

A scheme to provide Number Portability to Mobile IPTV

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Abstract— This paper is about the scheme to provide number portability to additional service of mobile IPTV system. In this paper, we present system and packet structure to realize number portability of additional service of mobile IPTV.

Keywords— mobile, IPTV, number portability, system

I. INTRODUCTION

This paper presents number portability system for mobile IPTV. It includes mobile IPTV management server, additional service provider server, IP network, wireless transfer network, mobile IPTV terminal device and number portability DB.

We want to explain number portability of mobile IPTV by using more general system scheme. Numerous additional services can be introduced into mobile IPTV because of the capacity of two-way data communication of mobile IPTV. We devised number portability system for additional service of mobile IPTV.

II. GENERAL CONCEPTS OF NUMBER PORTABILITY

There are two methods to realize number portability in intelligent network. The one is QoR(Query on Release) and the other is ACQ(All Call Query). We explain about the two methods concisely to explain number portability system for mobile IPTV.

ACQ and QoR are based on intelligent network. The two method use number portability database to know recipient network.

A. Concept of QoR method

The concept of QoR is same as figure1. If someone make a call, then the originating network routing that call to donor network by using DN(dialled number) firstly. The donor network searches its customer database and if the called people is not exist in its customer database, then sends “ported out” message to originating network. After receiving that message, originating network query routing number to the NPDB(number portability database by using dialled number. NPDB respond to the originating network’s query by routing number (RN). After that, the originating network route the call to the recipient network by using RN and DN.

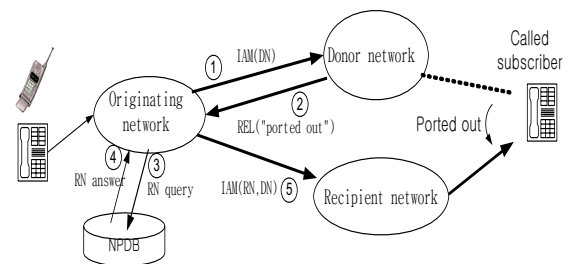


Figure 1. Concept of QoR

B. Concept of ACQ method

The concept of ACQ is same as figure2. If someone make a call, then the originating network query routing number to the NPDB(number portability database by using dialled number firstly. NPDB respond to the originating network’s query by routing number (RN). After acquired routing number, the originating network routing that call to the recipient network by using DN(dialled number) and RN.

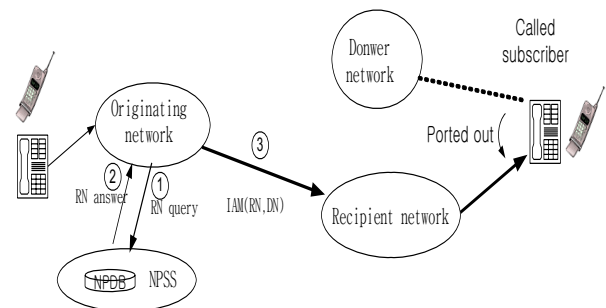


Figure 2. Concept of ACQ

III. NUMBER PORTABILITY SYSTEM FOR MOBILE IPTV

In this chapter, we present a system such as Figure3 to provide number portability for mobile IPTV. This system consists of various servers, NPDB(number portability database) and interconnection between each components.

A. Additional service system for mobile IPTV

Additional service system for mobile IPTV is same as follows.

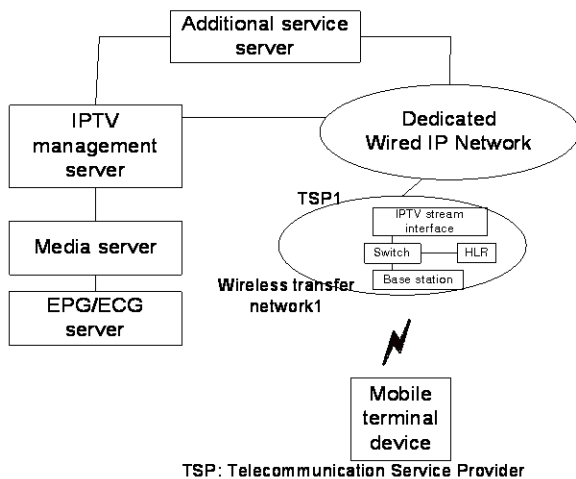


Figure 3. Additional service system for mobile IPTV

Figure3 shows simplified additional service system for mobile IPTV. In this system, mobile IPTV service can be provided by IPTV management server, media server, additional service server, dedicated wired network and wireless transfer network. Generally, service providers use their own dedicated networks to guarantee QoS.

