HUAWEI OCS

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Business Process Description

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About This Document

Intended Audience

This document describes the business processes of the HUAWEI Online Charging System (OCS).

This document is intended for:

- Policy planning engineers
- Technical support engineers

Change History

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Updates in Issue 01 (2010-07-28)

Initial commercial release.

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The Online Charging System (OCS) is an uniform charging platform that helps telecom network carriers to charge voice, data and multimedia services of fixed, mobile, and data networks.

1.2 System Networking
This chapter describes the typical networking and the function of each NE of the OCS system.

1.1 Concept of the OCS System

The Online Charging System (OCS) is an uniform charging platform that helps telecom network carriers to charge voice, data and multimedia services of fixed, mobile, and data networks.

The OCS system helps telecom network carriers to conform to the complicated operation environment, new services, different cooperators, and detailed customer types.

The OCS system can run on the Global System Of Mobile Telephone (GSM) network, Code Division Multiple Access (CDMA) network , Time Division Multiple Access (TDMA) network, Session Initiation Protocol (SIP) network and Next Generation Network (NGN).

In addition, the system can precisely realize the credit control to subscribers at a maximum. In this way, the risk of arrears can be reduced, and the revenue loss of carriers can be reduced accordingly.

The OCS system provides the functions such as:

- Product management

- Resource management

- Rating and billing

- Credit control

- Recharge center

- Call control

The OCS system is of good expendability and convergence. Through the convergence with external charging system, the OCS system can provide a uniform charging platform, a uniform service management platform and a uniform customer care platform for prepaid subscribers, postpaid subscribers and hybrid subscriber.

1.2 System Networking

This chapter describes the typical networking and the function of each NE of the OCS system.

The OCS system is the core charging system in the carrier networking. The core components of the OCS system, the SCP, CBP, and BMP, form the typical networking of the OCS system. With these components, the OCS system provides diversified interfaces for external systems and interacts with the external systems flexibly.

Figure 1-1 shows the typical physical networking diagram of the OCS system.
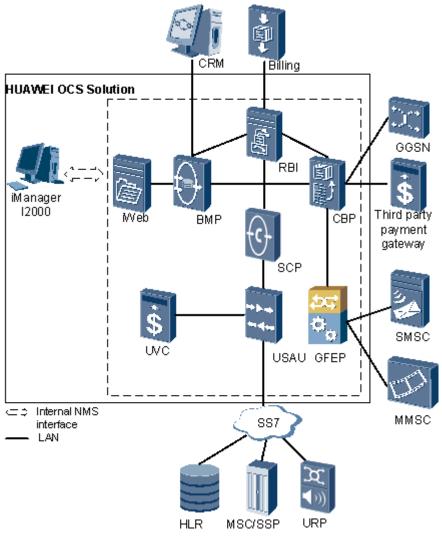
Figure 1-1 Typical physical networking diagram of the OCS

BMP: Business Manager Point   CBP: Convergent Billing Point

CRM: Customer Relations Management   GFEP: General Front End Processor

GGSN: Gateway GPRS Support Node   HLR: Home Location Register

iManager I2000: Network management system   iWEB: Report system

MSC: Mobile Switching Center   MMSC: Multimedia Messaging Service Center

RBI: Record Bill Interface   SCP: Service Control Point

SMSC: Short Message Service Center   SSP: Service Switching Point

SS7: No.7 Signaling Network   URP: Universal Resource Platform

USAU: Universal Signaling Access Point   UVC: Uniform Voucher Center

BMP

The BMP is the core component of the service operation management in the OCS system. The BMP manages the system, products, customers, resources, and charging and provides customer services. In certain networking, the BMP provides the third-party system with the WebService interface for handling customer services instead of directly providing the customer service function.

SCP

The SCP provides the call access and call control functions in the OCS system.

CBP

The OCS system separates the charging block from the SCP of intelligent networks and the mobile data service platform of data service networks. The CBP provides the charging and rating functions.

UVC

In the OCS system, the UVC system manages recharge cards, including the operations of generating, stocking, releasing, activating, and permanently locking recharge cards. Only the recharge cards in active state can be used. If certain recharge cards are damaged or the passwords of the recharge cards are disclosed, the recharge cards in active state can be permanently locked. The recharge cards that are permanently locked cannot be used.

GFEP

The GFEP converts protocols and forwards messages when other entities communicate with OCS entities. For example, when the SMSC communicates with the CBP, the GFEP converts the SMPP+ message sent by the SMSC to a Diameter message that can be identified by the CBP and sends the message to the CBP for charging.

The GFEP adopts the TCP/IP protocol to communicate with other entities. The SOCKET connection is built up for communication.

RBI

The RBI is the channel for record transportation between the CBP and billing center, operation system, and other systems. The RBI can also function as the channel for file transportation between any two OCS entities.

USAU

To meet the requirements for network development, Huawei provides a universal signaling access platform for IN products, namely, the USAU.

The USAU is based on the Open Standards Telecom Architecture (OSTA) platform, supporting the narrowband SS7 signaling protocol and broadband SIGTRAN protocol.

It has higher signaling link processing capability and integration degree than the traditional SAU and provides more powerful signaling access capability for:

- MSC/SSP

- HLR
- URP

2 Call Charging Processes

About This Chapter

In the OCS system, real-time charging for ordinary calls and forwarded calls is adopted. Calls are divided into the following types: calls from calling parties and calls from called parties.

Ordinary calls between subscribers are classified into the following types: ordinary calls between OCS subscribers and ordinary calls from OCS subscribers to other network subscribers. The following sections describe the processes of charging a calling party and a called party for the two types of calls, and the process for exception handling.

The forwarded calls are classified into the calls that are forwarded conditionally and the calls that are forwarded unconditionally. The following sections describe the charging process of each type of forwarded call.

This section describes the terms used in the call processes.

2.1 Overview

In the OCS system, real-time charging for ordinary calls and forwarded calls is adopted. Calls are divided into the following types: calls from calling parties and calls from called parties.

In the OCS system, after a voice call is triggered to the SCP through MSC/VLR/SSP, the SCP authenticates the incoming right and outgoing right of the call. After the call passes the authentication, the SCP sends a charging request to the CBP, and then the CBP authenticates and charges for the call, and the SCP controls the call. In this case, the OCS system can control, monitor, and charge for the call in real time.

The common call charging processes include the following types:

- Process of charging for an ordinary call
- Process of charging for a forwarded call

The following sections describe each call charging process in detail.

2.2 Process of Charging an Ordinary Call

Ordinary calls between subscribers are classified into the following types: ordinary calls between OCS subscribers and ordinary calls from OCS subscribers to other network subscribers. The following sections describe the processes of charging a calling party and a called party for the two types of calls, and the process for exception handling.

2.2.1 Process of Charging a Call Between Two OCS Subscribers

This section describes the process of charging for a call between two OCS subscribers from three aspects: calling process, called process, and exception handling process.

Process of Charging a Calling Party

Figure 2-1 shows the normal process of charging the calling party in a call between two OCS subscribers.
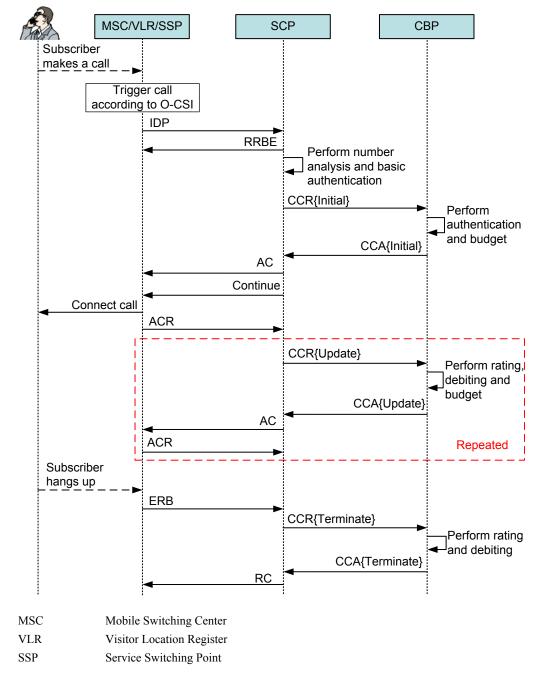
Figure 2-1 Normal process of charging the calling party in a call between two OCS subscribers

MSC	Mobile Switching Center
VLR	Visitor Location Register
SSP	Service Switching Point

The process is described as follows:

1. An OCS subscriber makes a call, and the call is forwarded to the MSC/VLR/SSP.

   The MSC/VLR/SSP sends an Send Routing Information (SRI) message to the HLR and obtains the Originating CAMEL Subscription Information (O-CSI) from the HLR. Then the MSC/VLR/SSP determines the SCP that the subscriber belongs to and the service that needs to be triggered according to the GT code and service key in the O-CSI.

2. The MSC/VLR/SSP reports the Initial DP (IDP) message to the SCP to start call control.

The IDP message contains the information such as the service key, calling number, and called number.

3. The SCP delivers a Request Report BCSM Event (RRBE) message to the MSC/VLR/SSP to request the dynamic configuration of the Event Detection Point (EDP).

   📖 **NOTE**

   > The MSC/VLR/SSP creates a Basic Call State Model (BCSM) for each call. Each call has a series of states. A detection point is set between two states, that is, a breakpoint in a call.

4. The SCP performs number analysis and basic authentication.

   The purpose of the authentication is to check whether the subscriber is an intra-network subscriber, whether the subscriber belongs to this SCP, whether the subscriber is in roaming state, and the call type (normal call or call to a special number).

5. The SCP sends a CCR{Initial} message to the CBP to initiate an authentication request.

   The CCR{Initial} message contains all the information required for charging, for example:

   ● **Service-context-id**: For example, **voice@huawei.com**.

   ● **request-type**: Here, the value is **Initial**.

   ● **request-action**: Here, the request action is fee deduction.

   ● **IN-Information**: This service information group of the intelligent network contains the information such as the calling number, called number, and charging processing type.

6. The CBP performs preprocessing, authentication, duration precalculation, and prededuction.

7. The CBP sends a CCA{Initial} message to return the authentication result and authorized duration to the SCP.

   The authentication result contains the information about whether the subscriber state is normal and whether to notify the subscriber of the small balance.

8. The SCP sends a Continue message to prompt the MSC/VLR/SSP to connect the call. In addition, the SCP delivers an AC message to monitor the call duration.

   If the call passes the authentication, the SCP determines the connection parameters. For example, the SCP may need to send an ATI message to the HLR to obtain the location of the called party.

9. The MSC/VLR/SSP connects the call and monitors the call duration of the subscriber.

10. When the call duration reaches a segment duration, the MSC/VLR/SSP reports an ACR message to the SCP.

11. The SCP sends a CCR{Update} message to the CBP to initiate a fee deduction request.

12. The CBP performs rating, debiting, duration precalculation, and prededuction.

    The rating procedure is as follows:

    Find the key value of the subscriber according to the charged number, find the product that the subscriber subscribes to according to the key value and the corresponding subscription relation, and then perform the price policy rule of the product to perform the rating.

    The debiting procedure is as follows:

    Invoke the debiting module according to the rating result and process flag (for example, fee deduction) to deduct fees from the account. Then rate the reserved service volume that is newly applied for and invoke the debiting module again for reservation.

13. The CBP sends a CCA{Update} message to return the processing result and precalculated duration to the SCP.

14. The SCP sends an AC message to instruct the MSC/VLR/SSP to continue the call and monitor the call duration.

15. When the call duration reaches a segment duration, the MSC/VLR/SSP reports an ACR message to the SCP.

   📖 **NOTE**

   > The interactions from step 11 through step 15 can be performed multiple times until either of the parties in the call ends the call or the account balance of the charged party is used up.

16. The subscriber hangs up, and the MSC/VLR/SSP reports an Event Report BCSM (ERB) message to the SCP.

17. The SCP sends a CCR{Terminate} message to the CBP to initiate a charging request and to request the termination of this Diameter message session.

18. The CBP performs rating and debiting.

19. The CBP sends a CCA{Terminate} message to return the processing result to the SCP and prompts the SCP to release the call.

20. The SCP sends an RC message to prompt the MSC/VLR/SSP to disconnect the call. The normal process of charging the calling party in a call between two OCS subscribers is complete.

Process of Charging a Called Party

Figure 2-2 shows the normal process of charging the called party in a call between two OCS subscribers.
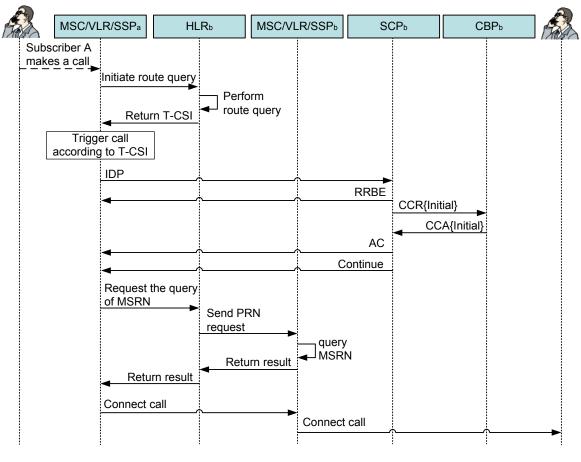
Figure 2-2 Normal process of charging the called party in a call between two OCS subscribers

HLR   Home Location Register

📖 **NOTE**

Subscriber A and subscriber B are OCS subscribers. Subscriber A is the calling party, and subscriber B is the called party.

The process is described as follows:

1. Subscriber A makes a call to subscriber B. The call reaches MSC/VLR/SSP$_a$.

2. MSC/VLR/SSP$_a$ sends an SRI request to HLR$_b$. HLR$_b$ returns the Terminated-CAMEL Subscription Information (T-CSI) of subscriber B to MSC/VLR/SSP$_a$.

3. MSC/VLR/SSP$_a$ triggers the call to SCP$_b$ according to the T-CSI.

   After the call is triggered to SCP$_b$, the subsequent fee deduction and CAP signaling interaction are the same as those in the calling process. For detailed process description, see step 2 through step 8 in the process of charging a calling party.

4. SCP$_b$ delivers the Continue signaling to MSC/VLR/SSP$_a$.

5. MSC/VLR/SSP$_a$ sends an SRI request to HLR$_b$ again to request HLR$_b$ to return the Mobile Station Roaming Number (MSRN) of subscriber B.

6. HLR$_b$ sends a Provide Roaming Number (PRN) request to MSC/VLR/SSP$_b$ to query the MSRN of subscriber B.

7.   MSC/VLR/SSP$_b$ finds the MSRN of subscriber B and returns the MSRN to HLR$_b$.

8.   HLR$_b$ returns the MSRN to MSC/VLR/SSP$_a$.

9.   MSC/VLR/SSP$_a$ connects the call to MSC/VLR/SSP$_b$.

10. MSC/VLR/SSP$_b$ connects the call to subscriber B. The call is connected. For the subsequent process, see step 10 through step 20 in the process of charging a calling party. Then the normal process of charging the called party in a call between two OCS subscribers is complete.

Exception Handling Process

If an exception such as response timeout or network connection error occurs in the CBP, the SCP can determine whether to continue a call according to the related flags. If the SCP determines to continue the call, the SCP needs to record an offline CDR. Then the CBP can charge for the call according to the offline CDR.
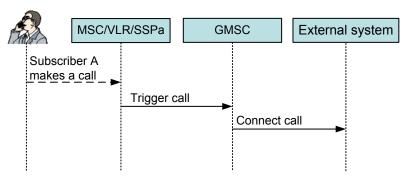
2.2.2 Process of Charging a Call Between an OCS Subscriber and a Subscriber of Another Network

This section describes the process of charging for a call between an OCS subscriber and a subscriber of another network from three aspects: calling process, called process, and exception handling process.

Process of Charging a Calling Party

Figure 2-3 shows the normal process of charging the calling party in a call made by an OCS subscriber to a subscriber of another network.

Figure 2-3 Normal process of charging the calling party in a call made by an OCS subscriber to a subscriber of another network

The process is described as follows:

1.   OCS subscriber A makes a call to a subscriber of another network. The call reaches MSC/VLR/SSP$_a$.

2.   MSC/VLR/SSP$_a$ determines that the called party is a subscriber of another network. Then MSC/VLR/SSP$_a$ triggers the call to the GMSC.

3.   The GMSC performs the subsequent processing and connects the call to the called party.

📖 **NOTE**

> The process of charging the calling party of a call between an OCS subscriber and a subscriber of another network is the same as the process of charging a calling party described in **2.2.1 Process of Charging a Call Between Two OCS Subscribers**. For detailed process description, see the process of charging a calling party described in **2.2.1 Process of Charging a Call Between Two OCS Subscribers**.

Process of Charging a Called Party

For the process of charging the called party in a call made by a subscriber of another network to an OCS subscriber, see the process of charging a called party in **2.2.1 Process of Charging a Call Between Two OCS Subscribers**.

Exception Handling Process

If an exception such as response timeout or network connection error occurs in the CBP, the SCP can determine whether to continue a call according to the related flags. If the SCP determines to continue the call, the SCP needs to record an offline CDR. Then the CBP can charge for the call according to the offline CDR.

2.3 Process of Charging a Forwarded Call

The forwarded calls are classified into the calls that are forwarded conditionally and the calls that are forwarded unconditionally. The following sections describe the charging process of each type of forwarded call.

2.3.1 Process of Charging a Call That Is Forwarded Unconditionally

The Call Forwarding Unconditional (CFU) process is invoked in either of the following cases:

- The call is forwarded unconditionally.
- The called party is unreachable.

  When the called party is unreachable, the subscriber is in IMSI detached state on the HLR. After the MSC/VLR/SSP sends an SRI message to the HLR for the first time, the HLR returns the forward-to number.

The following sections describe the process of charging for a call that is forwarded unconditionally in the following scenarios:
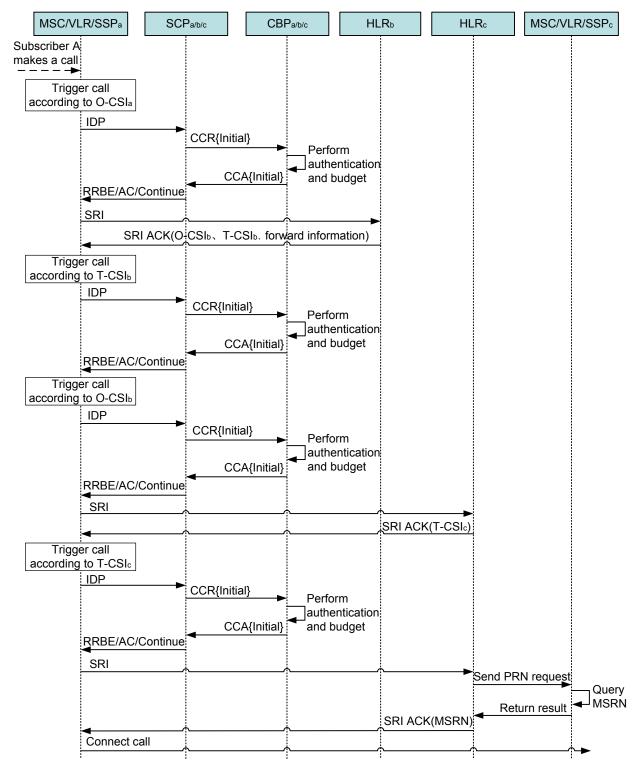
- A call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a third OCS subscriber.
- A call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a non-OCS subscriber.
- A call made by a non-OCS subscriber to an OCS subscriber is unconditionally forwarded to another OCS subscriber.

Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Unconditionally Forwarded to a Third OCS Subscriber

Figure 2-4 shows the charging process when a call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a third OCS subscriber. Assume that:

- Subscriber A, subscriber B, and subscriber C are OCS subscribers.
- Subscriber A calls subscriber B, and the call is forwarded to subscriber C unconditionally.
- Subscriber A, subscriber B, and subscriber C belong to the same SCP.

Figure 2-4 Charging process when a call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a third OCS subscriber

MSC/VLR/SSP$_a$	SCP$_{a/b/c}$	CBP$_{a/b/c}$	HLR$_b$	HLR$_c$	MSC/VLR/SSP$_c$

Subscriber A makes a call

Trigger call according to O-CSI$_a$

IDP →

CCR{Initial} →

Perform authentication and budget

← CCA{Initial}

← RRBE/AC/Continue

SRI →

← SRI ACK(O-CSI$_b$、 T-CSI$_b$、 forward information)

Trigger call according to T-CSI$_b$

IDP →

CCR{Initial} →

Perform authentication and budget

← CCA{Initial}

← RRBE/AC/Continue

Trigger call according to O-CSI$_b$

IDP →

CCR{Initial} →

Perform authentication and budget

← CCA{Initial}

← RRBE/AC/Continue

SRI →

← SRI ACK(T-CSI$_c$)

Trigger call according to T-CSI$_c$

IDP →

CCR{Initial} →

Perform authentication and budget

← CCA{Initial}

← RRBE/AC/Continue

SRI →

Send PRN request →

Query MSRN

← Return result

← SRI ACK(MSRN)

Connect call →

The process is described as follows:

1. Subscriber A makes a call to subscriber B. The call reaches MSC/VLR/SSP$_a$.

2. MSC/VLR/SSP$_a$ triggers the call according to the O-CSI of subscriber A and reports an IDP message to SCP$_a$.

3. SCP$_a$ sends a CCR{Initial} message to CBP$_a$ to initiate the authentication and budget requests.

4. CBP$_a$ receives the authentication and budget requests from SCP$_a$, performs authentication and budget, and then sends a CCA{Initial} message containing the authentication and budget results to SCP$_a$.

5. If the authentication is passed, SCP$_a$ sends the RRBE, AC, and Continue messages to prompt MSC/VLR/SSP$_a$ to connect the call.

6. After receiving the Continue message, MSC/VLR/SSP$_a$ sends an SRI message to HLR$_b$ through the MAP protocol.

7. HLR$_b$ returns the O-CSI and T-CSI of subscriber B and the forward-to number to MSC/VLR/SSP$_a$.

8. MSC/VLR/SSP$_a$ triggers the service according to the T-CSI of subscriber B and reports an IDP message to SCP$_b$.

9. SCP$_b$ sends a CCR{Initial} message to CBP$_b$ to initiate the authentication and budget requests.

10. If the authentication is passed, CBP$_b$ sends a CCA{Initial} message to SCP$_b$. Then SCP$_b$ delivers the RRBE, AC, and Continue messages to prompt MSC/VLR/SSP$_a$ to connect the call.

