and later is registered again, the system will compare MSCID (or VMSCID) to decide whether to send roaming greetings.

3 Prospect of the Service

The roaming advertisement service is a kind of tracking service, the expansion of which needs the operators to send roaming information to ISP/ICP. Based on the user's registered contract and the information of the user's location, ISP/ICP sends roaming advertisement at a fixed time. The emergence of the service, only putting forward a close cooperation mode for the operator and ISP/ICP, can promote the development of more practical services, and make the operators, equipment manufactures and service providers obtain mutual profits to advance the growing development of CDMA wireless data services. **ZTE**

Reference

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Biography

Shen Guoqiang received his B.S. degree in electronic engineering from Xi'an Jiaotong University in 1990. He is currently a senior engineer with ZTE Corporation. His main research interest is WAN.