IPTV management server consists of subscriber management server, conditional access server and provisioning server etc. This server store subscriber's profile and provide provisioning of user terminal device using conditional access system.

Media server provides IPTV system with media streaming. Media server should have sufficient capabilities for streaming. The location of media server is designed according to the load of media streaming and type of streaming. In mobile IPTV system, user's terminal device can be a media server as well as service provider (SP).

EPG/ECG server provide electronic program guide (EPG) and electronic content guide (ECG) to subscriber. EPG/ECG servers are connected to the IP network and communicate with IPTV management server, media server, additional service server and user's mobile IPTV terminal device. The contents of EPG/ECG are continuously updated through IP network. Mobile terminal device can receive linear TV channel, can receive VOD channel and can enjoy any two-way media contents. Mobile IPTV terminal device even can be a media server or additional service server for another subscriber.

Dedicated wired IP network is essential parts of mobile IPTV system because we need high quality managed network to guarantee quality of service (QoS) of mobile IPTV and QoS of additional service for mobile IPTV. Dedicated wired IP network should be optimized for transmitting of contents of mobile IPTV and contents of additional services for mobile IPTV.

Wireless transfer network is an end network to transmit of contents of mobile IPTV to user. Through this network,

contents can be transferred from SP to user and user can transmit content to another mobile IPTV user or user group.

Wireless network can acquire the state of radio channel and send it to the IPTV management server. Management server determine QoS by using the received channel data and user profile after that it allot QoS to mobile terminal device.

Wireless network has limited bandwidth for communication. Therefore, to overcome limited bandwidth of wireless transfer network, multicast technology such as MBS(multimedia Broadcasting Service), MBMS(Multimedia Broadcast and Multicast service) and IEEE 802.16m can be used at wireless transfer network and mobile terminal device. By using all technology mentioned above, mobile terminal device have two way communication capabilities.

We want to provide additional service on this mobile IPTV system by expanding its basic functions and adding a new server. The additional service can use the two-way communication capabilities of mobile IPTV terminal device.

To provide additional service, we added additional service server to general mobile IPTV system. This additional server can be multiple servers according to the number of additional service. Additional service server is connected to management server and IP network by using TCP/IP protocol

In this system, additional service can be provided to mobile terminal device by using additional service server. Firstly, additional service server should be registered to IPTV subscriber management server, then modify EPG or ECG according to their additional service. In case that the content should be stored at the media server, additional service server store related contents into media server before the service. After that, additional service server can provide additional service to mobile IPTV terminal device. Service sequence is same as follows.

- Registration of addition service content on media server
- Registration service list and summary of service on EPG/ECG server
- Transmit the EPG/ECG to mobile terminal device
- Mobile IPTV terminal device select a additional service
- The selection of subscriber sends to addition service server
- Additional service server query on management server that the request of subscriber is legal.
- Additional service server provide additional service by using media server
- If any request occurs when the additional service is providing, the media server can respond about it.

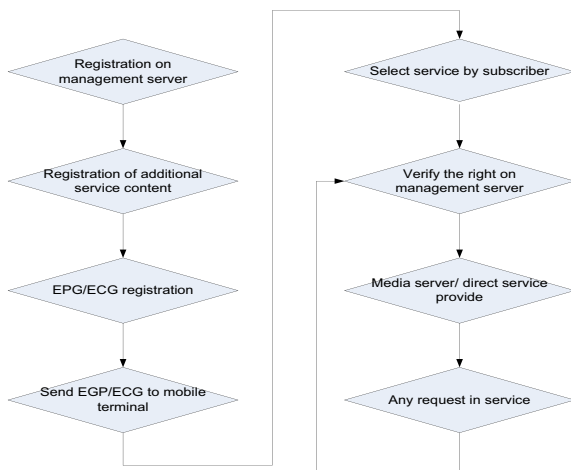


Figure 4. Additional service procedure

Mobile terminal device can be provided additional service by selecting EPG/ECG or by pushing special button of mobile terminal device. Control signal of user is transferred to the service server through wireless network and dedicated wired IP network.

B. Number portability system for mobile IPTV

In this chapter, we present number portability system for mobile IPTV. In this system, NPDB are located at IPTV management server and TSP(Telecommunication Service Provider).

In figure 4, IPTV management server is connected to NPDB and TSP has NPDB in their networks. Number portability can be provided by QoR scheme or ACQ scheme.

QoR scheme is advantageous to the initial cost which is needed to setup the number portability. ACQ scheme is advantageous to the simplicity of network.