11. After receiving the Continue message, MSC/VLR/SSP$_a$ triggers the call forwarding process according to the information such as the O-CSI and forward-to number in the SRI message. Then MSC/VLR/SSP$_a$ reports an IDP message to SCP$_b$.

12. After receiving the IDP message, SCP$_b$ sends a CCR{Initial} message to CBP$_b$ to initiate the authentication and budget requests.

13. If the authentication is passed, CBP$_b$ sends a CCA{Initial} message to SCP$_b$. Then SCP$_b$ delivers the RRBE, AC, and Continue messages to prompt MSC/VLR/SSP$_a$ to connect the call.

14. After receiving the Continue message, MSC/VLR/SSP$_a$ sends an SRI message to HLR$_c$ through the MAP protocol to obtain the information about subscriber C, for example, T-CSI.

15. MSC/VLR/SSP$_a$ triggers the service according to the T-CSI of subscriber C and reports an IDP message to SCP$_c$.

16. After receiving the IDP message, SCP$_c$ sends a CCR{Initial} message to CBP$_c$ to initiate the authentication and budget requests.

17. If the authentication is passed, CBP$_c$ sends a CCA{Initial} message to SCP$_c$. Then SCP$_c$ delivers the RRBE, AC, and Continue messages to prompt MSC/VLR/SSP$_a$ to connect the call.

18. MSC/VLR/SSP$_a$ sends an SRI message to HLR$_c$.

19. HLR$_c$ sends a PRN request to MSC/VLR/SSP$_c$ to obtain the MSRN of subscriber C and returns the MSRN to MSC/VLR/SSP$_a$ for call connection.

20. After receiving the MSRN of subscriber C, MSC/VLR/SSP$_a$ connects the call. When the call ends, the charging process of this call is complete.

    📖 **NOTE**

> For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**. MSC/VLR/SSP$_a$ sends the charging report and hang-up event to SCP$_a$, SCP$_b$, and SCP$_c$.

Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Unconditionally Forwarded to a Non-OCS Subscriber

Figure 2-5 shows the charging process when a call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a non-OCS subscriber. Assume that:

- Subscriber A and subscriber B are OCS subscribers.

- Subscriber C is a non-OCS subscriber.

- Subscriber A calls subscriber B, and the call is forwarded to subscriber C unconditionally.

Figure 2-5 Charging process when a call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a non-OCS subscriber

The charging process when a call made by an OCS subscriber to another OCS subscriber is unconditionally forwarded to a non-OCS subscriber is similar to the charging process as shown in **Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Unconditionally Forwarded to a Third OCS Subscriber**. The only difference is that the call is not triggered according to the T-CSI of subscriber C because the call is forwarded to a non-OCS subscriber. The call is connected only after the MSRN of subscriber C is obtained through an FRN request. For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**.

Charging Process When a Call Made by a Non-OCS Subscriber to an OCS Subscriber Is Unconditionally Forwarded to Another OCS Subscriber

Figure 2-6 shows the charging process when a call made by a non-OCS subscriber to an OCS subscriber is unconditionally forwarded to another OCS subscriber. Assume that:

- Subscriber A is a non-OCS subscriber.

- Subscriber B and subscriber C are OCS subscribers.

- Subscriber A calls subscriber B, and the call is forwarded to subscriber C unconditionally.

Figure 2-6 Charging process when a call made by a non-OCS subscriber to an OCS subscriber is unconditionally forwarded to another OCS subscriber

The charging process when a call made by a non-OCS subscriber to an OCS subscriber is unconditionally forwarded to another OCS subscriber is similar to the charging process as shown in **Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Unconditionally Forwarded to a Third OCS Subscriber**. The only difference is that the call is not triggered according to the O-CSI of subscriber A because the call is made by a non-OCS subscriber. MSC/VLR/SSP$_a$ sends an SRI message to obtain the information such as O-CSI, T-CSI, and forward-to number of subscriber B and then triggers the call directly. For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**.

2.3.2 Process of Charging a Call That Is Forwarded Conditionally

The call forwarding conditional (CFC) process is invoked in any of the following cases:

- The call is forwarded on no answer.

- The call is forwarded on busy.

- The called party is unreachable.

    When the called party is unreachable, the called party is in IMSI attached state on the HLR.

The following sections describe the process of charging for a call that is forwarded on busy from the following aspects:
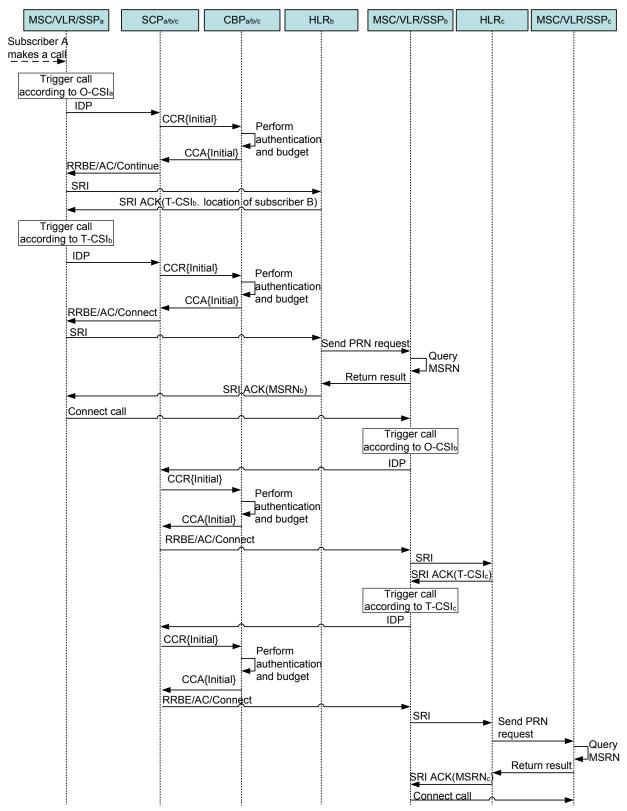
- A call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a third OCS subscriber.

- A call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a non-OCS subscriber.

- A call made by a non-OCS subscriber to an OCS subscriber is conditionally forwarded to another OCS subscriber.

Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Conditionally Forwarded to a Third OCS Subscriber

Figure 2-7 shows the charging process when a call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a third OCS subscriber. Assume that:

- Subscriber A, subscriber B, and subscriber C are OCS subscribers.

- Subscriber A calls subscriber B, and the call is forwarded to subscriber C conditionally.

- Subscriber A, subscriber B, and subscriber C belong to the same SCP.

Figure 2-7 Charging process when a call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a third OCS subscriber

The process is described as follows:

1. Subscriber A makes a call to subscriber B. The call reaches MSC/VLR/SSP$_a$.

2. MSC/VLR/SSP$_a$ triggers the call according to the O-CSI of subscriber A and reports an IDP message to the SCP$_a$.

3. SCP$_a$ sends a CCR{Initial} message to CBP$_a$ to initiate the authentication and budget requests.

4. CBP$_a$ receives the authentication and budget requests from SCP$_a$, performs authentication and budget, and then sends a CCA{Initial} message containing the authentication and budget results to SCP$_a$.

5. If the authentication is passed, SCP$_a$ sends the RRBE, AC, and Continue messages to prompt MSC/VLR/SSP$_a$ to connect the call.

6. After receiving the Continue message, MSC/VLR/SSP$_a$ sends an SRI message to HLR$_b$ through the MAP protocol.

7. HLR$_b$ returns the T-CSI and location of subscriber B to MSC/VLR/SSP$_a$.

8. MSC/VLR/SSP$_a$ triggers the service according to the T-CSI of subscriber B and reports an IDP message to SCP$_b$.

9. SCP$_b$ sends a CCR{Initial} message to CBP$_b$ to initiate the authentication and budget requests.

10. If the authentication is passed, CBP$_b$ sends a CCA{Initial} message to SCP$_b$. Then SCP$_b$ delivers the RRBE, AC, and Connect messages to prompt MSC/VLR/SSP$_a$ to connect the call.

11. After receiving the Connect message, MSC/VLR/SSP$_a$ delivers an SRI message to HLR$_b$ to obtain the MSRN of subscriber B.

12. HLR$_b$ sends a PRN request to MSC/VLR/SSP$_b$ to obtain the MSRN of subscriber B and returns the MSRN to HLR$_b$.

13. HLR$_b$ returns the MSRN of subscriber B to MSC/VLR/SSP$_a$. Then MSC/VLR/SSP$_a$ connects the call to MSC/VLR/SSP$_b$ according to the MSRN.

14. MSC/VLR/SSP$_b$ triggers the CFC service according to the conditions such as the O-CSI and busy situation of subscriber B and reports an IDP message to SCP$_b$.

15. SCP$_b$ sends a CCR{Initial} message to CBP$_b$ to initiate the authentication and budget requests.

16. If the authentication is passed, CBP$_b$ sends a CCA{Initial} message to SCP$_b$. Then SCP$_b$ delivers the RRBE, AC, and Connect messages to prompt MSC/VLR/SSP$_b$ to connect the call.

17. After receiving the Connect message, MSC/VLR/SSP$_b$ sends an SRI message to HLR$_c$ of subscriber C through the MAP protocol.

18. HLR$_c$ returns the T-CSI and location of subscriber C to MSC/VLR/SSP$_b$.

19. MSC/VLR/SSP$_b$ triggers the service according to the T-CSI of subscriber C and reports an IDP message to SCP$_c$.

20. After receiving the IDP message, SCP$_c$ sends a CCR{Initial} message to CBP$_c$ to initiate the authentication and budget requests.

21. If the authentication is passed, CBP_c sends a CCA{Initial} message to SCP_c. Then SCP_c delivers the RRBE, AC, and Continue messages to prompt $MSC/VLR/SSP_b$ to connect the call.

22. After receiving the Continue message, $MSC/VLR/SSP_b$ delivers an SRI message to HLR_c to obtain the MSRN of subscriber C.

23. HLR_c sends a PRN request to $MSC/VLR/SSP_c$ to obtain the MSRN of subscriber C and returns the MSRN to HLR_c.

24. HLR_c returns the MSRN of subscriber C to $MSC/VLR/SSP_b$. Then $MSC/VLR/SSP_b$ connects the call to $MSC/VLR/SSP_c$ according to the MSRN. When the call ends, the charging process of this call is complete.
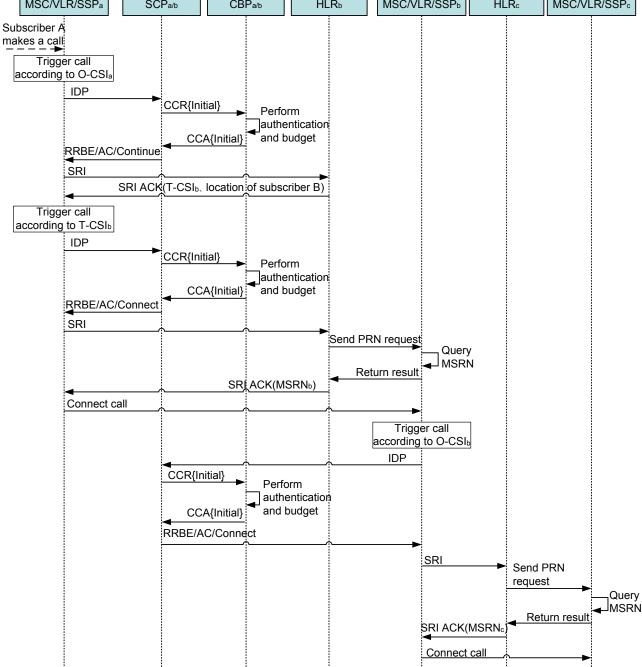
📖 **NOTE**

> For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**. When either of the calling party or called party ends the call, $MSC/VLR/SSP_a$ sends the charging report and hang-up event to SCP_a and SCP_b, and $MSC/VLR/SSP_b$ sends the charging report, and hang-up event to SCP_b and SCP_c. Then the CBP node of each subscriber performs debiting.

Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Conditionally Forwarded to a Non-OCS Subscriber

Figure 2-8 shows the charging process when a call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a non-OCS subscriber. Assume that:

● Subscriber A and subscriber B are OCS subscribers.

● Subscriber C is a non-OCS subscriber.

● Subscriber A calls subscriber B, and the call is forwarded to subscriber C conditionally.

Figure 2-8 Charging process when a call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a non-OCS subscriber

The charging process when a call made by an OCS subscriber to another OCS subscriber is conditionally forwarded to a non-OCS subscriber is similar to the charging process as shown in **Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Conditionally Forwarded to a Third OCS Subscriber**. The only difference is that the call is not triggered according to the T-CSI of subscriber C because the call is forwarded to a non-OCS subscriber. The call is connected only after the MSRN of subscriber C is obtained through an FRN request. For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**.

Charging Process When a Call Made by a Non-OCS Subscriber to an OCS Subscriber Is Conditionally Forwarded to Another OCS Subscriber

Figure 2-9 shows the charging process when a call made by a non-OCS subscriber to an OCS subscriber is conditionally forwarded to another OCS subscriber. Assume that:

- Subscriber A is a non-OCS subscriber.

- Subscriber B and subscriber C are OCS subscribers.

- Subscriber A calls subscriber B, and the call is forwarded to subscriber C unconditionally.

Figure 2-9 Charging process when a call made by a non-OCS subscriber to an OCS subscriber is conditionally forwarded to another OCS subscriber

The charging process when a call made by a non-OCS subscriber to an OCS subscriber is conditionally forwarded to another OCS subscriber is similar to the charging process as shown in **Charging Process When a Call Made by an OCS Subscriber to Another OCS Subscriber Is Conditionally Forwarded to a Third OCS Subscriber**. The only difference is that the call is not triggered according to the O-CSI of subscriber A because the call is made by a non-OCS subscriber. MSC/VLR/SSP$_a$ sends an SRI message to directly obtain the information such as the T-CSI and location of subscriber B. For the charging process after the call is connected, see **2.2 Process of Charging an Ordinary Call**.

2.4 Reference

This section describes the terms used in the call processes.

The Customized Applications for Mobile Network Enhanced Logic (CAMEL) is a set of GSM standards used in the GSM core network. The standards allow carriers to define certain services superior to the ordinary GSM service. The architecture of the CAMEL is based on the European Telecommunications Standards Institute (ETSI) of the mobile intelligent service.

The call-related 3GPP CAMEL phase 3 series standards are as follows:

- 3GPP TS 29.078 V4.4.0 (2002-03) Release 4
- 3GPP TS 22.078 version 4.0.0 (2000-10) Release 4
- 3GPP TS 23.078 V4.4.0 (2002-03) Release 4

3 SMS Charging Processes

About This Chapter

3.1 Overview

An SMS charging process refers to the process in which the OCS system charges a subscriber when the subscriber sends or receives a short message.

The following sections describe the SMS charging processes of the following protocols:

- DCC
- SMPP+
- CAMEL3

The following sections describe each SMS charging process in detail.

3.2 Process of Charging an Ordinary Short Message Through DCC
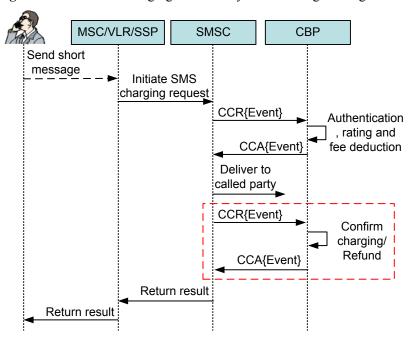
The OCS system supports the following function: The SMSC sends a Diameter protocol message to the CBP for charging, that is, the CBP charges an ordinary short message through the DCC.

 NOTE

SMSC needs to support Huawei extension diameter protocol that is based on the 3GPP standard.

Figure 3-1 shows the process of charging an ordinary short message through DCC.

Figure 3-1 Process of charging an Ordinary short message through DCC
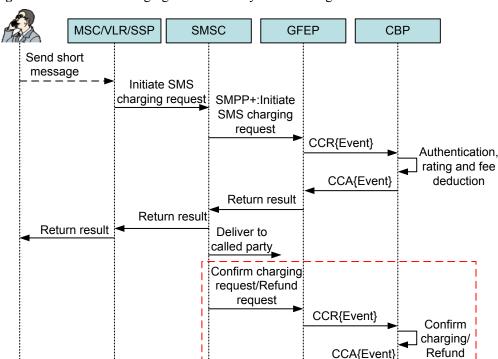
The process is described as follows:

1. A subscriber sends a short message. The charging request of the short message reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP sends a charging request to the SMSC.

3. The SMSC sends a CCR{Event} message to the CBP to initiate a charging request.

4. The CBP performs authentication, rating, and charging, and sends a CCA{Event} message to return the processing result to the SMSC.

5. After receiving the result from CBP, the SMSC delivers the short message to the called party.

6. The SMSC sends a CCR{Event} message to the CBP for charging confirmation. If fee refund is required, the CBP refunds the fee. For the detailed process, see the dotted box in red in the preceding figure.

7. After confirming the charging or refunding the fee, the CBP sends a CCA{Event} message containing the processing result to the SMSC.

8. The SMSC returns the charging result to the MSC/VLR/SSP and the MSC/VLR/SSP returns the charging result to the calling party. Then the process of charging for the short message through DCC protocol is complete.

3.3 Process of Charging an Ordinary Short Message Based on SMPP+

In this solution GFEP communicates with SMSC via SMPP+ protocol and communicates with CBP via Diameter interface to achieve SMS charging.

Figure 3-2 shows the normal process of charging for an ordinary short message based on SMPP+.

Figure 3-2 Process of charging for an ordinary short message based on SMPP+

The process is described as follows:

1. A subscriber sends a short message. The charging request of the short message reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP sends a charging request to the SMSC.

3. The SMSC forwards the charging request to the GFEP through SMPP+.

4. The GFEP converts the charging request to a DCC message, and then sends a CCR{Event} message to the CBP to initiate a charging request.

5. The CBP charges for the short message and sends a CCA{Event} message to return the processing result to the GFEP.

6. The GFEP returns the charging result to the SMSC.

7. The SMSC returns the charging result to the MSC/VLR/SSP. The MSC/VLR/SSP returns the charging result to the calling party.

8. The SMSC checks the return result. If the charging is successful, the SMSC sends a short message to the called party. If the short message is successfully sent, the SMSC sends a short message to the GFEP for confirmation. If the short message is unsuccessfully sent, the SMSC sends a fee refund request to the GFEP.

9. The GFEP sends a CCR{Event} message to the CBP for charging confirmation or fee refund.

   📖 **NOTE**

   When a short message refund is required, the SMSC sends a refund request to request the CBP to perform the refund operation. The refund process is similar to the process of charging for a short message. For details, see the process in the dotted box in red, as shown in **Figure 3-2**.

10. After confirming the charging or refunding the fee, the CBP sends a CCA{Event} message containing the processing result to the GFEP.

11. The GFEP returns the charging result to the SMSC. Then the process of charging for the short message based on the SMPP+ protocol is complete.

3.4 Process of Charging an Ordinary Short Message Based on CAMEL3

The OCS system supports the process of charging an ordinary short message based on CAMEL3. The MSC/VLR/SSP sends a short message charging request to the corresponding SCP according to the subscription information (CSI) of a subscriber. Then, the SCP sends a DCC short message to the CBP for charging.

Normal Process

Figure 3-3 shows the process of charging for an ordinary short message based on CAMEL3.
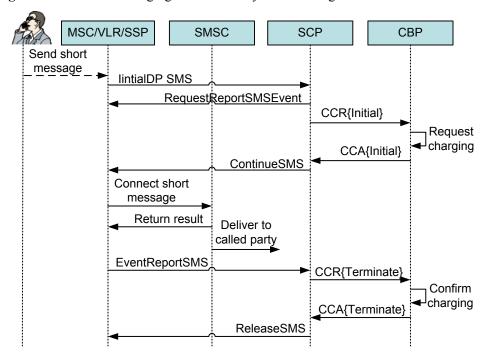
Figure 3-3 Process of charging for an ordinary short message based on CAMEL3

The process is described as follows:

1. A subscriber sends a short message. The upstream charging request of the short message reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP sends an InitialDP SMS message to the SCP to request charging.

3. The SCP returns a RequestReportSMSEvent message to the MSC/VLR/SSP.

4. After receiving the request, the SCP sends a CCR{Initial} message to the CBP to initiate a charging request.

5. The CBP prededucts the short message fee and sends a CCA{Initial} message to return the processing result to the SCP.

6. The SCP returns ContinueSMS message to the MSC/VLR/SSP.

7. After receiving the ContinueSMS message, the MSC/VLR/SSP delivers a message to prompt the SMSC to connect the short message.

8. The SMSC returns result to MSC/VLR/SSP and delivers the short message to the called party.

9. After receiving the request, the MSC/VLR/SSP sends an EventReportSMS message to the SCP to confirm the charging.

10. The SCP sends a CCR{Terminate} message to the CBP to initiate a charging confirmation request.

11. The CBP confirms the charging and sends a CCA{Terminate} message to return the processing result to the SCP.

12. After receiving a DCC message indicating that the fee deduction is successful, the SCP delivers the ReleaseSMS message to the MSC/VLR/SSP. Then the process of charging for the short message based on the CAMEL3 protocol is complete.

📖 **NOTE**

> Since standard CAMEL3 protocol does not support MT flow, OCS CAMEL3 SMS solution does not support SMS MT charging either.

Exception Handling Process

If the CBP fails to deduct the short message fee, the SCP delivers a message to release the short message according to the result code returned by the CBP.

3.5 Reference

This section describes the terms used in the SMS charging processes.

The Short Message Peer to Peer (SMPP) protocol is an open message transfer protocol. Through this protocol, the entities beyond the wireless network, for example, SMS entity, can interact with the SMSC. The unmovable entities that submit short messages to the SMSC and receive the short messages delivered by the SMSC are called extended SMS entities.

The basic Diameter protocol is an Authentication, Authorization and Accounting (AAA) protocol based on the AAA frame. The application protocol extended based on the basic Diameter protocol is the Diameter Credit Control (DCC) protocol. The DCC protocol defines the charging mechanism for prepaid subscribers and uses credit control to achieve the charging based on sessions and events. Therefore, the requirement for charging prepaid subscribers is met.

The short message-related 3GPP CAMEL phase 3 series standards are as follows:

- 3GPP TS 29.078 V4.4.0 (2002-03) Release 4
- 3GPP TS 22.078 version 4.0.0 (2000-10) Release 4
- 3GPP TS 23.078 V4.4.0 (2002-03) Release 4

4 Activation Processes

About This Chapter

4.1 Overview

The initial state of a new prepaid subscriber is idle. The corresponding numbers can be used after the subscriber is activated.

The system provides several ways to activate the subscriber:

- Activate subscribers by first call by dialing any number.
- The OCS provides a WebService interface to activate subscribers. CRM system can send the WebService command to activate subscribers.
- The OCS provides the GUI to help activate subscribers, and allows operators to activate subscribers on the SMAP.
- An idle subscriber can dial the access code of the IVR process to activate the personal account.
- A subscriber can send a short message to activate the personal account through SMPP+ or CAMEL3.
- A subscriber can dial the access code of the IVR process to trigger the activation process to activate the personal account.

4.2 Process of Activating an Account by Making the First Call

When a subscriber in **Idle** state dials any number, the system activates the subscriber automatically, sends the activation response message via short message to the subscriber, and plays announcements to the subscriber.

Figure 4-1 shows the process of activating an account by making the first call.
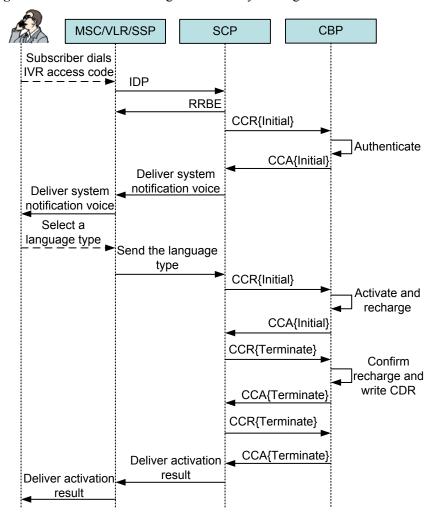
Figure 4-1 Process of activating an account by making the first call

The process is described as follows:

1. A subscriber dials the IVR access code. The call reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP of the visited area reports an IDP message to trigger the call to the SCP of the home area.

3. The SCP delivers an RRBE message to the MSC/VLR/SSP according to the service logic to request the dynamic configuration of the EDP.

4. The SCP sends a CCR{Initial} message to request the CBP to authenticate the subscriber state.

5. After performing the authentication, the CBP sends a CCA{Initial} message containing the authentication result to the SCP.

6. The SCP also delivers the first activation voice to the MSC/VLR/SSP according to the authentication result returned by the CBP. Then the MSC/VLR/SSP plays the first activation voice to the subscriber.

7. The subscriber chooses a language type according to voice that is played.

   The language type is the same as the language type used in the result notification voice or short message in the activation.

8. The MSC/VLR/SSP sends the language type to the SCP.

9. When receiving the authentication result indicating that the subscriber is not activated from the CBP, the SCP delivers a CCR{Initial} message to the CBP for activation and recharge.

10. The CBP activates and pre-recharges the account of the subscriber, and then returns a CCA {Initial} message to the SCP.

11. The SCP sends a CCR{Terminate} message to the CBP according to the processing result returned by the CBP to confirm the recharge.

12. The CBP confirms the recharge and sends a CCA{Terminate} message containing the processing result to the SCP.

13. The SCP sends a CCR{Terminate} message to request the CBP to write a CDR.

14. The CBP writes a CDR and sends a CCA{Terminate} message containing the processing result to the SCP.

15. The SCP delivers a notification voice to the MSC/VLR/SSP according to the processing result returned by the CBP.

16. The MSC/VLR/SSP plays the activation result voice to the subscriber. Then the process of activating an account by making the first call is complete.
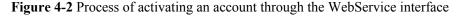
📖 **NOTE**
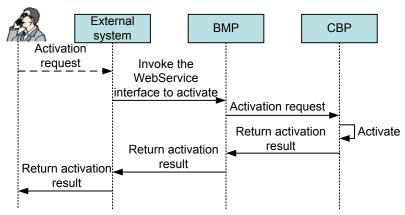
Due to needing to play announcement or send short message in activation flow, the network operator needs to load the corresponding announcement and the short message center needs to support SMPP protocol.

4.3 Process of Activating an Account Through the WebService Interface

After an external system receives an activation request from a subscriber, the external system invokes the WebService interface through the BMP and activates the account of the subscriber on the CBP. This activation process is called the process of activating an account through the WebService interface.

Figure 4-2 shows the normal process of activating an account through the WebService interface.

Figure 4-2 Process of activating an account through the WebService interface

The process is described as follows:
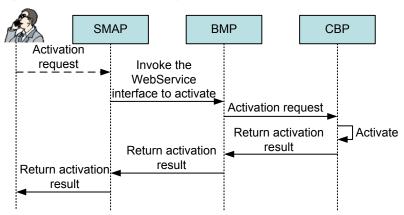
1. A subscriber sends an activation request to the OCS system through an external system.

   The external system refers to a system that accesses the OCS system externally. The external system is a foreground that can process subscriber requests.

2. The external system receives the activation request from the subscriber and forwards the activation request to the BMP through the WebService interface.

3. The BMP forwards the activation request to the CBP.

4. The CBP activates the account of the subscriber and returns the activation result to the BMP.

5. The BMP returns the activation result to the external system, and the external system returns the activation result to the subscriber. Then the process of activating an account through the WebService interface is complete.

4.4 Process of Activating an Account on the SMAP

In this process, an operator handles the request of activating an account on the SMAP after receiving the request.

Figure 4-3 shows the normal process of activating an account on the SMAP.

Figure 4-3 Process of activating an account on the SMAP

The process is described as follows:

1. A subscriber initiates an activation request.

2. After the request is sent to the SMAP, the SMAP sends the request to the BMP through the WebService interface.

3. The BMP forwards the activation request to the CBP.

4. The CBP activates the account of the subscriber and returns the activation result to the BMP.

5. The BMP returns the activation result to the SMAP, and the SMAP returns the activation result to the subscriber. Then the process of activating an account on the SMAP is complete.

4.5 Process of Activating an Account Through IVR

This section describes the process of activating an account through IVR.

Normal Process

Figure 4-4 shows the normal process of activating an account through IVR.
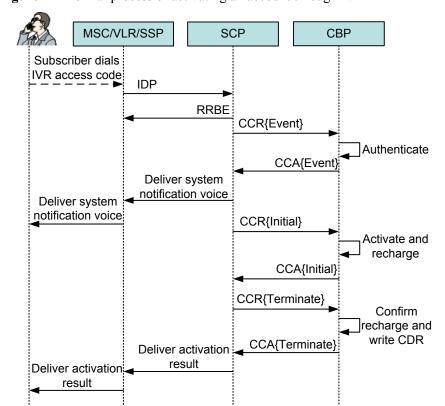
Figure 4-4 Normal process of activating an account through IVR

The process is described as follows:

1. A subscriber dials the IVR access code. The call reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP of the visited area reports an IDP message to trigger the call to the SCP of the home area.

3. The SCP delivers an RRBE message to the MSC/VLR/SSP according to the service logic to request the dynamic configuration of the EDP.

4. The SCP sends a CCR{Event} message to request the CBP to authenticate the subscriber state.

5. After performing the authentication, the CBP sends a CCA{Event} message containing the authentication result to the SCP.

6. The SCP also delivers the first activation voice to the MSC/VLR/SSP according to the authentication result returned by the CBP. Then the MSC/VLR/SSP plays the first activation voice to the subscriber.

7. The SCP delivers a CCR{Initial} message to the CBP for activation and recharge.

8. The CBP activates and pre-recharges the account of the subscriber, and then returns a CCA {Initial} message to the SCP.

9. The SCP sends a CCR{Terminate} message to the CBP according to the processing result returned by the CBP to confirm the recharge and write a CDR.

10. The CBP confirms the recharge and writes a CDR, then the CBP sends a CCA{Terminate} message containing the processing result to the SCP.

11. The SCP delivers a notification voice to the MSC/VLR/SSP according to the processing result returned by the CBP.

12. The MSC/VLR/SSP plays the activation result voice to the subscriber. Then the process of activating an account through IVR is complete.

Exception Handling Process

If the DCC message that is sent by the SCP to the CBP for activation fails to be processed, the SCP delivers the activation failure voice to the MSC/VLR/SSP according to the processing result returned by the CBP.

4.6 Process of Activating an Account by Sending a Short Message

This section describes the process of activating an account by sending a short message.

Process of Activating an Account by Sending a Short Message Through SMPP+

Figure 4-5 shows the normal process of activating an account by sending a short message through SMPP+.
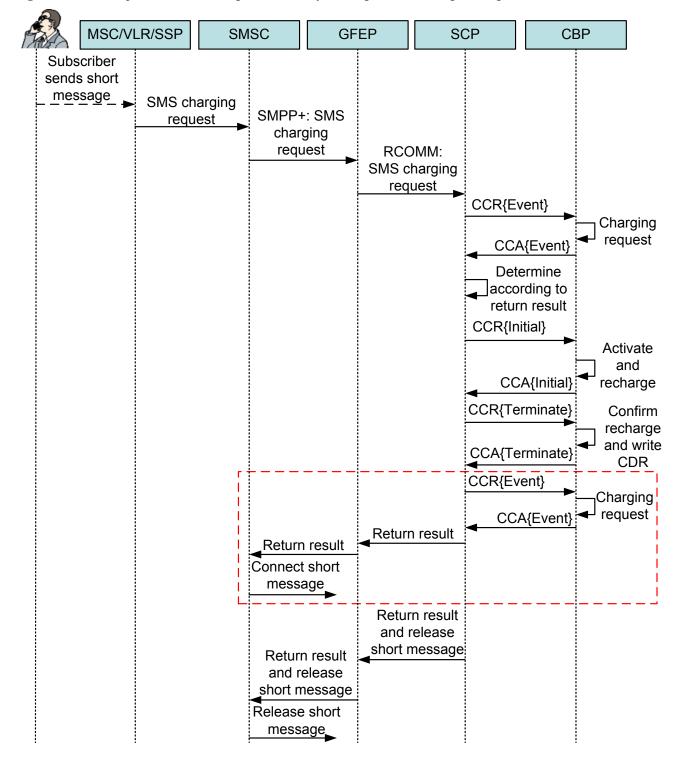
Figure 4-5 Normal process of activating an account by sending a short message through SMPP+

The process is described as follows:

1. A subscriber sends a short message. The upstream charging request of the short message reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP forwards the charging request to the SMSC.

3. The SMSC forwards the charging request to the GFEP through SMPP+.

4. The GFEP converts the charging request to an RCOMM message and sends the RCOMM message to the SCP.

5. After receiving the RCOMM message, the SCP sends a CCR{Event} message to the CBP for charging.

6. After receiving the charging request, the CBP determines whether the subscriber is in idle state and sends a CCA{Event} message containing the result to the SCP.

7. If the CBP returns the result that the subscriber is in idle state, the SCP sends a CCR{Initial} message to the CBP for first activation and recharge.

8. The CBP activates and pre-recharges the account of the subscriber and returns the processing result to the SCP.

9. The SCP sends a CCR{Terminate} message to the CBP according to the processing result returned by the CBP to confirm the recharge and write a CDR.

   📖 **NOTE**

   > After step 9 is performed, the subscriber is activated. The option of continuing to send this short message or releasing this short message after the subscriber is activated is configurable. When the option of continuing to send this message is configured, the operations in the dotted red box in **Figure 4-5** are performed. Otherwise, the SCP releases this short message. Steps 10 through 12 describe the operations in the dotted red box in **Figure 4-5**.

10. After receiving the message indicating that the subscriber is activated successfully, the SCP sends a CCR{Event} message to request the CBP to charge the short message.

11. The CBP charges the short message and sends a CCA{Event} message containing the processing result to the SCP.

12. The SCP returns the processing result to the GFEP, the GFEP returns the processing result to the SMSC, and the SMSC sends the short message to the subscriber. Then the process of activating an account by sending a short message through SMPP+ is complete.

Process of Activating an Account by Sending a Short Message Through CAMEL3

Figure 4-6 shows the normal process of activating an account by sending a short message through CAMEL3.
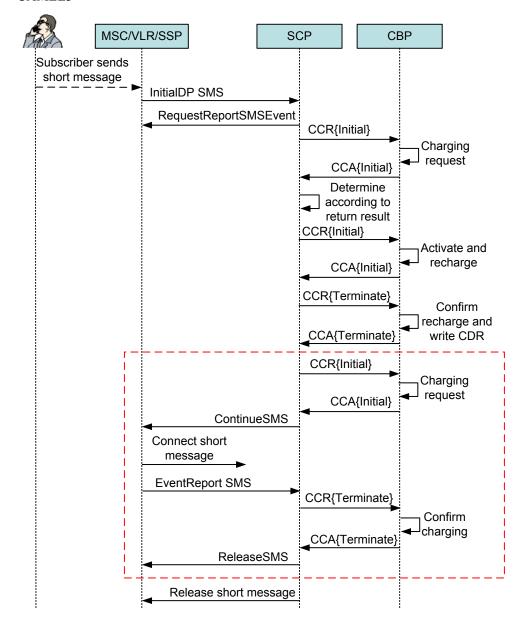
Figure 4-6 Normal process of activating an account by sending a short message through CAMEL3
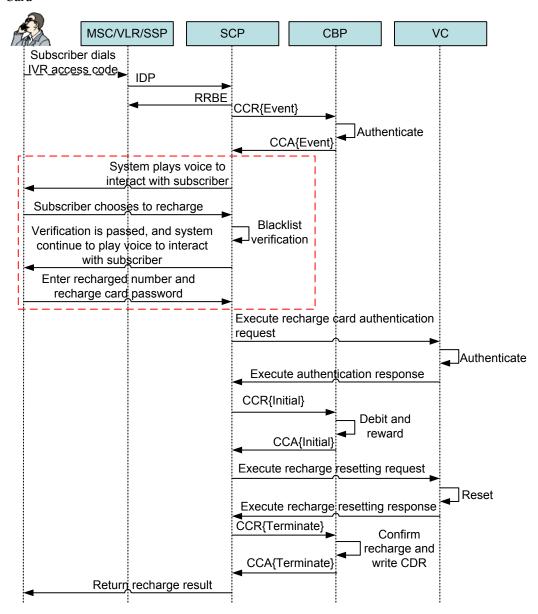
For the description of the process, see **3.4 Process of Charging an Ordinary Short Message Based on CAMEL3** and **Process of Activating an Account by Sending a Short Message Through SMPP+**. The operations in the dotted red box in **Figure 4-6** are performed when the option of continuing to send the short message is configured after the SCP receives the message indicating that the CBP activates the account successfully. If the option of releasing the short message is configured after the account of the subscriber is activated, the operations under the dotted red box are performed.

4.7 Process of Activating an Account by Recharging the Account by Using a Recharge Card

This section describes the process of activating an account by recharging the account by using a recharge card.

Figure 4-7 shows the normal process of activating an account by recharging the account by using a recharge card.

Figure 4-7 Process of Activating an Account by Recharging the Account by Using a Recharge Card

The process of activating an account by recharging the account by using a recharge card is similar to the process of recharging an account by using a recharge card. After a subscriber dials the access code of the IVR management process, the system authenticates the subscriber. If a subscriber has not been activated, the SCP invokes the first activation process. In addition, the SCP interacts with the subscriber by playing voices to obtain recharge card information. After receiving the first activation request reported through the recharge request from the SCP, the CBP processes the recharge card information, activates the subscriber, and recharges the account. For process details, see **5.2 Process of Recharging an Account by Using a Recharge Card Through IVR**.

4.8 Reference

This section describes the terms used in the activation processes.

None.

5 Recharge Processes

About This Chapter

A prepaid subscriber can use a service only when the subscriber has sufficient account balance and the account balance is valid. When the account balance is insufficient, the subscriber needs to recharge the account in time.

Carrier distributes the scratch cards, which have printed with face value and password under cover. Subscribers can buy the card, scratch the cover and get the PIN, and then he/she can recharge the account via OCS IVR self care management flow.

In this process, a subscriber recharges an account by sending a USSD short message.

This section describes the process of recharging an account by using a recharge card through a short message.

This section describes the process of recharging an account manually by using a recharge card.

This section describes the process of recharging an account by cash.

This section describes the process of recharging an account by dialing a recharge access code.

This section describes the process of recharging an account through the EVC.

This section briefly describes the basic terms related to the recharge processes.

5.1 Overview

A prepaid subscriber can use a service only when the subscriber has sufficient account balance and the account balance is valid. When the account balance is insufficient, the subscriber needs to recharge the account in time.

A subscriber can recharge the account in any of the following modes:

- Through IVR

  In this mode, a subscriber can recharge the personal account or the account of another subscriber by dialing the access code of the IVR process and performing operations according to the voices played on the main menu of the IVR process.

- Through USSD

  In this mode, a subscriber can send a USSD string or a short message to recharge an account. The short message needs to contain the recharge access code and the password of the recharge card. If the subscriber wants to recharge the account of another subscriber, the short message also needs to contain the number of the recharged party.

- By using a recharge card through a short message

  In this mode, a subscriber can send a short message containing the password of a recharge card to a specified access code to recharge an account.

- Manually

  In this mode, a Web page or third-party platform can be used to invoke the WebService interface to recharge the account of a subscriber by using a recharge card.

- By cash

  In this mode, a subscriber can recharge an account by cash through different access channels, for example, customer service centers, banks, and ATMs. When a subscriber recharges an account by cash, the SMAP or a third-party platform is used to invoke the WebService interface to perform the recharge.

- By dialing a recharge access code

  In this mode, a subscriber can dial a specified recharge access code to recharge an account through the VC.

- Through the EVC

  In this mode, a dealer can use the account transfer function to recharge the account of a subscriber. The specific process is: A dealer prepays a certain amount. When a subscriber wants to recharge an account, the recharge amount is deducted from the account of the dealer and transferred to the call fee account of the subscriber.

The following sections describe each recharge process in detail.

5.2 Process of Recharging an Account by Using a Recharge Card Through IVR

Carrier distributes the scratch cards, which have printed with face value and password under cover. Subscribers can buy the card, scratch the cover and get the PIN, and then he/she can recharge the account via OCS IVR self care management flow.

Process of Recharging the Personal Account of a Subscriber Through IVR

Figure 5-1 shows the process of recharging the personal account of a subscriber through IVR.

Figure 5-1 Process of recharging the personal account of a subscriber through IVR

The process is described as follows:

1. A subscriber dials the IVR access code. The call reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP of the visited area reports an IDP message to trigger the call to the SCP of the home area.

3. The SCP sends a CCR{Initial} message to the CBP for authentication.

4. After performing the authentication, the CBP sends a CCA{Initial} message containing the authentication result to the SCP.

5. The SCP delivers an RRBE message to the MSC/VLR/SSP according to the service logic to request the dynamic configuration of the EDP. Then the SCP determines the EDPs that need to be reported to the SCP.

6. If the authentication is passed, the SCP plays voices to interact with the subscriber.

   📖 **NOTE**

   The operations in the dotted red box in **Figure 5-1** are interactions between the SCP and the subscriber.

7. The subscriber chooses to recharge the account by using a recharge card.

8. After receiving the recharge request from the subscriber, the SCP checks whether the subscriber is blacklisted.

9. If the subscriber is not blacklisted, the SCP plays voices to prompt the subscriber to enter the recharged number and the password of the recharge card. The subscriber enters the required information as prompted.

10. If the subscriber is not in the recharge blacklist, and if the recharged subscriber is an OCS subscriber, the SCP sends a message for authenticating the recharge card to the home VC of the recharge card through the INAP Execute interface.

11. The VC verifies the password of the recharge card and returns the verification result to the SCP.

    The VC checks whether the password of the recharge card is correct. If the password of the recharge card is incorrect, the VC returns the verification result to the SCP. In addition, after the recharge card fails to pass the authentication, the SCP records an authentication failure. When the number of authentication failures reaches the threshold, the SCP sends an RCOMM message to request the BMP to blacklist the subscriber. The subscriber cannot recharge the account before being released from the blacklist. After the subscriber recharges the account by using the recharge card successfully, the number of authentication failures is cleared.

12. The SCP checks the verification result returned by the VC. If the recharge card passes the authentication, the SCP sends a CCR{Initial} message to the CBP for recharge.

13. The CBP sends a CCA{Initial} message containing the recharge result to the SCP.

    After receiving the recharge request, the CBP recharges the account of the subscriber. If certain resources need to be rewarded to the subscriber, the CBP also processes the resource reward.

14. The SCP checks the recharge result returned by the CBP. If the recharge is successful, the SCP sends a request for resetting the recharge card through the INAP Execute interface.

15. The VC modifies the recharge card information and returns the modification result to the SCP.

    The VC changes the recharge card status to a status indicating that the recharge card is used and records the information such as the recharged number and recharge time.

16. The SCP checks the modification result returned by the VC. If the VC resets the recharge card successfully, the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge.

17. After confirming the recharge, the CBP sends a CCA{Terminate} message containing the confirmation result to the SCP.

    After receiving the confirmation request, the CBP submits the recharge transaction to perform debiting on the recharge and preference and to record the recharge log and CDR.

The confirmation result returned to the SCP contains the notification contents of the recharge short message sent to the subscriber.

18. The SCP sends a CCR{Terminate} message to request the CBP to end the recharge.

19. The CBP ends the recharge and sends a CCA{Terminate} message containing the processing result to the SCP.

20. After the recharge is complete, the SCP plays a voice or sends a short message to notify the subscriber of the recharge result. Then the process of recharging the personal account of a subscriber through IVR is complete.

📖 **NOTE**

● The SCP delivers the ID of the short message that needs to be sent to the subscriber to the SMSC. Then the SMSC delivers the short message to the subscriber.

● The SCP delivers the ID of the voice that needs to be played to the subscriber to the MSC/VLR/SSP. Then the MSC/VLR/SSP plays the voice to the subscriber.