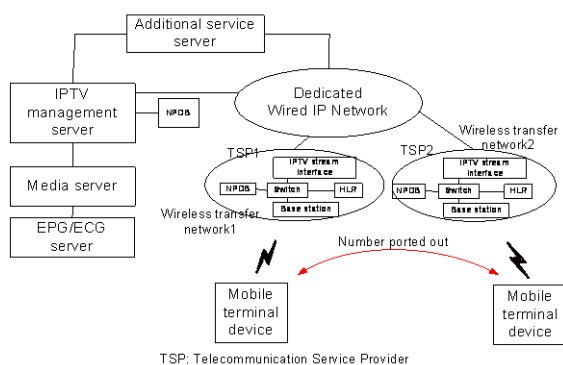


Figure 5. Number Portability System for Mobile IPTV

1) QoR Scheme to provide number portability

In this scheme, IPTV management server has NPDB and process number portability for mobile IPTV. If IPTV

management server sends a control signal to mobile terminal which is ported out from TSP1 to TSP2, then TSP1 send “ported out” signal to IPTV management server. After receiving “ported out” signal from TSP1, IPTV management server query on NPDB to know recipient network (final receiving network) and get routing number of recipient network. NPDB management server sends control signal to TSP2 by using routing number that is acquired from NPDB. Management server sends routing number to additional server. By using that number, additional service server sever send its control and content signal to TSP2(recipient network).

2) ACQ scheme to provide number portability

In this scheme, IPTV management server has NPDB and query on the NPDB before the sending a control message to mobile IPTV terminal device. IPTV management server queries NPDB to know routing number of recipient network (final receiving network). NPDB management server sends control signal to TSP2 by using routing number that is acquired from NPDB. Management server sends routing number to additional server. By using that number, additional service server sever send its control and content signal to TSP2(recipient network) directly.

C. Control packet for number portability for mobile IPTV

We should communicate between user mobile IPTV terminal device and additional service server of mobile IPTV in order to exchange control and number portability data. To exchange data, we devised special data packet structure. This packet may have important information such as user location, user ID, type of service, terminal device intrinsic number, number portability and type of terminal. Therefore, it should be encrypted during transmission.

Device number	Type of terminal	User ID	Type of service	Message serial number	User data 1	User data 2	User data 3	Number ported
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- Device number: intrinsic number of terminal device, 15 byte length
- Type of terminal: predefined type of terminal, 4byte length
- User ID: intrinsic user identifier, 15byte length
- Type of service: service type which user want to use, 7byte length
- Message serial number: serial number of packet message, 7byte length
- User data 1, user data2, user data3: data needed for additional service, each 90 byte length
- Number ported: status of number portability, 1byte, 1=ported out, 0= no ported out

Figure 6. Packet structure to control mobile IPTV service and to provide number portability for mobile IPTV

Packet structure for data exchange is same as Figure6. Packet has 9 data fields and each field has its own function.

- Device number: “device number” represents intrinsic number of terminal device. It has 15 byte length. It is used for verification and/or certification of mobile IPTV terminal device by additional service server.

- Type of terminal: it represents predefined type of mobile IPTV terminal device. It is determined by the resolution of display, communication capabilities, CPU capacity and function of terminal device. It has 4byte length. This field is important to additional service provider, because additional service provider can determine what kinds of service is possible by using this field.
- User ID: it represents intrinsic numeric ID of user. This ID is used to utilize user profile and certification process.
- Type of service: This field represents type of service which user wants to be provided. The value of this field is defined before the service. The additional service server can identify service that is wanted by user by checking this field. If this field is set to "0000", then it indicates that it is a packet from server to user terminal device.
- Message serial number: This field represents serial number of user message. It is generated from user mobile IPTV terminal device serially. We can detect error and identify message easily by checking this field.
- User data1~data3: These fields can contain any data which is less or equal then 90byte length. Any information can be sent from user to additional service server by using this field.
- Number ported: This field represents the status of number portability of mobile terminal. If it is "1" then the mobile terminal is ported out. If it is "0" then the mobile terminal is no ported out.

This packet structure is easy to implement and easy to operate and error detection. Total length of this packet structure is 488 byte. Therefore, it is easy to encrypt and transmit through narrow radio channel.

IV. CONCLUSIONS

Mobile IPTV system has two-way communication capability. We can do much useful things by using that capability.

In this paper, we present generalized number portability system for mobile IPTV additional service scheme, packet structure for control data and number portability status exchange. By using this structure, number portability for mobile IPTV will be possible. To use this scheme, we define specific packet structure to transfer control data and exchange of number portability status.

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