Process of Recharging the Account of Another OCS Subscriber Through IVR

Figure 5-2 shows the process of recharging the account of another OCS subscriber through IVR.
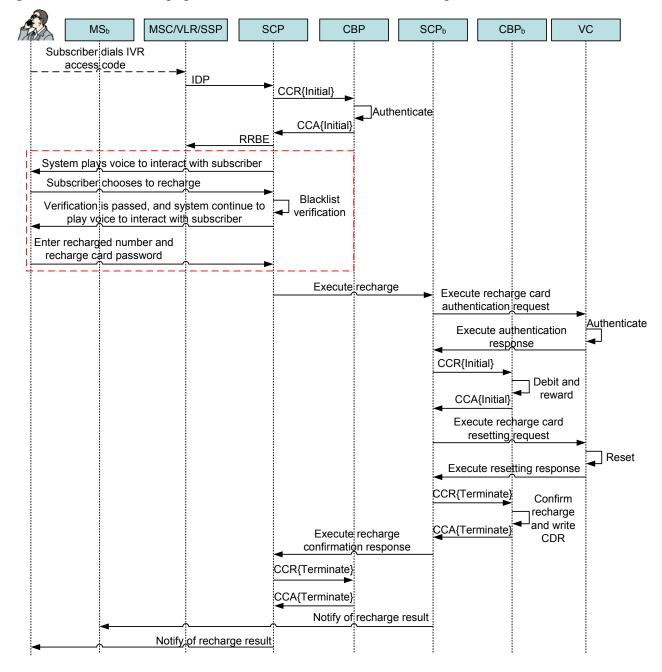
Figure 5-2 Process of recharging the account of another OCS subscriber through IVR

MS$_b$	OCS subscriber to be recharged.
SCP$_b$	Home SCP of the MSISDN of the recharged subscriber.
CBP$_b$	Home CBP of the MSISDN of the recharged subscriber.

The process is described as follows:

1. A subscriber dials the IVR access code. The call reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP of the visited area reports an IDP message to trigger the call to the SCP of the home area.

3. The SCP sends a CCR{Initial} message to the CBP for authentication.

4. After performing the authentication, the CBP sends a CCA{Initial} message containing the authentication result to the SCP.

5. The SCP delivers an RRBE message to the MSC/VLR/SSP according to the service logic to request the dynamic configuration of the EDP.

6. If the authentication is passed, the SCP plays voices to interact with the subscriber.

   📖 **NOTE**

   The operations in the dotted red box in **Figure 5-2** are interactions between the SCP and the subscriber.

7. The subscriber chooses to recharge the account by using a recharge card.

8. After receiving the recharge request from the subscriber, the SCP checks whether the recharging number and recharged number are blacklisted.

9. If the subscriber is not blacklisted, the SCP plays voices to prompt the subscriber to enter the recharged number and the password of the recharge card. The subscriber enters the required information as prompted.

10. The SCP determines that the recharged number is the MSISDN of another OCS subscriber. Then the SCP forwards the recharge request of the subscriber to SCP_b through the INAP Execute interface.

11. SCP_b sends a message for authenticating the recharge card to the home VC of the recharge card through the INAP Execute interface.

12. The VC verifies the password of the recharge card and returns the verification result to SCP_b.

    The VC checks whether the recharge card exists and whether the status of the recharge card is normal. Then the VC returns a result containing the information such as the face value, status, and validity period of the recharge card to SCP_b.

13. SCP_b checks the result returned by the VC. If the recharge card passes the authentication, SCP_b sends a CCR{Initial} message to CBP_b for recharge.

14. After receiving the recharge request from SCP_b, CBP_b performs the recharge and processes the resource reward if available. Then CBP_b sends a CCA{Initial} message containing the processing result to SCP_b.

15. After the recharge is successful, SCP_b sends a request for resetting the recharge card through the INAP Execute interface.

16. The VC modifies the recharge card information and returns the modification result to SCP_b.

    The VC changes the recharge card status to a status indicating that the recharge card is used and records the information such as the recharged number and recharge time.

17. SCP_b checks the result returned by the VC. If the recharge card is resetted successfully, SCP_b sends a CCR{Terminate} message to CBP_b to submit the recharge transaction.

18. After receiving the request, the CBP performs debiting on the recharge and preference and records the recharge log and CDR. Then the CBP sends a CCA{Terminate} message containing the processing result to SCP_b.

19. SCP_b returns the recharge result to the home SCP of the recharging subscriber through the INAP Execute interface.

20. The SCP of the recharging subscriber sends a CCR{Terminate} message to request the CBP of the recharging subscriber to end the recharge.

21. The CBP sends a CCA{Terminate} message containing the processing result to the SCP.

22. SCP_b delivers the recharge result to the recharged subscriber.

23. The SCP notifies the recharging subscriber of the recharge result. Then the process of recharging the account of another OCS subscriber through IVR is complete.

Exception Handling Process

The exceptions that may occur when the subscriber recharges the account are as follows:

1. Symptom: After the SCP sends a CCR{Initial} message to the CBP for charging, the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration.

   Possible cause and exception handling: If the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration, the SCP sends a CCR{Event} message again to the CBP to query the recharge status of the subscriber. If a success message is returned, it indicates that the recharge is successful. If a failure message is returned, it indicates that the recharge fails. If the SCP still does not receive the CCA{Event} message returned by the CBP within the specified duration, the SCP considers that the recharge is successful.

2. Symptom: After the SCP sends a message through the INAP Execute interface to request the VC to reset the recharge card, the SCP does not receive the response message from the VC within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the result of resetting the recharge card from the VC, the SCP sends a request for authenticating the recharge card to the VC to query the recharge card status and performs the following processing according to the query result:

   (1) If the VC returns a message indicating that the recharge card is not reset, the SCP sends a DCC message to request the CBP to cancel the recharge and notifies the subscriber that the recharge fails.

   (2) If the VC returns a message indicating that the recharge card is already reset, the SCP considers that the recharge card is reset successfully and continues the subsequent processing.

   (3) If the SCP still does not receive the result of resetting the recharge card from the VC, the SCP continues the subsequent processing in the interest of the subscriber.

3. Symptom: After the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge, the SCP does not receive the CCA{Terminate} message from the CBP within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the CCA {Terminate} message from the CBP within the specified duration, the SCP considers that the recharge is successful in the interest of the subscriber.

5.3 Process of Recharging an Account by Using a Recharge Card Through USSD

In this process, a subscriber recharges an account by sending a USSD short message.

Normal Process

Figure 5-3 shows the process of recharging an account through USSD.

Figure 5-3 Process of recharging an account through USSD

The process is described as follows:
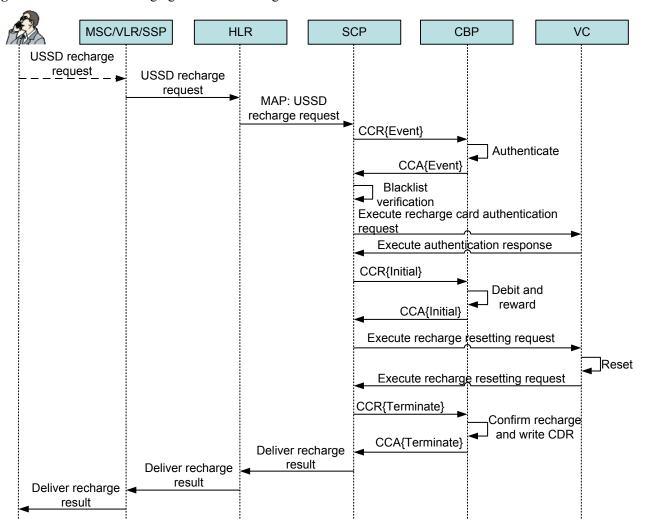
1. A subscriber sends a USSD recharge request. The request reaches the MSC/VLR/SSP.

   The request contains the information such as the recharge access code and the password of the recharge card. If the subscriber wants to recharge the account of another subscriber, the request also contains the MSISDN of the recharged subscriber.

2. The MSC/VLR/SSP forwards the request to the HLR through the MAP signaling.

3. The HLR routes the request to the SCP through the MAP signaling.

4. The SCP sends a CCR{Event} message to the CBP for authentication. For example, the CBP checks whether the information such as the subscriber state is normal.

5. The CBP authenticates the subscriber and sends a CCA{Event} message containing the processing result to the SCP.

6. The SCP parses the access code. After determining that the service is the recharge service, the SCP triggers the recharge service process, checks whether the subscriber is in the recharge blacklist, and authenticates the recharged subscriber.

7. If the subscriber is not in the recharge blacklist, and if the recharged subscriber is an OCS subscriber, the SCP sends a message for authenticating the recharge card to the home VC of the recharge card through the INAP Execute interface.

8. The VC verifies the password of the recharge card and returns the verification result to the SCP.

    The VC checks whether the password of the recharge card is correct. If the password of the recharge card is incorrect, the VC returns the verification result to the SCP. In addition, after the recharge card fails to pass the authentication, the SCP records an authentication failure. When the number of authentication failures reaches the threshold, the SCP sends an RCOMM message to request the BMP to blacklist the subscriber. The subscriber cannot recharge the account before being released from the blacklist. After the subscriber recharges the account by using the recharge card successfully, the number of authentication failures is cleared.

9. The SCP checks the verification result returned by the VC. If the recharge card passes the authentication, the SCP sends a CCR{Initial} message to the CBP for recharge.

10. The CBP sends a CCA{Initial} message containing the recharge result to the SCP.

    After receiving the recharge request, the CBP recharges the account of the subscriber. If certain resources need to be rewarded to the subscriber, the CBP also processes the resource reward.

11. The SCP checks the recharge result returned by the CBP. If the recharge is successful, the SCP sends a request to VC for resetting the recharge card through the INAP Execute interface.

12. The VC modifies the recharge card information and returns the modification result to the SCP.

    The VC changes the recharge card status to a status indicating that the recharge card is used and records the information such as the recharged number and recharge time.

13. The SCP checks the modification result returned by the VC. If the VC resets the recharge card successfully, the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge.

14. After confirming the recharge, the CBP sends a CCA{Terminate} message containing the confirmation result to the SCP.

    After receiving the confirmation request, the CBP submits the recharge transaction to perform debiting on the recharge and preference and to record the recharge log and CDR. The confirmation result returned to the SCP contains the notification contents of the recharge short message sent to the subscriber.

15. After receiving the confirmation result returned by the CBP, the SCP returns the recharge result to the HLR, the HLR returns the recharge result to the MSC/VLR/SSP, and the MSC/VLR/SSP returns the recharge result to the subscriber. Then the process of recharging an account through USSD is complete.

    The recharge result returned by the SCP contains the information such as the account balance of the subscriber and the validity period of the account.

Exception Handling Process

The exceptions that may occur when the subscriber recharges the account are as follows:

1. Symptom: After the SCP sends a CCR{Initial} message to the CBP for charging, the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration.

Possible cause and exception handling: If the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration, the SCP sends a CCR{Event} message again to the CBP to query the recharge status of the subscriber. If a success message is returned, it indicates that the recharge is successful. If a failure message is returned, it indicates that the recharge fails. If the SCP still does not receive the CCA{Event} message returned by the CBP within the specified duration, the SCP considers that the recharge is successful.

2. Symptom: After the SCP sends a message through the INAP Execute interface to request the VC to reset the recharge card, the SCP does not receive the response message from the VC within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the result of resetting the recharge card from the VC, the SCP sends a request for authenticating the recharge card to the VC to query the recharge card status and performs the following processing according to the query result:

   (1) If the VC returns a message indicating that the recharge card is not reset, the SCP sends a DCC message to request the CBP to cancel the recharge and notifies the subscriber that the recharge fails.

   (2) If the VC returns a message indicating that the recharge card is already reset, the SCP considers that the recharge card is reset successfully and continues the subsequent processing.

   (3) If the SCP still does not receive the result of resetting the recharge card from the VC, the SCP continues the subsequent processing in the interest of the subscriber.

3. Symptom: After the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge, the SCP does not receive the CCA{Terminate} message from the CBP within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the CCA {Terminate} message from the CBP within the specified duration, the SCP considers that the recharge is successful in the interest of the subscriber.

5.4 Process of Recharging an Account by Using a Recharge Card Through a Short Message

This section describes the process of recharging an account by using a recharge card through a short message.

Normal Process

Figure 5-4 shows the normal process of recharging an account by using a recharge card through a short message.
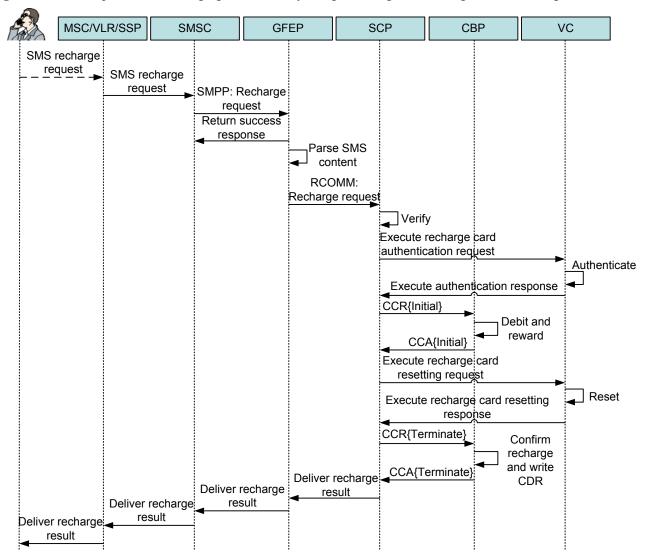
Figure 5-4 Normal process of recharging an account by using a recharge card through a short message

The process is described as follows:

1. A subscriber sends a recharge request through a short message. The request reaches the MSC/VLR/SSP.

    The recharge request contains the information such as the password of a recharge card.

2. The MSC/VLR/SSP authenticates the subscriber. If the subscriber has the right to send this short message, the MSC/VLR/SSP forwards the short message to the SMSC.

3. After receiving the short message, the SMSC forwards the short message to the GFEP through SMPP3.4 according to the ID of the External Short Message Entity (ESME).

4. After receiving the short message sent by the SMSC, the GFEP directly returns a response message to the SMSC.

5. The GFEP parses the short message contents and sends an RCOMM message to interact with the SCP.

6. After receiving the RCOMM message, the SCP verifies the subscriber and authenticates the recharged number.

By verifying the subscriber, the SCP checks whether the subscriber is in the recharge blacklist. The recharge blacklist records are stored on the SCP. When the number of consecutive attempts for the subscriber to enter the recharge password reaches the maximum, the subscriber enters the recharge blacklist. A subscriber in recharge blacklist state cannot recharge accounts any more.

By authenticating the recharged number, the SCP determines whether the recharged number is an OCS subscriber.

7. If the subscriber is not in the recharge blacklist, and if the recharged subscriber is an OCS subscriber, the SCP sends a message for authenticating the recharge card to the home VC of the recharge card through the INAP Execute interface.

8. The VC verifies the password of the recharge card and returns the verification result to the SCP.

9. The SCP checks the verification result returned by the VC. If the recharge card passes the authentication, the SCP sends a CCR{Initial} message to the CBP for recharge.

10. The CBP sends a CCA{Initial} message containing the recharge result to the SCP.

11. The SCP checks the recharge result returned by the CBP. If the recharge is successful, the SCP sends a request to VC for resetting the recharge card through the INAP Execute interface.

12. The VC modifies the recharge card information and returns the modification result to the SCP.

13. The SCP checks the modification result returned by the VC. If the VC resets the recharge card successfully, the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge.

14. After confirming the recharge, the CBP sends a CCA{Terminate} message containing the confirmation result to the SCP.

15. After the recharge is successful, the SCP delivers a short message to notify the subscriber of the recharge result through the SMSC. Then the process of recharging an account by using a recharge card through a short message is complete.

Exception Handling Process

The exceptions that may occur when the subscriber recharges the account are as follows:

1. Symptom: After the SCP sends a CCR{Initial} message to the CBP for charging, the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration.

    Possible cause and exception handling: If the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration, the SCP sends a CCR{Event} message again to the CBP to query the recharge status of the subscriber. If a success message is returned, it indicates that the recharge is successful. If a failure message is returned, it indicates that the recharge fails. If the SCP still does not receive the CCA{Event} message returned by the CBP within the specified duration, the SCP considers that the recharge is successful.

2. Symptom: After the SCP sends a message through the INAP Execute interface to request the VC to reset the recharge card, the SCP does not receive the response message from the VC within the specified duration.

    Possible cause and exception handling: When the SCP does not receive the result of resetting the recharge card from the VC, the SCP sends a request for authenticating the recharge card to the VC to query the recharge card status and performs the following processing according to the query result:

(1) If the VC returns a message indicating that the recharge card is not reset, the SCP sends a DCC message to request the CBP to cancel the recharge and notifies the subscriber that the recharge fails.

(2) If the VC returns a message indicating that the recharge card is already reset, the SCP considers that the recharge card is reset successfully and continues the subsequent processing.

(3) If the SCP still does not receive the result of resetting the recharge card from the VC, the SCP continues the subsequent processing in the interest of the subscriber.

3. Symptom: After the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge, the SCP does not receive the CCA{Terminate} message from the CBP within the specified duration.

Possible cause and exception handling: When the SCP does not receive the CCA {Terminate} message from the CBP within the specified duration, the SCP considers that the recharge is successful in the interest of the subscriber.

5.5 Process of Recharging an Account by Using a Recharge Card Manually

This section describes the process of recharging an account manually by using a recharge card.

Normal Process

Figure 5-5 shows the normal process of recharging an account manually.
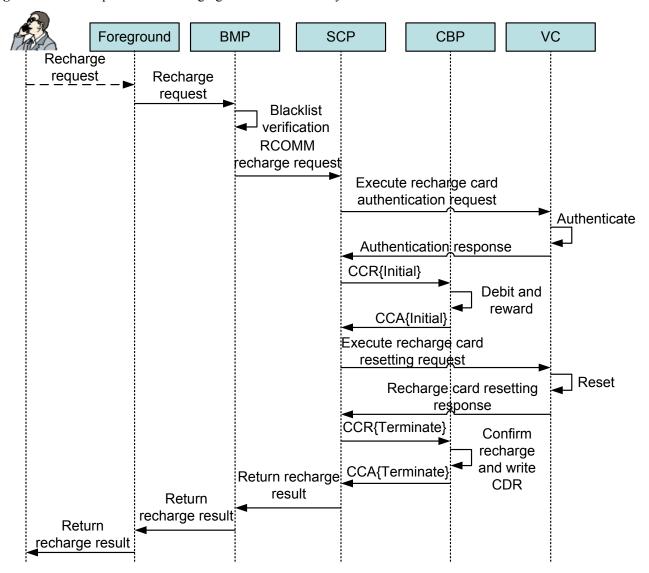
Figure 5-5 Normal process of recharging an account manually

The process is described as follows:

1. A subscriber sends a recharge request. The recharge request reaches the OCS foreground.

2. After receiving the recharge request, the OCS foreground forwards the recharge request to the BMP through Web pages, WebService interface, or SMAP.

3. The BMP checks whether the subscriber is in the recharge blacklist. If the subscriber is not in the recharge blacklist, the BMP sends an RCOMM message containing the recharge request to the SCP.

   The recharge request contains the information such as the MSISDN of the subscriber, sequence number, and password of a recharge card.

4. The SCP determines that the recharged number is an OCS subscriber according to the RCOMM message sent by the BMP, and then sends a message for authenticating the recharge card to the home VC of the recharge card through the INAP Execute interface.

5. The VC verifies the password of the recharge card and returns the verification result to the SCP.

6. The SCP checks the verification result returned by the VC. If the recharge card passes the authentication, the SCP sends a CCR{Initial} message to the CBP for recharge.

7. The CBP sends a CCA{Initial} message containing the recharge result to the SCP.

8. The SCP checks the recharge result returned by the CBP. If the recharge is successful, the SCP sends a request to VC for resetting the recharge card through the INAP Execute interface.

9. The VC modifies the recharge card information and returns the modification result to the SCP.

10. The SCP checks the modification result returned by the VC. If the VC resets the recharge card successfully, the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge.

11. After confirming the recharge, the CBP sends a CCA{Terminate} message containing the confirmation result to the SCP.

12. The SCP sends an RCOMM message containing the recharge result to the BMP.

    The recharge result contains the information such as the recharge amount, validity period of the account after the recharge, and recharge bonus.

13. The BMP returns the recharge result to the OCS foreground, and the OCS foreground returns the recharge result to the subscriber. Then the process of recharging an account manually is complete.

Exception Handling Process

The exceptions that may occur when the subscriber recharges the account are as follows:

1. Symptom: After the SCP sends a CCR{Initial} message to the CBP for charging, the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration.

   Possible cause and exception handling: If the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration, the SCP sends a CCR{Event} message again to the CBP to query the recharge status of the subscriber. If a success message is returned, it indicates that the recharge is successful. If a failure message is returned, it indicates that the recharge fails. If the SCP still does not receive the CCA{Event} message returned by the CBP within the specified duration, the SCP considers that the recharge is successful.

2. Symptom: After the SCP sends a message through the INAP Execute interface to request the VC to reset the recharge card, the SCP does not receive the response message from the VC within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the result of resetting the recharge card from the VC, the SCP sends a request for authenticating the recharge card to the VC to query the recharge card status and performs the following processing according to the query result:

   (1) If the VC returns a message indicating that the recharge card is not reset, the SCP sends a DCC message to request the CBP to cancel the recharge and notifies the subscriber that the recharge fails.

   (2) If the VC returns a message indicating that the recharge card is already reset, the SCP considers that the recharge card is reset successfully and continues the subsequent processing.

(3) If the SCP still does not receive the result of resetting the recharge card from the VC, the SCP continues the subsequent processing in the interest of the subscriber.

3. Symptom: After the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge, the SCP does not receive the CCA{Terminate} message from the CBP within the specified duration.

Possible cause and exception handling: When the SCP does not receive the CCA {Terminate} message from the CBP within the specified duration, the SCP considers that the recharge is successful in the interest of the subscriber.

5.6 Process of Recharging an Account by Cash

This section describes the process of recharging an account by cash.

Figure 5-6 shows the normal process of recharging an account by cash.
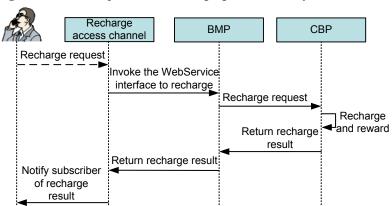
Figure 5-6 Normal process of recharging an account by cash

The process is described as follows:

1. A subscriber sends a cash recharge request through a recharge access channel.

   The recharge access channel can be the SMAP or a third-party platform that is used to invoke the WebService interface to recharge.

2. The recharge access channel invokes the WebService interface provided by the OCS system to initiate a cash recharge request to the BMP.

3. The BMP forwards the recharge request of the subscriber to the CBP.

4. The CBP performs the cash recharge and processes the resource reward if available. In addition, the CBP records the recharge log and CDR and returns the recharge result to the BMP.

5. The BMP returns the recharge result to the recharge access channel, and the recharge access channel returns the recharge result to the subscriber. Then the process of recharging an account by cash is complete.
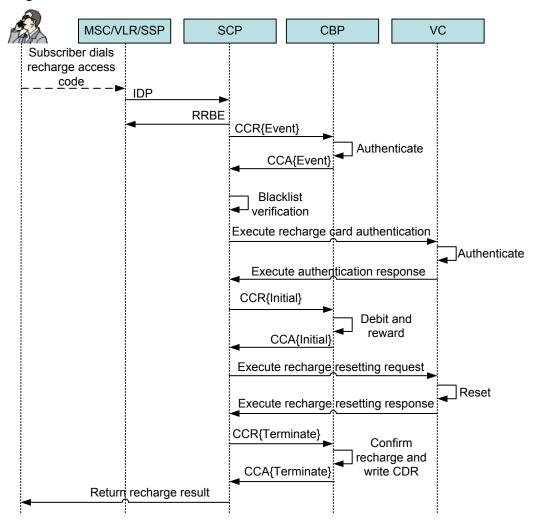
5.7 Process of Recharging an Account by Dialing a Recharge Access Code

This section describes the process of recharging an account by dialing a recharge access code.

Normal Process

A subscriber needs to dial different recharge access codes for recharging the personal account and for recharging the account of another subscriber. After a subscriber dials a recharge access code, the SCP directly forwards the call to the process of recharging the personal account or the process of recharging the account of another subscriber according to the recharge access code without interacting with the subscriber through voices. **Figure 5-7**shows the normal process of recharging the personal account of a subscriber by dialing the recharge access code. For the process of recharging the account of another subscriber by dialing the recharge access code, see the process of recharging the account of another subscriber through IVR in **5.2 Process of Recharging an Account by Using a Recharge Card Through IVR**.

Figure 5-7 Normal process of recharging the personal account of a subscriber by dialing the recharge access code

For the description of the process, see **5.2 Process of Recharging an Account by Using a Recharge Card Through IVR**.

Exception Handling Process

The exceptions that may occur when the subscriber recharges the account are as follows:

1. Symptom: After the SCP sends a CCR{Initial} message to the CBP for charging, the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration.

   Possible cause and exception handling: If the SCP does not receive the CCA{Initial} message returned by the CBP within the specified duration, the SCP sends a CCR{Event} message again to the CBP to query the recharge status of the subscriber. If a success message is returned, it indicates that the recharge is successful. If a failure message is returned, it indicates that the recharge fails. If the SCP still does not receive the CCA{Event} message returned by the CBP within the specified duration, the SCP considers that the recharge is successful.

2. Symptom: After the SCP sends a message through the INAP Execute interface to request the VC to reset the recharge card, the SCP does not receive the response message from the VC within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the result of resetting the recharge card from the VC, the SCP sends a request for authenticating the recharge card to the VC to query the recharge card status and performs the following processing according to the query result:

   (1) If the VC returns a message indicating that the recharge card is not reset, the SCP sends a DCC message to request the CBP to cancel the recharge and notifies the subscriber that the recharge fails.

   (2) If the VC returns a message indicating that the recharge card is already reset, the SCP considers that the recharge card is reset successfully and continues the subsequent processing.

   (3) If the SCP still does not receive the result of resetting the recharge card from the VC, the SCP continues the subsequent processing in the interest of the subscriber.

3. Symptom: After the SCP sends a CCR{Terminate} message to request the CBP to confirm the recharge, the SCP does not receive the CCA{Terminate} message from the CBP within the specified duration.

   Possible cause and exception handling: When the SCP does not receive the CCA {Terminate} message from the CBP within the specified duration, the SCP considers that the recharge is successful in the interest of the subscriber.

5.8 Process of Recharging an Account Through the EVC

This section describes the process of recharging an account through the EVC.

Through the EVC, an account can be recharged:
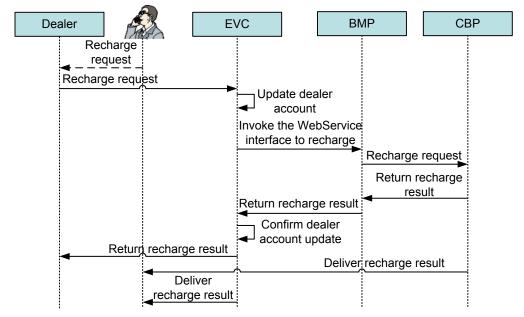
- Not in DCC mode
- In DCC mode

The following sections describe the process of recharging an account through the EVC in each mode in detail.

Process of Recharging an Account Through the EVC Not in DCC Mode

Figure 5-8 shows the process of recharging an account through the EVC not in DCC mode.

Figure 5-8 Process of recharging an account through the EVC not in DCC mode

The process is described as follows:

1. A subscriber sends a recharge request to a dealer.
2. The dealer receives the recharge request and sends the recharge request to the EVC.
3. The EVC receives the recharge request, updates the account balance of the dealer, prededucts the recharge amount, and forwards the recharge request to the BMP through the WebService interface.
4. The BMP invokes the cash recharge service of the OCS system and requests the CBP to recharge the account of the subscriber.
5. The CBP recharges the account of the subscriber and returns the recharge result to the BMP and the subscriber.
6. After receiving the recharge result, the BMP returns the recharge result to the EVC.
7. The EVC updates the account balance of the dealer according to the recharge result returned by the BMP and confirms the account update of the dealer. If the recharge fails, the EVC rolls back the prededucted amount.
8. The EVC returns the recharge result to the dealer and the subscriber. Then the process of recharging an account through the EVC not in DCC mode is complete.

Process of Recharging an Account Through the EVC in DCC Mode

Figure 5-9 shows the process of recharging an account through the EVC in DCC mode.
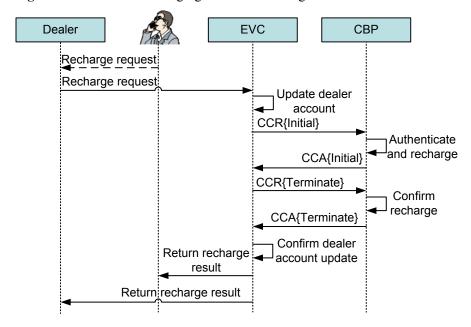
Figure 5-9 Process of recharging an account through the EVC in DCC mode

The process is described as follows:

1. A subscriber sends a recharge request to a dealer.

2. The dealer receives the recharge request and sends the recharge request to the EVC.

3. The EVC receives the recharge request, updates the account balance of the dealer, prededucts the recharge amount, and sends a CCR{Initial} message to the CBP for recharge.

4. After receiving the CCR{Initial} message, the CBP performs authentication and pre-recharge on the subscriber. If the subscriber is in arrears, the CBP generates a work order and sends a CCA{Initial} message containing the authentication result to the EVC.

5. After receiving the authentication result, the EVC sends a CCR{Terminate} message to request the CBP to confirm the recharge.

6. After receiving the recharge confirmation message, the CBP performs the recharge. If a recharge preference is available, the CBP also triggers the recharge preference and writes the recharge log and CDR. If the subscriber is suspended because of arrears before the recharge, the CBP sends a work order to resume the subscriber.

7. After processing the recharge, the CBP sends a CCA{Terminate} message containing the recharge result to the EVC.

   The recharge result contains the information about the recharge amount, preference, and notification short message for the recharge.

   📖 **NOTE**

   If the EVC requests to cancel the recharge, the EVC sends a CCR{Terminate} message to request the CBP to roll back the recharge. Then the CBP rolls back the recharge and performs the subsequent processing.

8. The EVC updates the account balance of the dealer according to the recharge result returned by the CBP and confirms the account update of the dealer. If the recharge fails, the EVC rolls back the prededucted amount.

9. The EVC returns the recharge result to the dealer and the recharged party. Then the process of recharging an account through the EVC in DCC mode is complete.

5.9 Reference

This section briefly describes the basic terms related to the recharge processes.

None.

6 Balance Query Processes

About This Chapter

6.1 Overview

This section describes the balance query modes and balance query processes that are supported by the OCS system.

A prepaid subscriber can query the personal account balance. The balance query modes supported by the OCS system are as follows:

- Querying the account balance of a subscriber through IVR

- Querying the account balance of a subscriber through USSD

- Querying the account balance of a subscriber by sending a short message

- Querying the account balance of a subscriber through the WebService interface

- Querying the account balance of a subscriber on the SMAP

The following sections describe each balance query process in detail.
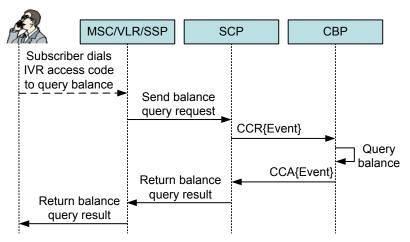
6.2 Process of Querying the Account Balance of a Subscriber Through IVR

This section describes the process of querying the account balance of a subscriber through IVR. In this process, the subscriber may be free of charge or charged.

6.2.1 Process of Querying the Account Balance of a Subscriber Through IVR When the Subscriber Is Free of Charge

Figure 6-1 shows the normal process of querying the account balance of a subscriber through IVR when the subscriber is free of charge.

Figure 6-1 Normal process of querying the account balance of a subscriber through IVR when the subscriber is free of charge

The process is described as follows:

1. A subscriber sends a request of querying the balance through IVR. The request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP forwards the request to the SCP.

3. The SCP sends a CCR{Event} message to request the CBP to query the account balance of the subscriber.

4. The CBP queries the account balance of the subscriber and sends a CCA{Event} message containing the query result to the SCP.

5. The SCP delivers the query result to the MSC/VLR/SSP, and the MSC/VLR/SSP notifies the subscriber of the query result. Then the process of querying the account balance of a subscriber through IVR when the subscriber is free of charge is complete.

6.2.2 Process of Querying the Account Balance of a Subscriber Through IVR When the Subscriber Is Charged

Figure 6-2 shows the normal process of querying the account balance of a subscriber through IVR when the subscriber is charged.

Figure 6-2 Normal process of querying the account balance of a subscriber through IVR when the subscriber is charged

The process is described as follows:

1. A subscriber sends a request of querying the balance through IVR. The request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP forwards the request to the SCP.

3. The SCP sends a CCR{Initial} message to request the CBP to query the account balance of the subscriber and to deduct the balance query fee.

4. The CBP prededucts the balance query fee, queries the account balance of the subscriber, and then sends a CCA{Initial} message containing the processing result to the SCP.

5. After receiving the processing result returned by the CBP, the SCP sends a CCR {Terminate} message to request the CBP to confirm the fee deduction.

6. The CBP confirms the fee deduction and returns the processing result to the SCP.

7. The SCP delivers the processing result to the MSC/VLR/SSP, and the MSC/VLR/SSP returns the processing result to the subscriber. Then the process of querying the account balance of a subscriber through IVR when the subscriber is charged is complete.

6.3 Process of Querying the Account Balance of a Subscriber Through USSD

This section describes the process of querying the account balance of a subscriber through USSD. In this process, the subscriber may be free of charge or charged.

6.3.1 Process of Querying the Account Balance of a Subscriber Through USSD When the Subscriber Is Free of Charge

Figure 6-3 shows the normal process of querying the account balance of a subscriber through USSD when the subscriber is free of charge.

Figure 6-3 Normal process of querying the account balance of a subscriber through USSD when the subscriber is free of charge

The process is described as follows:

1. A subscriber sends a USSD string to query the personal account balance. The request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP triggers the USSD service according to the U-CSI and forwards the request to the SCP.

3. The SCP sends a CCR{Event} message to request the CBP to query the account balance of the subscriber.

4. The CBP queries the account balance of the subscriber and sends a CCA{Event} message containing the query result to the SCP.

5. The SCP delivers the query result to the MSC/VLR/SSP, and the MSC/VLR/SSP notifies the subscriber of the query result. Then the process of querying the account balance of a subscriber through USSD when the subscriber is free of charge is complete.

6.3.2 Process of Querying the Account Balance of a Subscriber Through USSD When the Subscriber Is Charged

Figure 6-4 shows the normal process of querying the account balance of a subscriber through USSD when the subscriber is charged.

Figure 6-4 Normal process of querying the account balance of a subscriber through USSD when the subscriber is charged

The process is described as follows:

1. A subscriber sends a USSD string to query the personal account balance. The request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP triggers the USSD service according to the U-CSI and forwards the request to the SCP.

3. The SCP sends a CCR{Initial} message to request the CBP to query the account balance of the subscriber and to deduct the balance query fee.

4. The CBP prededucts the balance query fee, queries the account balance of the subscriber, and then sends a CCA{Initial} message containing the processing result to the SCP.

5. After receiving the processing result returned by the CBP, the SCP sends a CCR {Terminate} message to request the CBP to confirm the fee deduction.

6. The CBP confirms the fee deduction and returns the processing result to the SCP.

7. The SCP delivers the processing result to the MSC/VLR/SSP, and the MSC/VLR/SSP returns the processing result to the subscriber. Then the process of querying the account balance of a subscriber through USSD when the subscriber is charged is complete.

6.4 Process of Querying the Account Balance of a Subscriber by Sending a Short Message

This section describes the process of querying the account balance of a subscriber by sending a short message. In this process, the subscriber may be free of charge or charged.

6.4.1 Process of Querying the Account Balance of a Subscriber by Sending a Short Message When the Subscriber Is Free of Charge

Figure 6-5 shows the normal process of querying the account balance of a subscriber by sending a short message when the subscriber is free of charge.

Figure 6-5 Normal process of querying the account balance of a subscriber by sending a short message when the subscriber is free of charge

The process is described as follows:

1. A subscriber sends a short message to query the personal account balance. The balance query request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP authenticates the subscriber. If the subscriber has the right to send this short message, the MSC/VLR/SSP forwards the short message to the SMSC.

3. After receiving the short message, the SMSC forwards the short message to the GFEP through SMPP3.4 according to the ID of the ESME (External Short Message Entity).

4. After receiving the short message sent by the SMSC, the GFEP directly returns a response message to the SMSC.

5. The GFEP parses the short message contents and sends an RCOMM message to interact with the SCP.

6. After receiving the RCOMM message, the SCP determines whether the subscriber needs to be charged for sending this short message according to the related flag. If the subscriber is free of charge, the SCP sends a CCR{Event} message to request the CBP to query the account balance of the subscriber.

7. The CBP queries the account balance of the subscriber and sends a CCA{Event} message containing the query result to the SCP.

8. The SCP returns the balance query result to the GFEP and writes a dynamic short message according to the balance query result returned by the CBP. Then the SCP delivers the dynamic short message to the SMSC.

9. The SMSC delivers a short message containing the balance query result to the subscriber. Then the process of querying the account balance of a subscriber by sending a short message when the subscriber is free of charge is complete.

6.4.2 Process of Querying the Account Balance of a Subscriber by Sending a Short Message When the Subscriber Is Charged

Figure 6-6 shows the normal process of querying the account balance of a subscriber by sending a short message when the subscriber is charged.
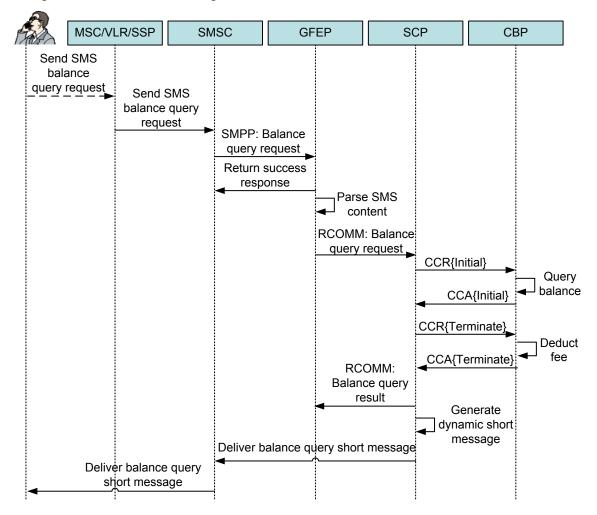
Figure 6-6 Normal process of querying the account balance of a subscriber by sending a short message when the subscriber is charged

The process is described as follows:

1. A subscriber sends a short message to query the personal account balance. The balance query request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP authenticates the subscriber. If the subscriber has the right to send this short message, the MSC/VLR/SSP forwards the short message to the SMSC.

3. After receiving the short message, the SMSC forwards the short message to the GFEP through SMPP3.4 according to the ID of the ESME.

4. After receiving the short message sent by the SMSC, the GFEP directly returns a response message to the SMSC.

5. The GFEP parses the short message contents and sends an RCOMM message to interact with the SCP.

6. After receiving the RCOMM message, the SCP determines whether the subscriber needs to be charged for sending this short message according to the related flag. If the subscriber needs to be charged, the SCP sends a CCR{Initial} message to request the CBP to query the account balance of the subscriber.
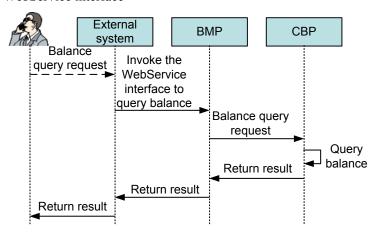
7. The CBP queries the account balance of the subscriber and sends a CCA{Initial} message containing the query result to the SCP.

8. The SCP sends a CCR{Terminate} message to request the CBP to deduct the balance query fee.

9. After deducting the balance query fee, the CBP sends a CCA{Terminate} message containing the processing result to the SCP.

10. The SCP returns the balance query result to the GFEP and generates a dynamic short message according to the balance query result returned by the CBP. Then the SCP delivers the dynamic short message to the SMSC.

11. The SMSC delivers a short message containing the balance query result to the subscriber. Then the process of querying the account balance of a subscriber by sending a short message when the subscriber is charged is complete.

6.5 Process of Querying the Account Balance of a Subscriber Through the WebService Interface

This section describes the process of querying the account balance of a subscriber through the WebService interface.

Figure 6-7 shows the normal process of querying the account balance of a subscriber through the WebService interface.

Figure 6-7 Normal process of querying the account balance of a subscriber through the WebService interface

The process is described as follows:

1. A subscriber sends a balance query request to the OCS system through an external system.

   The external system refers to a system that accesses the OCS system externally. The external system is a foreground that can process subscriber requests.

2. The external system receives the balance query request from the subscriber and forwards the request to the BMP through the WebService interface.

3. The BMP forwards the request to the CBP.
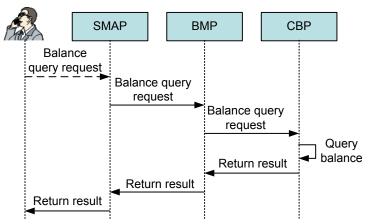
4. The CBP queries the account balance of the subscriber and returns the balance query result to the BMP.

5. The BMP returns the balance query result to the external system, and the external system returns the balance query result to the subscriber. Then the process of querying the account balance of a subscriber through the WebService interface is complete.

6.6 Process of Querying the Account Balance of a Subscriber on the SMAP

This section describes the process of querying the account balance of a subscriber on the SMAP.

Figure 6-8 shows the normal process of querying the account balance of a subscriber on the SMAP.

Figure 6-8 Normal process of querying the account balance of a subscriber on the SMAP

The process of querying the account balance of a subscriber on the SMAP is similar to the process of querying the account balance of a subscriber through the WebService interface. The only difference is that the SMAP replaces the external system. For the description of the process, see **6.5 Process of Querying the Account Balance of a Subscriber Through the WebService Interface**.

6.7 Reference

This section briefly describes the basic terms related to the balance query processes.

None.

7 Balance Transfer Processes

About This Chapter

7.1 Overview

This section describes a balance transfer and the associated processes.

In the OCS, balances can be transferred between the accounts of prepaid subscribers. During a balance transfer, only the balance of the main account can be transferred. The balance of the free resource account and bonuses cannot be transferred. The common balance transfer processes are as follows:

- Process of transferring a balance through the IVR

- Process of transferring a balance through the USSD

- Process of transferring a balance through the WebService interface

- Process of transferring a balance on the SMAP

The following sections describe each balance transfer process in detail.

7.2 Process of Transferring a Balance Through the IVR

This section describes the process of transferring a balance through the IVR.

Figure 7-1 shows the process of transferring a balance through the IVR.
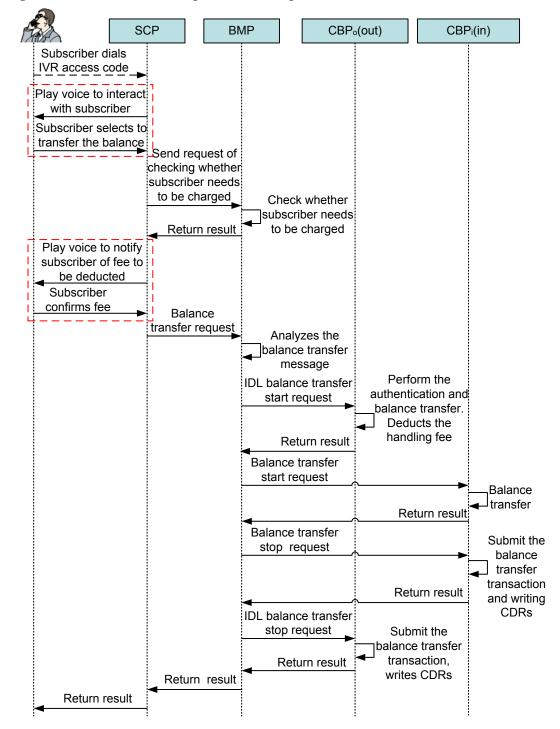
Figure 7-1 Process of transferring a balance through the IVR

The process description is as follows:

1. A subscriber dials the IVR access code, applying for a balance transfer.

2. The SCP interacts with the subscriber by playing a voice. (See the first dotted box in red in the preceding figure.) The subscriber selects to transfer the balance.

3. The SCP sends a fee query request to the BMP.

4. The BMP receives the request, queries the fees, determines whether the subscriber needs to be charged for the balance transfer, and then returns a result to the SCP.

5. The SCP performs operations according to the result from the BMP as follows:
   - If the subscriber does not need to be charged, the SCP directly sends the balance transfer request to the BMP to proceed with the operations in step 6.
   - If the subscriber needs to be charged, the operations in the second dotted red box in the preceding figure are performed. The SCP plays a voice to notify the subscriber of the fee to be deducted for the balance transfer. After the subscriber confirms the fee deduction, the SCP sends the balance transfer request to the BMP.

6. The BMP analyzes the balance transfer message.

7. The BMP sends an IDL balance transfer start request to CBP_o of the transfer-out party.

8. After receiving the request, CBP_o performs the authentication and balance transfer. If any handling fee needs to be deducted according to the result of fee query, CBP_o also deducts the handling fee, and then returns the processing result to the BMP.

9. The BMP receives the result, and then sends a balance transfer start request to CBP_i of the transfer-in party for the balance transfer.

10. CBP_i performs the balance transfer, and then returns the result to the BMP.

11. The BMP receives the result, and then sends a balance transfer stop request to CBP_i of the transfer-in party for submitting the balance transfer transaction and writing CDRs.

12. CBP_i submits the balance transfer transaction, writes CDRs, and returns the result to the BMP.

13. The BMP receives the result, and then sends an IDL balance transfer stop request to CBP_o of the transfer-out party for submitting the balance transfer transaction.

14. CBP_o submits the balance transfer transaction, writes CDRs, and returns the result to the BMP.

15. The BMP returns the balance transfer result to the SCP.

16. The SCP returns the balance transfer result to the subscriber. The process of transferring a balance through the IVR ends.

7.3 Process of Transferring a Balance Through the USSD

This section describes the process of transferring a balance through the USSD.

The process of transferring a balance through the USSD varies according to network connection, and can be divided into the following categories:

- Process triggered in U-CSI mode
- Process triggered in MAP mode

The specific triggering mode of a process depends on the actual network deployment.

Process of Transferring a Balance Through the USSD (Triggered in U-CSI Mode)

Figure 7-2 shows the process of transferring a balance through the USSD (triggered in U-CSI mode).
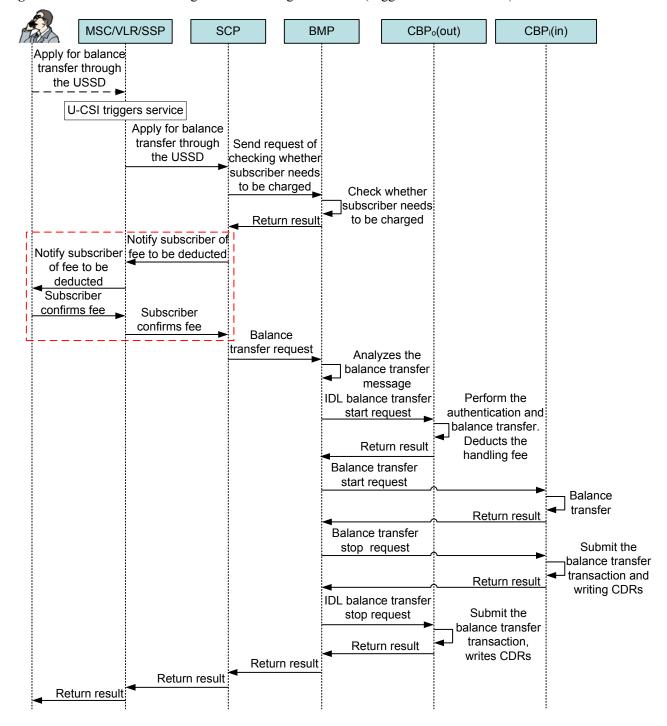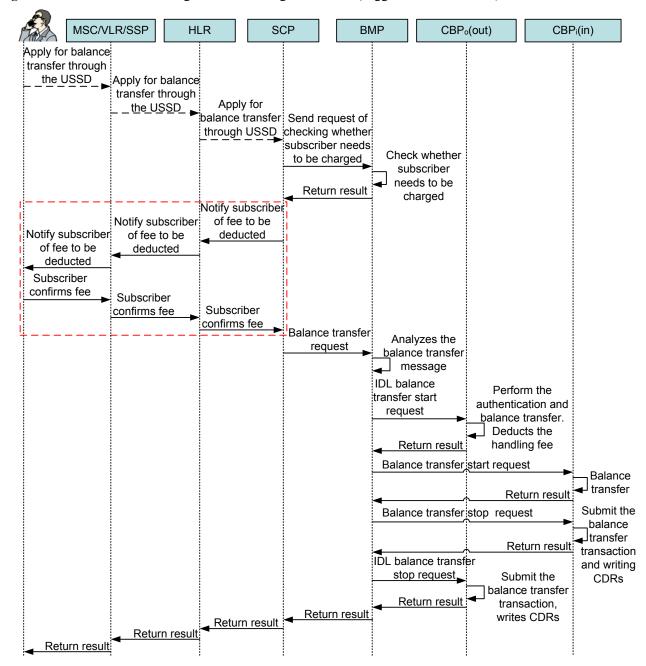
Figure 7-2 Process of transferring a balance through the USSD (triggered in U-CSI mode)

The process of transferring a balance through the USSD (triggered in U-CSI mode) is similar to the process of transferring a balance through the IVR. During the process, the SCP queries fees from the BMP. If any fee needs to be deducted, the SCP confirms the fee deduction with the subscriber. Then, the CBP_o of the transfer-out party deducts the fee. For process details, see **7.2 Process of Transferring a Balance Through the IVR**.

Process of Transferring a Balance Through the USSD (Triggered in MAP Mode)

Figure 7-3 shows the process of transferring a balance through the USSD (triggered in MAP mode).

Figure 7-3 Process of transferring a balance through the USSD (triggered in MAP mode)

The process of transferring a balance through the USSD (triggered in MAP mode) is similar to the process of transferring a balance through the USSD (triggered in U-CSI mode). During the process, the SCP performs a fee query on the BMP. If any fee needs to be deducted, the SCP confirms the fee deduction with the subscriber. Then, CBP_o of the transfer-out party deducts the

fee. For process details, see **Process of Transferring a Balance Through the USSD (Triggered in U-CSI Mode)**.

7.4 Process of Transferring a Balance Through the WebService Interface

This section describes the process of transferring a balance through the WebService interface.

Figure 7-4 shows the process of transferring a balance through the WebService interface.

Figure 7-4 Process of transferring a balance through the WebService interface

The process description is as follows:

1. A subscriber applies for a balance transfer. The request is sent to an external system.
2. The external system sends the subscriber request to the BMP.
3. The BMP analyzes the balance transfer message, and checks whether any fee needs to be deducted.
4. The BMP sends an IDL balance transfer start request to CBP_o of the transfer-out party.
5. After receiving the request, CBP_o performs the authentication and balance transfer. If any handling fee needs to be deducted, CBP_o also deducts the handling fee, and then returns the processing result to the BMP.
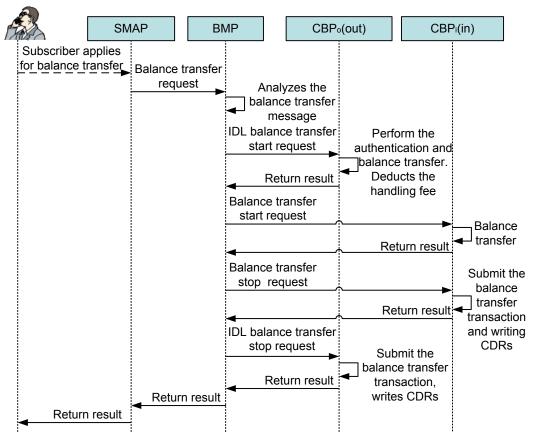
6. The BMP receives the result, and then sends a balance transfer start request to CBP_i of the transfer-in party for the balance transfer.

7. CBP_i performs the balance transfer, and then returns the result to the BMP.

8. The BMP receives the result, and then sends a balance transfer stop request to CBP_i of the transfer-in party for submitting the balance transfer transaction and writing CDRs.

9. CBP_i submits the balance transfer transaction, writes CDRs, and returns the result to the BMP.

10. The BMP receives the result, and then sends an IDL balance transfer stop request to CBP_o of the transfer-out party for submitting the balance transfer transaction.

11. CBP_o submits the balance transfer transaction, writes CDRs, and returns the result to the BMP.

12. The BMP returns the balance transfer result to the external system.

13. The external system returns the result to the subscriber. The process of transferring a balance through the WebService interface ends.

7.5 Process of Transferring a Balance on the SMAP

This section describes the process of transferring a balance on the SMAP.

Figure 7-5 shows the process of transferring a balance on the SMAP.

Figure 7-5 Process of transferring a balance on the SMAP

The process of transferring a balance on the SMAP is similar to the process of transferring a balance through the WebService interface. After a subscriber applies for a balance transfer, an operator handles the request on the SMAP. By invoking the WebSservice interface, the operator transfers the balance for the subscriber on the BMP and CBP. If any handling fee needs to be deducted, CBP_o of the transfer-out party deducts the handling fee. For process details, see **7.4 Process of Transferring a Balance Through the WebService Interface**.

7.6 Reference

This section describes the terms used in balance transfer processes.

None.

8 Monthly Settlement Processes

About This Chapter

8.1 Overview

Monthly settlement refers to one-off fee deduction performed by the OCS system at specified intervals.

This section describes the following processes related to monthly settlement:

● Monthly settlement process

This section describes the process of performing the monthly settlement of the OCS system.

● Process of notifying a subscriber of the monthly settlement by short message

This section describes the process of notifying a subscriber of the monthly settlement by short message.

8.2 Monthly Settlement Process

This section describes the typical monthly settlement process.
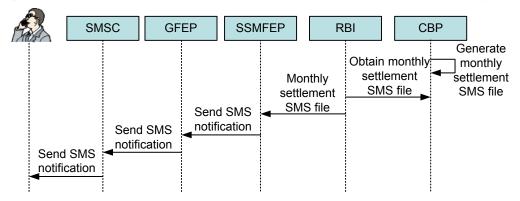
The monthly settlement process is a periodical charging process. After a subscriber subscribes to a product, the monthly settlement of the product is performed on a specified date of a period. The scheduled transaction mechanism inside the OCS system triggers the monthly settlement and settles the monthly rental of the product. Bill cycle refers to a period for charging and bill run.

8.3 Process of Notifying a Subscriber of the Monthly Settlement by Short Message

After the monthly settlement, the system sends a short message to a subscriber. This section describes the process of notifying a subscriber of the monthly settlement by short message.

Figure 8-1 shows the process of notifying a subscriber of the monthly settlement by short message.

Figure 8-1 Process of notifying a subscriber of the monthly settlement by short message

The process is described as follows:

1. The OCS system periodically runs or triggers in real time the monthly settlement process of a subscriber. Then the CBP writes a monthly settlement short message to a monthly settlement SMS file.

2. The RBI obtains the monthly settlement SMS file from the CBP periodically and sends the file to the SSMFEP. Generally, the SSMFEP is deployed on the SCP.

3. The SSMFEP sends the monthly settlement SMS file to the GFEP.

4. The GFEP sends the monthly settlement SMS file to the SMSC, and the SMSC delivers the monthly settlement SMS file to the subscriber. Then the process of notifying a subscriber of the monthly settlement by short message is complete.

8.4 Reference

This section describes the terms used in the monthly settlement processes.

None.

9 Registration and Deregistration Processes

About This Chapter

9.1 Overview

OCS provide GUI/Web Service interface to create a new subscriber.

This section describes the processes of registering and deregistering an OCS subscriber and the processes of registering and deregistering OCS subscribers in batches.

9.2 Subscriber Registration Processes

While creating subscriber, user has to provide the information of the customer. After the operation is complete, the customer information, subscriber information, and account information for the new subscriber are generated.

9.2.1 Process of Registering a Subscriber

Figure 9-1 shows the process of registering a subscriber.
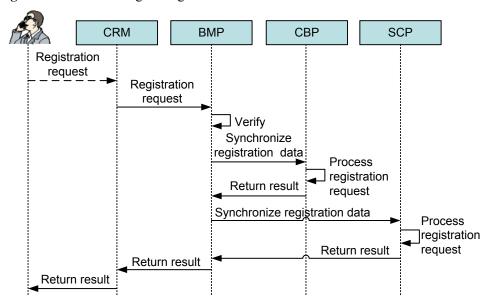
Figure 9-1 Process of registering a subscriber

The process is described as follows:

1. A user requests being registered as an OCS subscriber. The registration request reaches the CRM system.

2. The CRM system forwards the registration request to the BMP.

3. After receiving the registration request, the BMP verifies the user data.

   The user data that needs to be verified includes the current resources, main product, and account of the user. The subsequent registration processing can be performed only when the user data is correct.

4. After the user data passes the verification, the BMP requests the CBP to synchronize the user data.

5. The CBP registers the user as an OCS subscriber and returns the processing result to the BMP.

6. The BMP forwards the registration request to the SCP. After receiving the registration request, the SCP synchronizes the user data and returns the processing result to the BMP.

7. The BMP returns the processing result to the CRM system, and the CRM system returns the processing result to the user. Then the process of registering a subscriber is complete.

9.2.2 Process of Registering Subscribers in Batches

Figure 9-2 shows the process of registering subscribers in batches.
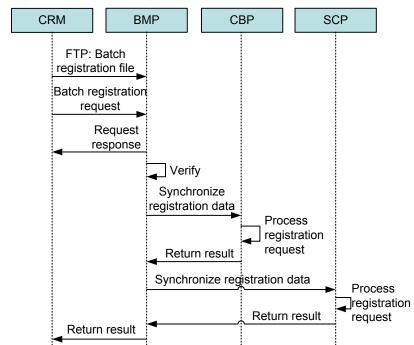
Figure 9-2 Process of registering subscribers in batches

The process is described as follows:

1. The CRM system transfers the batch registration file to the BMP through FTP.

2. After transferring the batch registration file, the CRM system sends a request of registering subscribers in batches to the BMP again.

3. After receiving the request, the BMP responds to the request.

4. After the user data passes the verification, the BMP requests the CBP to synchronize the user data.

5. The CBP registers the users as OCS subscribers and returns the processing result to the BMP.

6. The BMP forwards the registration request to the SCP. After receiving the registration request, the SCP synchronizes the user data and returns the processing result to the BMP.

7. The BMP returns the processing result to the CRM system. Then the process of registering subscribers in batches is complete.
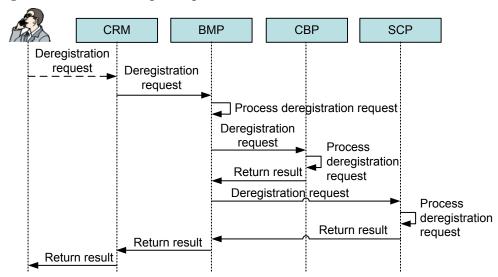
9.3 Subscriber Deregistration Processes

The OCS system provides the deregistration function and a scheduled task for clearing deregistration data periodically.

9.3.1 Process of Deregistering a Subscriber

Figure 9-3 shows the process of deregistering a subscriber.

Figure 9-3 Process of deregistering a subscriber

The process is described as follows:

1. A subscriber requests being deregistered. The deregistration request reaches the CRM system.
2. The CRM system forwards the deregistration request to the BMP.
3. The BMP processes the deregistration request and requests the CBP to deregister the subscriber.
4. The CBP processes the deregistration request and returns the processing result to the BMP.
5. The BMP requests the SCP to deregister the subscriber. The SCP deregisters the subscriber and returns the processing result to the BMP.
6. The BMP returns the processing result to the CRM system, and the CRM system returns the processing result to the subscriber. Then the process of deregistering a subscriber is complete.

9.3.2 Process of Deregistering Subscribers in Batches

Figure 9-4 shows the process of deregistering subscribers in batches.
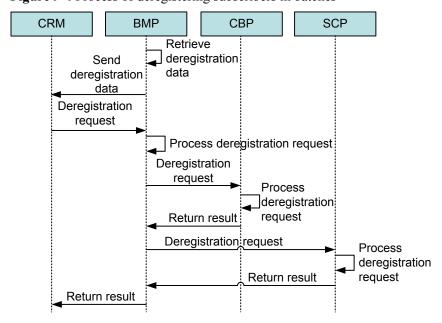
Figure 9-4 Process of deregistering subscribers in batches

The process is described as follows:

1. The BMP retrieves in batches the data of the subscribers to be deregistered and sends the subscriber data to the CRM system as a file.

2. After receiving the subscriber data, the CRM system sends a batch deregistration request to the BMP.

3. The BMP processes the batch deregistration request and requests the CBP to deregister the subscribers in batches.

4. The CBP processes the batch deregistration request and returns the processing result to the BMP.

5. The BMP requests the SCP to deregister the subscribers in batches.

6. The SCP deregisters the subscribers in batches and returns the processing result to the BMP. The BMP returns the processing result to the CRM system. Then the process of deregistering subscribers in batches is complete.

9.4 Reference

This section describes the terms used in the registration and deregistration processes.

None.

10 Password Change Processes

About This Chapter

10.1 Overview

This section describes the password change processes of the OCS system.

OCS subscribers must enter their personal service passwords when applying for services. The subscribers can change their passwords in any of the following modes:

- Through the WebService interface

- On the SMAP

- Through USSD

- Through IVR
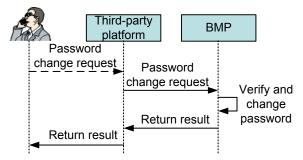
The following sections describe each password change process in detail.

10.2 Process of Changing a Password Through the WebService Interface

This section describes the process of changing a password through the WebService interface.

Figure 10-1 shows the normal process of changing a password through the WebService interface.

Figure 10-1 Normal process of changing a password through the WebService interface

The process is described as follows:
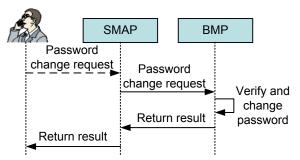
1. A subscriber sends a password change request. The request reaches a third-party platform.

2. The third-party platform forwards the password change request to the BMP through the WebService interface.

3. The BMP verifies the new and old passwords of the subscriber. After the new and old passwords pass the verification, the BMP changes the password of the subscriber.

4. After changing the password successfully, the BMP returns the processing result to the third-party platform, and the third-party platform returns the processing result to the subscriber. Then the process of changing a password through the WebService interface is complete.

10.3 Process of Changing a Password on the SMAP

This section describes the process of changing a password on the SMAP.

Figure 10-2 shows the normal process of changing a password on the SMAP.

Figure 10-2 Normal process of changing a password on the SMAP

The process is described as follows:

1. A subscriber sends a password change request on the SMAP.
2. The SMAP forwards the request to the BMP through the WebService interface.
3. The BMP verifies the new and old passwords of the subscriber. After the new and old passwords pass the verification, the BMP changes the password of the subscriber.
4. After changing the password successfully, the BMP returns the processing result to the SMAP, and the SMAP returns the processing result to the subscriber. Then the process of changing a password through the WebService interface is complete.

10.4 Process of Changing a Password Through USSD

This section describes the process of changing a password through USSD.

Figure 10-3 shows the normal process of changing a password through USSD.
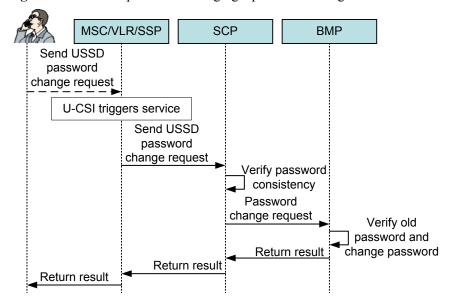
Figure 10-3 Normal process of changing a password through USSD

The process is described as follows:

1. A subscriber sends a USSD password change request. The request reaches the MSC/VLR/SSP.

   The password change request contains the USSD access code, old password of the subscriber, and new password of the subscriber.

2. The MSC/VLR/SSP triggers the USSD service according to the U-CSI and forwards the password change request to the SCP.

3. After receiving the request, the SCP checks whether the subscriber can change the password and whether the old and new passwords of the subscriber are correct.

4. After the password verification is passed, the SCP sends an RCOMM message to request the BMP to change the password.

5. The BMP verifies the old password. After the old password passes the verification, the BMP changes the password of the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the MSC/VLR/SSP, and the MSC/VLR/SSP returns the processing result to the subscriber. Then the process of changing a password through USSD is complete.

10.5 Process of Changing a Password Through IVR

This section describes the process of changing a password through IVR.

Figure 10-4 shows the normal process of changing a password through IVR.
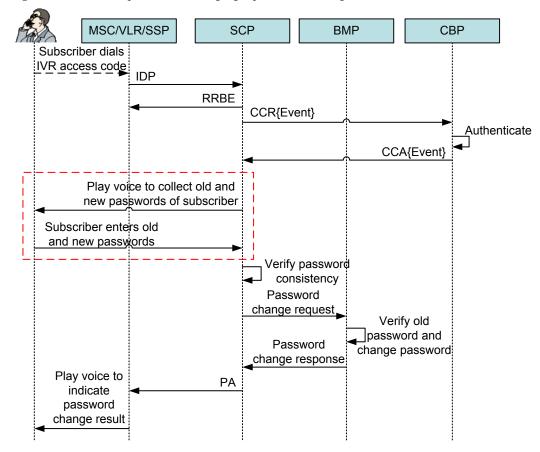
Figure 10-4 Normal process of changing a password through IVR

The process is described as follows:

1. A subscriber dials the IVR access code. The call reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP reports an IDP message to trigger the call to the SCP of the home area.

3. The SCP returns an RRBE message to the MSC/VLR/SSP.

4. The SCP sends a CCR{Event} message to request the CBP to authenticate the subscriber state.

5. The CBP authenticates the subscriber state and sends a CCA{Event} message containing the authentication result to the SCP. The subscriber can perform the subsequent password change operations only after the subscriber state passes the authentication.

6. The SCP also plays the related voices to interact with the subscriber according to the authentication result returned by the CBP to obtain the old and new passwords of the subscriber. The dotted red box in **Figure 10-4** shows the interactions.

7. The subscriber enters the old and new passwords as prompted.

8. The SCP checks whether the subscriber can change the password and whether the new password and confirm password are the same.

9. If the verification is passed, the SCP forwards the password request to the BMP.

10. The BMP verifies the old password of the subscriber. If the old password is correct, the BMP changes the password of the subscriber.

11. The BMP returns the password change result to the SCP.

12. The SCP delivers a voice to the MSC/VLR/SSP according to the password change result, and the MSC/VLR/SSP plays the voice to notify the subscriber of the password change result. Then the process of changing a password through IVR is complete.

10.6 Reference

This section describes the terms used in the password change processes.

None.

11 MMS Charging Processes

About This Chapter

11.1 Overview

This section describes the terms related to multimedia message service (MMS) charging and the classifications of MMS charging processes.

The MMS service can be charged online through any of the following protocols:

- DCC
- EMPP
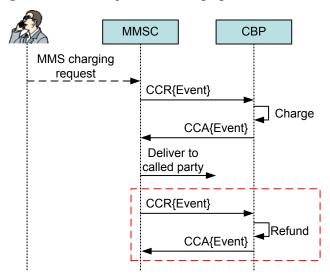
The following sections describe each charging process of the data service in detail.

11.2 Process of Charging for the MMS Service Through DCC

This section describes the process of charging for the MMS service online through DCC.

Figure 11-1 shows the normal process of charging for the MMS service online through DCC.

Figure 11-1 Normal process of charging for the MMS service online through DCC

MMSC   Multimedia Messaging Service Center

The process is described as follows:

1. A subscriber sends a multimedia message. The MMS charging request reaches the MMSC.

2. The MMSC sends a CCR{Event} message to the CBP for charging.

3. The CBP processes the charging request and sends a CCA{Event} message containing the processing result to the MMSC.

4. After receiving the result indicating that the charging is successful, the MMSC sends a multimedia message to the called subscriber.

5. If the subscriber fails to send the multimedia message, the multimedia message fee needs to be refunded. Then the operations in the dotted red box in **Figure 11-1** are performed, the MMSC sends a CCR{Event} message to the CBP for refund.

6. The CBP processes the refund request and sends a CCA{Event} message containing the processing result to the MMSC. Then the process of charging for the MMS service through DCC is complete.

11.3 Process of Charging for the MMS Service Through EMPP

This section describes the process of charging for the MMS service online through EMPP.

Figure 11-2 shows the normal process of charging for the MMS service online through EMPP.

Figure 11-2 Normal process of charging for the MMS service online through EMPP

> **NOTE**
>
> During the process of charging for the MMS service online through EMPP, the MMSC registers itself on the GFEP when attempting to connect to the GFEP. After the MMSC registers itself on the GFEP successfully, the connection between the MMSC and GFEP is created successfully. Then the GFEP converts the EMPP protocol to a DCC message and sends the DCC message to the CBP for authentication. After the authentication is passed, the subsequent charging operations can be performed normally.

The process is described as follows:

1. A subscriber sends a multimedia message. The MMS charging request reaches the MMSC.

2. The MMSC forwards the charging request to the GFEP through EMPP.

3. The GFEP converts the protocol and sends a CCR{Event} message to the CBP to apply for authorization, rating and charging.

4. After receiving the message, the CBP processes the charging request and sends a CCA{Event} message containing the processing result to the GFEP.

5. The GFEP returns the processing result to the MMSC.

6. After receiving the processing result returned by the CBP, the GFEP sends a CCR{Event} message to request the CBP to confirm the charging. If the multimedia message fee needs to be refunded, the GFEP sends a CCR{Event} message to the CBP for refund.

7. The CBP confirms the charging or refunds the fee, and then sends a CCA{Event} message containing the processing result to the GFEP.

8. Then the process of charging for the MMS service online through EMPP is complete.

11.4 Reference

This section describes the terms used in the charging processes of MMS.

None.

12 GPRS Charging Processes

About This Chapter

12.1 Overview

This section describes the terms related to the GPRS service charging and the classifications of GPRS charging processes.

The GPRS service can be charged online through any of the following protocols:

- DCC
- CAMEL3

The following sections describe each charging process of the data service in detail.

12.2 Process of Charging for the GPRS Service Through DCC

OCS communicates with external data service components through Diameter and performs real time authentication and charging for data services.

Figure 12-1 shows the process of charging for the GPRS service through DCC.
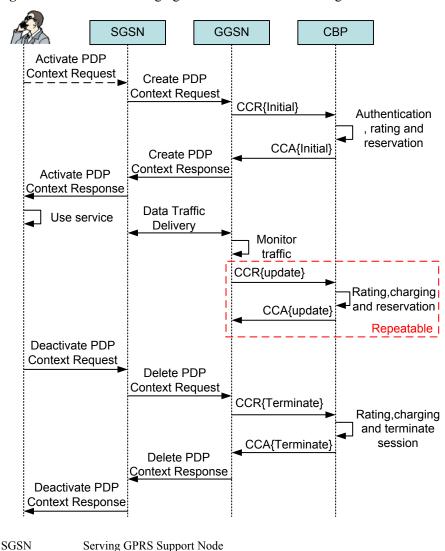
Figure 12-1 Process of charging for the GPRS service through DCC

SGSN   Serving GPRS Support Node
PDP   Packet Data Protocol

The process is described as follows:

1. When a subscriber requests for WAP/Web visit, the SGSN detects PDP context activation request from MS (Mobile Station), then sends the Create PDP context request to GGSN.

2. The GGSN analyzes the request and sends the request to the corresponding CBP.

3. After receiving the request, the CBP performs authentication, rating, and reservation, and sends a CCA{Initial} message containing the processing result to the GGSN.

4. The GGSN sends the result to the SGSN.

5. The SGSN sends the result to the subscriber. Then the subscriber can use the GPRS service.

6. A data channel is established between the subscriber and the GGSN and thus the GGSN can monitor the service usage of the subscriber.

7. When the allocated duration is used up, the GGSN sends a CCR{Update} message to the CBP to request more duration.

8. The CBP debits the fees generated in the previous duration and performs rating and reservation.

9. The CBP sends a CCA{Update} message containing the processing result to the GGSN.

   📖 **NOTE**

   Steps 7 to 9, that is, the processes described in the previous dotted box in red, can be repeated.

10. When the subscriber stops using the service, the SGSN receives a PDP context deactivation request.

11. The SGSN sends the request of deleting the PDP context to the GGSN.

12. The GGSN sends a CCR{Terminate} message to request the CBP to confirm the charging and write a CDR.

13. The CBP confirms the charging, writes a CDR, and ends the session. In addition, the CBP sends a CCR{Terminate} message to return the processing result.

14. The GGSN sends PDP Context Deletion Response to the SGSN.

15. The SGSN sends the PDP context deactivation request to the subscriber. Then the process of charging for the GPRS service through DCC is complete.

12.3 Process of Charging for the GPRS Service Through CAMEL3

OCS communicates with external data service components through Diameter and performs real time authentication and charging for data services.

Figure 12-2 shows the process of charging for the GPRS service through CAMEL3.
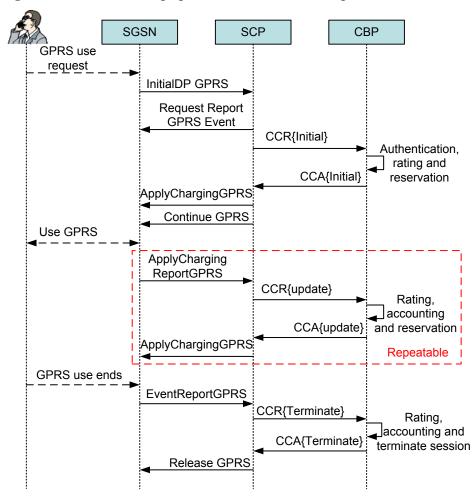
Figure 12-2 Process of charging for the GPRS service through CAMEL3

1. When a subscriber requests for WAP/Web visit, the SGSN detects PDP context activation request.

2. The SGSN trigger the service according to CSI, send InitialDP GPRS message to the SCP.

3. The SCP sends Request Report GPRS Event operation to the SGSN.

4. The SCP sends CCR{Initial} message to the CBP for authentication and reservation.

5. The CBP performs authentication, rating and reservation, and then sends CCA{Initial} message to the SCP.

    ●   If charge by time, the SCP sends Apply Charging GPRS with the monitoring time to the GGSN and sends Continue GPRS operation to home SGSN.

    ●   If charge by volume, the SCP sends Apply Charging GPRS with the monitoring traffic and time to the SGSN.

6. The SCP sends ContinueGPRS operation to instruct the SGSN to continue GPRS session or PDP context processing.

7. The SCP sends ApplyChargingGPRS operation to instruct SGSN to monitor the consumption of the subscriber.

8. When the allocated usage slice has been used up, the SGSN sends ApplyChargingReportGPRS to the SCP.

9. The SCP sends CCR{Update} message to CBP, reporting used volume/time and request for reservation again.

10. The CBP processes the charging request, performs debiting on the previous application, makes new reservation for the subscriber, and returns a CCA{Update} message containing the processing result to the SCP.

11. The SCP sends ApplyChargingGPRS operation to instruct SGSN to monitor the consumption of the subscriber.

   📖 **NOTE**

   The operations in the dotted red box in **Figure 12-2** can be performed circularly according to the actual service usage of the subscriber until the subscriber exhausts the account balance.

12. When the subscriber stops using the GPRS service, the SGSN sends ApplyChargingReportGPRS and EventReportGPRS to the SCP.

13. The SCP sends CCR{Terminate} message to CBP, reporting used volume.

14. The CBP commits the charge according to the message, and then sends a CCA{Terminate} message containing the processing result to the SCP.

15. The SCP sends ReleaseGPRS to tear down the existing GPRS Session or PDP. Then the process of charging for the GPRS service through CAMEL3 is complete.

12.4 Reference

This section describes the terms used in the charging processes of GPRS.

The GPRS-related 3GPP CAMEL phase 3 series standards are as follows:

● 3GPP TS 29.078 V4.4.0 (2002-03) Release 4

● 3GPP TS 22.078 version 4.0.0 (2000-10) Release 4

● 3GPP TS 23.078 V4.4.0 (2002-03) Release 4

13 International Roaming Service Processes

About This Chapter

13.1 Overview

This section describes interface roaming services and the main processes related to the services.

Common international roaming services are as follows:

● Call service

● SMS

The following sections describe these services.

13.2 Process of Charging for an International Roaming Call

This section describes the process of charging for an international roaming call.

An international roaming call can be charged in either of the following modes:

● CAMEL2 mode

● USSD Call Back (UCB) mode

The following sections describe the process of charging for an international roaming call in each mode.

13.2.1 Process of Charging for an International Roaming Call in CAMEL2 Mode

Figure 13-1 shows the normal process of charging for an international roaming call in CAMEL2 mode. Assume that:

● MSC/VLR/SSP is the visited country of subscriber A.

● SCP_a and CBP_a are the home SCP and CBP of subscriber A.
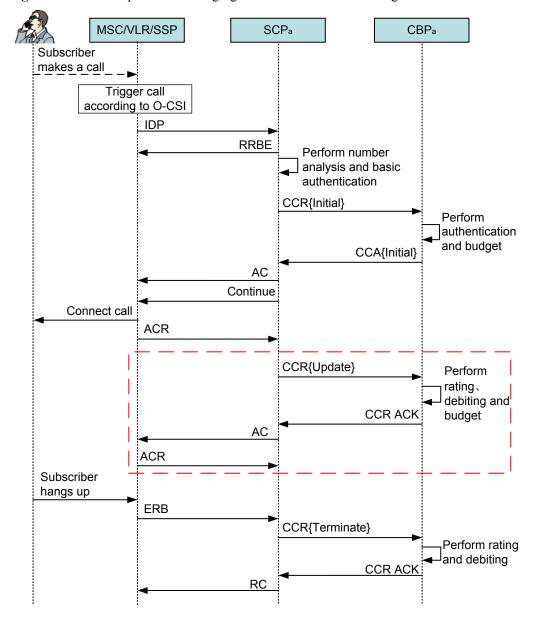
Figure 13-1 Normal process of charging for an international roaming call in CAMEL2 mode

The process of charging for an international roaming call in CAMEL2 mode is similar to the process of charging for an ordinary call. After subscriber A makes an international roaming call, the call reaches the MSC/VLR/SSP of the visited area. Then the MSC/VLR/SSP triggers the call to SCP$_a$ according to the O-CSI of subscriber A. For the subsequent process description, see the process of charging a calling party described in **2.2.1 Process of Charging a Call Between Two OCS Subscribers**.

📖 **NOTE**

In the process of charging for an international roaming call in CAMEL2 mode, the carrier of the home network needs to sign a roaming agreement with the carrier of the visited network so that the CAMEL signaling of the visited network can communicate with the CAMEL signaling of the home network.

13.2.2 Process of Charging for an International Roaming Call in UCB Mode

The following problems exist when a prepaid subscriber roams internationally:

- The international roaming function cannot be enabled for the subscriber based on the credit of the subscriber.
- The home SCP of the subscriber can be triggered through the Visited Mobile Switching Center (VMSC) only when the VMSC of the visited area supports the CAMEL2.

In this case, the carrier can enable the capability of only being a called party for the subscriber. The specific call process is: When an international roaming subscriber makes a call, a USSD request is sent to the home network of the subscriber. Then a special device is used to initiate two calls to the subscriber and to the called party respectively. When both the calling and called parties respond to the calls, the special device connects the two calls so that the subscriber can talk with the called party. This is called the UCB scheme.

Figure 13-2 shows the normal process of charging for an international roaming call in UCB mode. Assume that:

- Subscriber A roams to another country.
- Subscriber A makes an international roaming call to subscriber B.
- Both subscriber A and subscriber B are OCS subscribers.
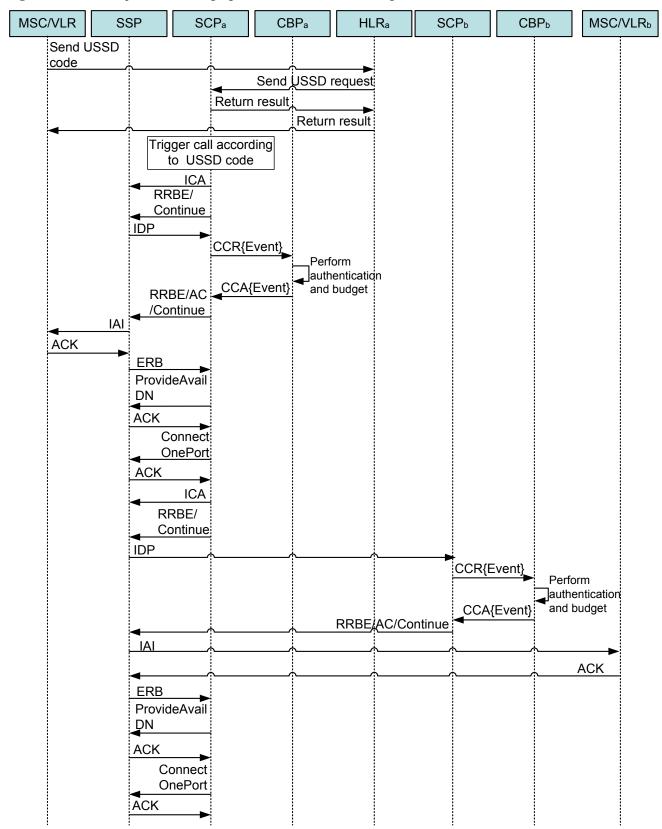
Figure 13-2 Normal process of charging for an intreational roaming call in UCB mode

The process is described as follows:

1. Subscriber A roams to another country and makes a USSD call. The call reaches the MSC/VLR of the visited area. The MSC/VLR of the visited area routes the USSD call to HLR_a.

2. HLR_a routes the USSD call to SCP_a.

3. SCP_a returns a USSD response to HLR_a.

4. HLR_a returns a response to the MSC/VLR.

5. SCP_a sends the Initial Call Attempt (ICA), RRBE, and Continue messages to request the SSP to initiate a call to subscriber A (call A).

6. The SSP triggers the called process of subscriber A and sends an IDP message to SCP_a. In addition, the SSP sends a CCR{Event} message to CBP_a to request authentication.

7. After the authentication is passed, CBP_a sends a CCA{Event} message to return the authentication result to SCP_a.

8. SCP_a delivers the RRBE, AC, and Continue messages according to the returned authentication result.

9. After receiving the request, the SSP sends an Initial Address Message with Additional Information (IAI) message to the MSC/VLR of the visited area to request the MSC/VLR to connect the call to subscriber A.

10. The MSC/VLR returns an ACK message to the SSP.

11. After subscriber A answers the call, the SSP reports an ERB message to notify SCP_a that the call is connected to subscriber A successfully.

12. SCP_a sends the ProvideAvailDN request to the SSP and applies to the SRF for an available DN. The DN functions as the unique identifier of call A.

13. The SSP receives the request and delivers a DN to SCP_a.

14. SCP_a sends the ConnectOnePort request to the SSP to connect call A to the SRF resource.

15. The SSP receives the request, connects call A to the SRF resource, and returns a result to SCP_a. Then the call to subscriber A is initiated successfully.

16. The SSP initiates a call to subscriber B (call B). SCP_a delivers the ICA, RRBE, and Continue messages to the SSP.

17. The SSP triggers the called process of subscriber B and sends an IDP message to SCP_b. In addition, the SCP_b sends a CCR{Event} message to CBP_b to request authentication.

18. After the authentication is passed, CBP_b sends a CCA{Event} message to return the authentication result to SCP_b.

19. SCP_b delivers the RRBE, AC, and Continue messages according to the returned authentication result.

20. After receiving the request, the SSP sends an IAI message to MSC/VLR_b to request MSC/VLR_b to connect the call to subscriber B.

21. The MSC/VLR_b returns an ACK message to the SSP.

22. After subscriber B answers the call, the SSP reports an ERB message to notify SCP_a that the call is connected to subscriber B successfully.

23. SCP_a sends the ProvideAvailDN request to the SSP and applies to the SRF for an available DN. The DN functions as the unique identifier of call B.

24. The SSP receives the request and delivers a DN to SCP$_a$.

25. SCP$_a$ sends the ConnectOnePort request to the SSP to connect call B to an SRF resource.

26. The SSP receives the request, connects call A with call B according to the two DNs, and returns a result to SCP$_a$. Then the call between subscriber A and subscriber B is connected. When the call ends, subscriber A is charged as a called party. Then the process of charging for an international roaming call in UCB mode is complete.
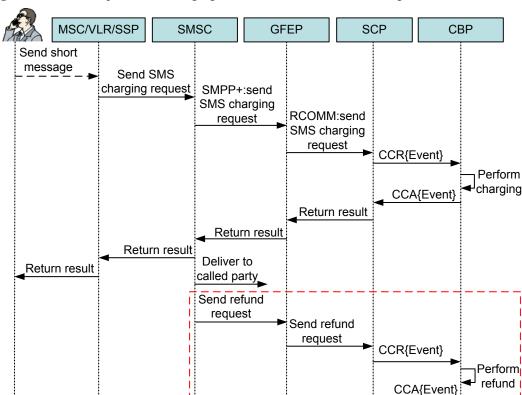
13.3 Process of Charging for an International Short Message

This section describes the process of charging for an international short message based on the SMPP+ protocol.

13.3.1 Process of Charging for an International Short Message Based on SMPP+

This section describes the process of charging for an international short message based on SMPP +.

Figure 13-3 shows the normal process of charging for an international short message based on SMPP+.

Figure 13-3 Normal process of charging for an international short message based on SMPP+

The process is described as follows:

1. A subscriber sends an international roaming short message. The upstream charging request of the short message reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP of the visited country routes the short message charging request to the home SMSC of the subscriber.

3. The SMSC forwards the charging request to the GFEP through SMPP+.

4. The GFEP converts the charging request to an RCOMM message and sends the RCOMM message to the home SCP.

5. After receiving the RCOMM message, the SCP sends a CCR{Event} message to the home CBP to initiate a charging request.

6. The CBP charges for the short message and sends a CCA{Event} message to return the processing result to the SCP.

7. The SCP returns the charging result to the GFEP. Then the GFEP returns the charging result to the SMSC.

8. If the charging is successful, the SMSC returns the charging result to the MSC/VLR/SSP and delivers the short message to the called party.

9. The MSC/VLR/SSP returns the charging result to the calling party. Then the process of charging for an international short message based on the SMPP+ protocol is complete.

 📖 **NOTE**

> Refunds are required only when a short message fails to be sent. When a short message refund is required, the SMSC sends a refund request to request the CBP to perform the refund operation. The refund process is similar to the process of charging for a short message. For details, see the process in the dotted box in red, as shown in **Figure 13-3**.

13.4 Reference

This section describes the terms used in the charging processes of international roaming service.

None.

14 FN Service Processes

About This Chapter

14.1 Overview

This section describes the Familiarity Number (FN) service and the FN service processes.

The FN service is a preferential service provided by the carrier to subscribers. When the FN service is enabled for a subscriber, the subscriber can set the frequently used numbers to FNs. After setting a number to an FN successfully and the setting takes effect, the subscriber can enjoy a discount or charge rate preference when making calls or sending short messages to this FN. The maximum number of FNs that an FN service subscriber can set is determined by the carrier. The common FN service processes are as follows:

● Processes of enabling the FN service for a subscriber

● Processes of disabling the FN service for a subscriber

● Processes of querying, adding or changing an FN of a subscriber

The FN service can be processed on the SMAP, through the WebService interface, IVR, USSD, or short messages.

14.2 Processes of Enabling the FN Service for a Subscriber

This section describes the processes of enabling the FN service for a subscriber.

The FN service can be enabled through the WebService interface, IVR, on the SMAP, USSD, or short messages. The following sections describe each process in detail.

14.2.1 Process of Enabling the FN Service for a Subscriber Through IVR

Figure 14-1 shows the normal process of enabling the FN service for a subscriber through IVR.
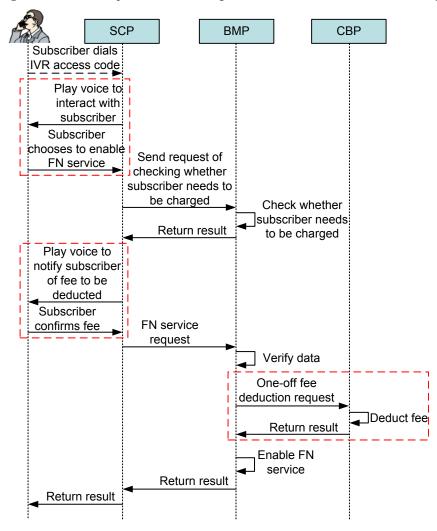
Figure 14-1 Normal process of enabling the FN service for a subscriber through IVR

The process is described as follows:

1. A subscriber dials the IVR access code to subscribe to the FN service.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 14-1** shows the interactions. Then the subscriber chooses to subscribe to the FN service.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to the FN service.

4. The BMP determines whether the subscriber needs to be charged for subscribing to the FN service and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

    ●   If the subscriber does not need to be charged for subscribing to the FN service, step 6 is proceeded with.

    ●   If the subscriber needs to be charged for subscribing to the FN service, the operations in the second dotted red box in **Figure 14-1** are performed. The SCP plays a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6. The SCP forwards the subscription request to the BMP.

7. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP sends a one-off fee deduction request to the CBP to deduct the fee if the subscriber needs to be charged. After deducting the fee, the CBP returns the processing result to the BMP.

9. The BMP enables the FN service for the subscriber and returns the processing result to the SCP.

10. The SCP returns the processing result to the subscriber. Then the process of enabling the FN service for a subscriber through IVR is complete.

14.2.2 Process of Enabling the FN Service for a Subscriber Through the WebService Interface

Figure 14-2 shows the normal process of enabling the FN service for a subscriber through the WebService interface.

Figure 14-2 Normal process of enabling the FN service for a subscriber through the WebService interface

The process is described as follows:

1. A subscriber applies for the FN service. The subscription request reaches an external system.

2. The external system forwards the subscription request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber.

- If the subscriber needs to be charged for subscribing to the FN service, the operations in the dotted red box in **Figure 14-2** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP.

- If the subscriber does not need to be charged for subscribing to the FN service, step 5 is proceeded with.

5. The BMP enables the FN service for the subscriber and returns the processing result to the external system.

6. The external system returns the processing result to the subscriber. Then the process of enabling the FN service for a subscriber through the WebService interface is complete.

14.2.3 Process of Enabling the FN Service for a Subscriber on the SMAP

Figure 14-3 shows the normal process of enabling the FN service for a subscriber on the SMAP.
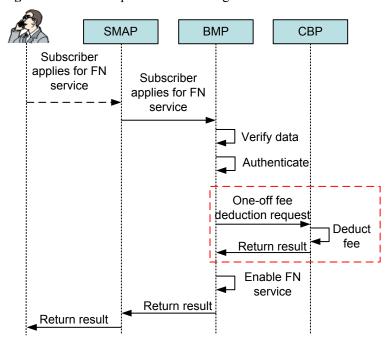
Figure 14-3 Normal process of enabling the FN service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for the FN service on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

3. The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber. If the subscriber needs to be charged for subscribing to the FN service, the operations in the dotted red box in **Figure 14-3** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for subscribing to the FN service, step 5 is proceeded with.

5. The BMP enables the FN service for the subscriber and returns the processing result to the SMAP.

6. The SMAP returns the processing result to the subscriber. Then the process of enabling the FN service for a subscriber on the SMAP is complete.

14.2.4 Processes of Enabling the FN Service for a Subscriber Through USSD

This section describes the processes of enabling the FN service for a subscriber through USSD.

The trigger modes of the processes of enabling the FN service for a subscriber through USSD include the following:

● In U-CSI mode

● In MAP mode

The specific trigger mode of a process depends on the actual network deployment.

Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)

Figure 14-4 shows the normal process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode).
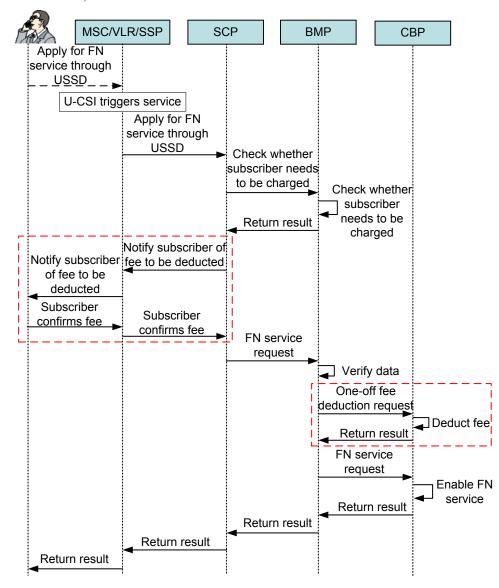
Figure 14-4 Normal process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode)

The process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode) is similar to the process of enabling the FN service for a subscriber through IVR. In the process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode), the SCP determines whether the subscriber needs to be charged on the BMP. If yes, the SCP requests the subscriber to confirm the fee that needs to be deducted, and the BMP sends a one-off fee deduction request to request the CBP to deduct the fee. For the description of the process, see **14.2.1 Process of Enabling the FN Service for a Subscriber Through IVR**.

Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in MAP Mode)

Figure 14-4 shows the normal process of enabling the FN service for a subscriber through USSD (triggered in MAP mode).
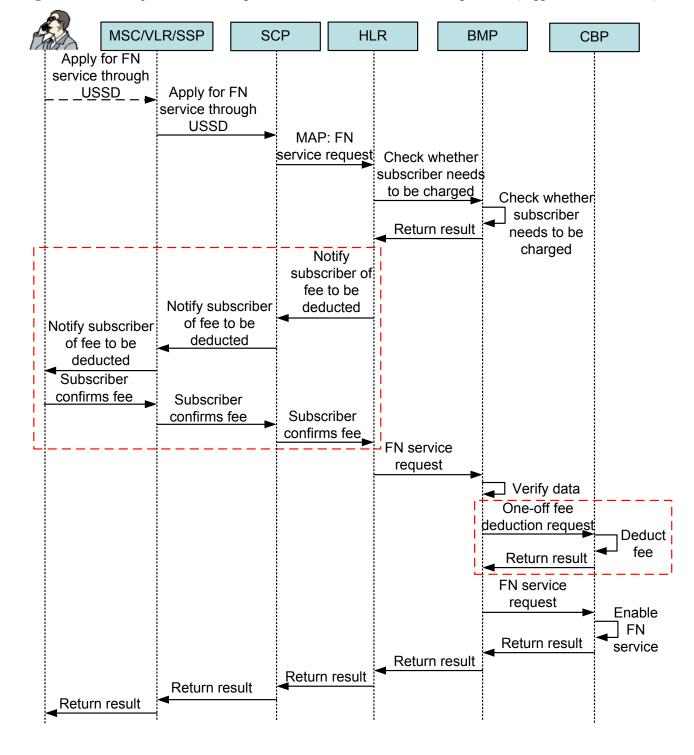
Figure 14-5 Normal process of enabling the FN service for a subscriber through USSD (triggered in MAP mode)

The process of enabling the FN service for a subscriber through USSD (triggered in MAP mode) is similar to the process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode) in the OCS system. The only difference is the trigger mode. For the description of the process, see **Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)**.

14.2.5 Process of Enabling the FN Service for a Subscriber Through a Short Message
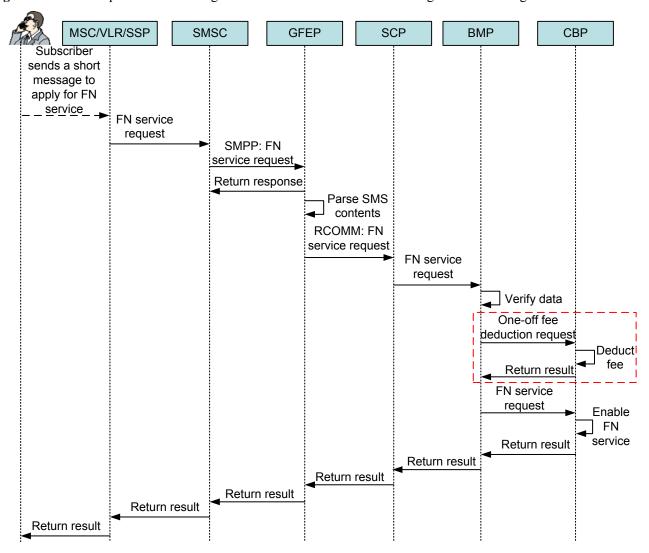
This section describes the process of enabling the FN service for a subscriber through a short message.

Figure 14-6 shows the normal process of enabling the FN service for a subscriber through a short message.

Figure 14-6 Normal process of enabling the FN service for a subscriber through a short message

The process is described as follows:

1. A subscriber sends a short message to subscribe to the FN service. The subscription request reaches the MSC/VLR/SSP.

2. The MSC/VLR/SSP authenticates the subscriber. If the subscriber has the right to send this short message, the MSC/VLR/SSP forwards the short message to the SMSC.

3. The SMSC forwards the short message to the GFEP through SMPP3.4 according to the ID of the ESME.

4. The GFEP directly returns a response message to the SMSC.

5. The GFEP parses the short message contents and sends an RCOMM message to interact with the SCP.

6. After receiving the RCOMM message, the SCP requests the BMP to enable the FN service for the subscriber.

7. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP authenticates the subscriber. If the subscriber needs to be charged for subscribing to the FN service, the operations in the dotted red box in **Figure 14-6** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for subscribing to the FN service, step 9 is proceeded with.

9. The BMP requests the CBP to enable the FN service for the subscriber.

10. The CBP enables the FN service and returns the processing result to the BMP.

11. The BMP returns the processing result to the SCP, and the SCP returns the processing result to the subscriber. Then the processes of enabling the FN service for a subscriber through a short message is complete.

14.3 Processes of Disabling the FN Service for a Subscriber

This section describes the processes of disabling the FN service for a subscriber.

The FN service can be disabled through the WebService interface, IVR, on the SMAP, USSD, or short messages. The following sections describe each process in detail.

14.3.1 Process of Disabling the FN Service for a Subscriber Through IVR

Figure 14-7 shows the normal process of disabling the FN service for a subscriber through IVR.
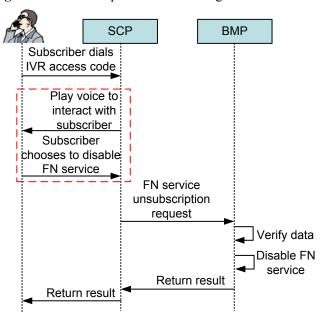
Figure 14-7 Normal process of disabling the FN service for a subscriber through IVR
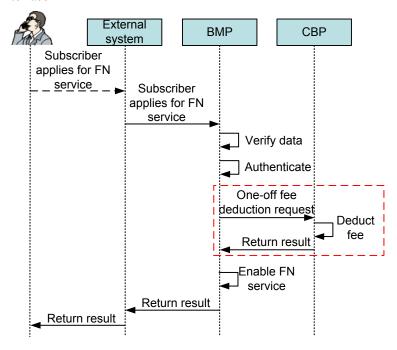

The process is described as follows:

1. A subscriber dials the IVR access code to send a request for unsubscribing from the FN service.

2. The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 14-7** shows the interactions. Then the subscriber chooses to unsubscribe from the FN service.

3. The SCP forwards the unsubscription request to the BMP.

4. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5. After the subscriber data passes the verification, the BMP disables the FN service for the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the subscriber. Then the process of disabling the FN service for a subscriber through IVR is complete.

14.3.2 Process of Disabling the FN Service for a Subscriber Through the WebService Interface

Figure 14-8 shows the normal process of disabling the FN service for a subscriber through the WebService interface.
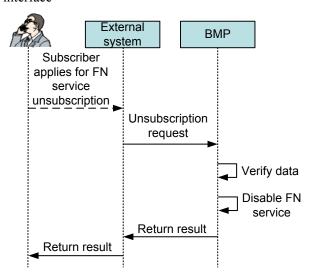
Figure 14-8 Normal process of disabling the FN service for a subscriber through the WebService interface

The process is described as follows:

1. A subscriber sends a request for unsubscribing from the FN service. The unsubscription request reaches an external system.

2. The external system forwards the unsubscription request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the FN service for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of disabling the FN service for a subscriber through the WebService interface is complete.

14.3.3 Process of Disabling the FN Service for a Subscriber on the SMAP

Figure 14-9 shows the normal process of disabling the FN service for a subscriber on the SMAP.
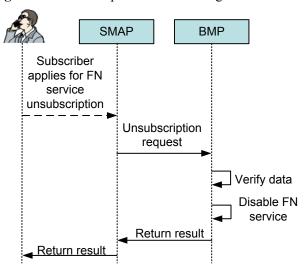
Figure 14-9 Normal process of disabling the FN service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request for unsubscribing from the FN service on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

3. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the FN service for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of disabling the FN service for a subscriber on the SMAP is complete.

14.3.4 Processes of Disabling the FN Service for a Subscriber Through USSD

This section describes the processes of disabling the FN service for a subscriber through USSD.

Process of Disabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)

Figure 14-10 shows the normal process of disabling the FN service for a subscriber through USSD (triggered in U-CSI mode).

Figure 14-10 Normal process of disabling the FN service for a subscriber through USSD (triggered in U-CSI mode)

The process of disabling the FN service for a subscriber through USSD (triggered in U-CSI mode) is similar to the process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode). For the description of the process, see **Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)**.

Process of Disabling the FN Service for a Subscriber Through USSD (Triggered in MAP Mode)

Figure 14-10 shows the normal process of disabling the FN service for a subscriber through USSD (triggered in MAP mode).

Figure 14-11 Normal process of disabling the FN service for a subscriber through USSD (triggered in MAP mode)

The process of disabling the FN service for a subscriber through USSD (triggered in MAP mode) is similar to the process of enabling the FN service for a subscriber through USSD (triggered in MAP mode). For the description of the process, see **Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in MAP Mode)**.

14.3.5 Process of Disabling the FN Service for a Subscriber Through a Short Message

This section describes the process of disabling the FN service for a subscriber through a short message.

Figure 14-12 shows the normal process of disabling the FN service for a subscriber through a short message.

Figure 14-12 Normal process of disabling the FN service for a subscriber through a short message

The process of disabling the FN service for a subscriber through a short message is similar to the process of enabling the FN service for a subscriber through a short message. In the process of disabling the FN service for a subscriber through a short message, a service unsubscription message is sent, and fee deduction is not required. For the description of the process, see **14.2.5 Process of Enabling the FN Service for a Subscriber Through a Short Message**.

14.4 Processes of Adding or Changing an FN of a Subscriber

This section describes the processes of adding or changing an FN of a subscriber.

After the FN service is enabled for a subscriber, the subscriber can add or change an FN through the WebService interface, IVR, on the SMAP, USSD, or short messages. The following sections describe each process in detail.

14.4.1 Process of Adding or Changing an FN of a Subscriber Through IVR

Figure 14-13 shows the normal process of adding or changing an FN of a subscriber through IVR.
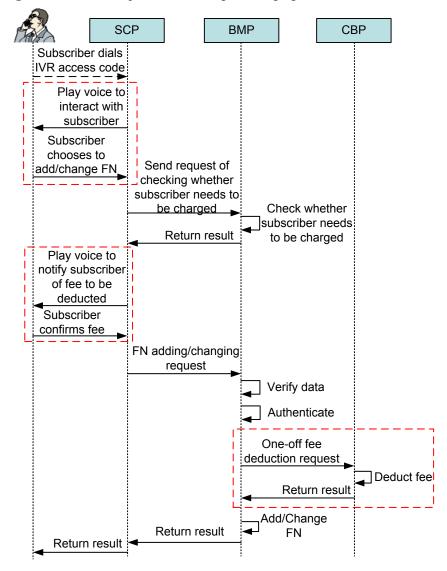
Figure 14-13 Normal process of adding or changing an FN of a subscriber through IVR

The process is described as follows:

1. A subscriber sends a request of adding or changing an FN through IVR.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 14-13** shows the interactions. Then the subscriber chooses to add or change an FN.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to add or change an FN.

4. The BMP determines whether the subscriber needs to be charged for subscribing to add or change an FN and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

   ● If the subscriber does not need to be charged for subscribing to add or change an FN, step 6 is proceeded with.

   ● If the subscriber needs to be charged for subscribing to add or change an FN, the operations in the second dotted red box in **Figure 14-13** are performed. The SCP plays

a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6. The SCP forwards the adding or changing request to the BMP.

7. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP authenticates the FN to be added or changed.

   The BMP accumulates the FN that needs to be added or changed by group to check whether the FN group exists, whether the number of FNs in the FN group reaches the maximum, and whether the FN can be added or changed according to the restrictions of the system on FNs.

9. After the FN passes the verification, the BMP adds or changes the FN for the subscriber and returns the processing result to the SCP.
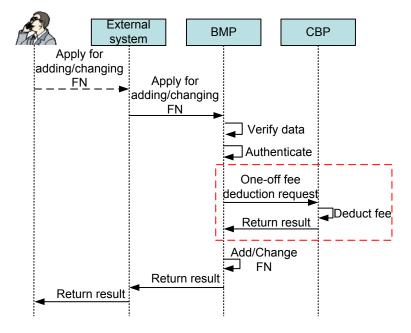
   📖 **NOTE**

   If the subscriber needs to be charged for adding or changing the FN, the operations in the third dotted red box in **Figure 14-13** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for adding or changing the FN, step 9 is proceeded with.

10. The SCP returns the processing result to the subscriber. Then the process of adding or changing an FN of a subscriber through IVR is complete.

14.4.2 Process of Adding or Changing an FN of a Subscriber Through the WebService Interface

Figure 14-14 shows the normal process of adding or changing an FN of a subscriber through the WebService interface.
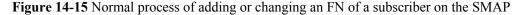
Figure 14-14 Normal process of adding or changing an FN of a subscriber through the WebService interface

The process is described as follows:
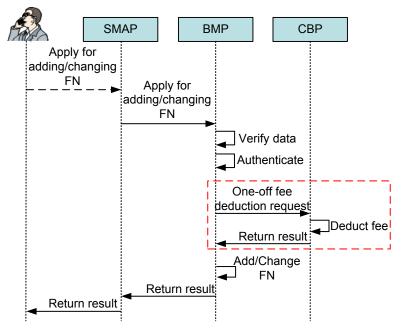
1. A subscriber sends a request of adding or changing an FN. The request reaches an external system.

2. The external system forwards the request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the FN to be added or changed.

   The BMP accumulates the FN that needs to be added or changed by group to check whether the FN group exists, whether the number of FNs in the FN group reaches the maximum, and whether the FN can be added or changed according to the restrictions of the system on FNs.

5. After the FN passes the verification, if the subscriber needs to be charged for adding or changing the FN, the operations in the dotted red box in **Figure 14-14** are performed. That is, the BMP adds or changes an FN for the subscriber and returns the processing result to the external system. If the subscriber does not need to be charged for adding or changing the FN, step 5 is proceeded with.

6. The external system returns the processing result to the subscriber. Then the process of adding or changing an FN of a subscriber through the WebService interface is complete.

14.4.3 Process of Adding or Changing an FN of a Subscriber on the SMAP

Figure 14-15 shows the normal process of adding or changing an FN of a subscriber on the SMAP.

Figure 14-15 Normal process of adding or changing an FN of a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request of adding or changing an FN on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the FN to be added or changed.

   The BMP accumulates the FN that needs to be added or changed by group to check whether the FN group exists, whether the number of FNs in the FN group reaches the maximum, and whether the FN can be added or changed according to the restrictions of the system on FNs.

5. After the FN passes the verification, if the subscriber needs to be charged for adding or changing the FN, the operations in the dotted red box in **Figure 14-15** are performed. That is, the BMP adds or changes an FN for the subscriber and returns the processing result to the SMAP. If the subscriber does not need to be charged for adding or changing the FN, step 5 is proceeded with.

6. The SMAP returns the processing result to the subscriber. Then the process of adding or changing an FN of a subscriber on the SMAP is complete.

14.4.4 Processes of Adding or Changing an FN of a Subscriber Through USSD

This section describes the processes of adding or changing an FN of a subscriber through USSD.

The process of adding or changing an FN of a subscriber through USSD (triggered in U-CSI or MAP mode) is similar to the processes of enabling the FN service for a subscriber through USSD (triggered in U-CSI or MAP mode).

Process of Adding or Changing an FN of a Subscriber Through USSD (Triggered in U-CSI Mode)

Figure 14-16 shows the normal process of adding or changing an FN of a subscriber through USSD (triggered in U-CSI mode).
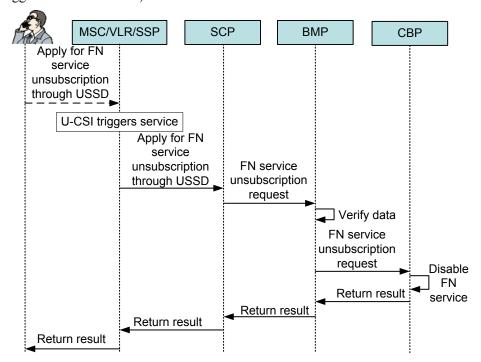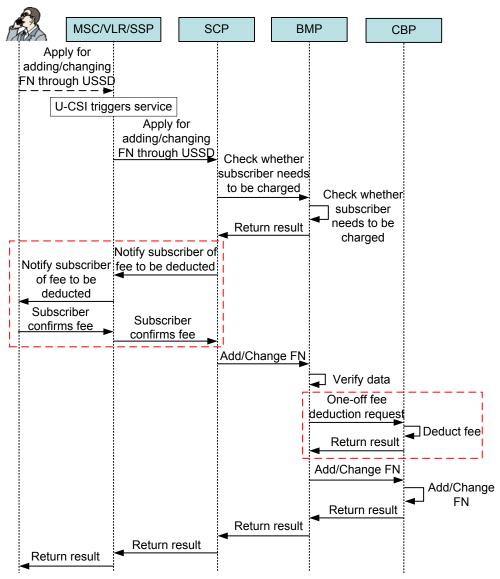
Figure 14-16 Normal process of adding or changing an FN of a subscriber through USSD (triggered in U-CSI mode)

The process of adding or changing an FN of a subscriber through USSD (triggered in U-CSI mode) is similar to the process of enabling the FN service for a subscriber through USSD (triggered in U-CSI mode). For the description of the process, see **Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)**.

Process of Adding or Changing an FN of a Subscriber Through USSD (Triggered in MAP Mode)

Figure 14-16 shows the normal process of adding or changing an FN of a subscriber through USSD (triggered in MAP mode).
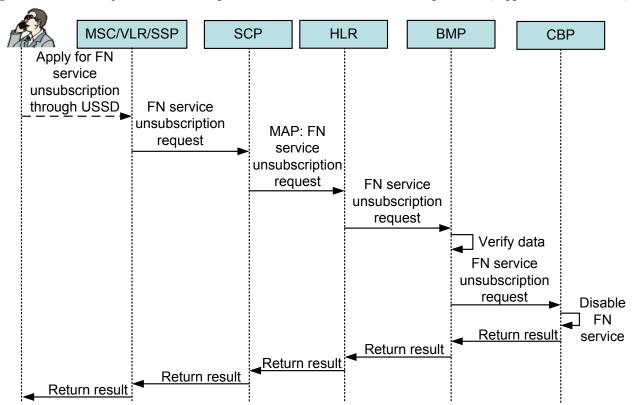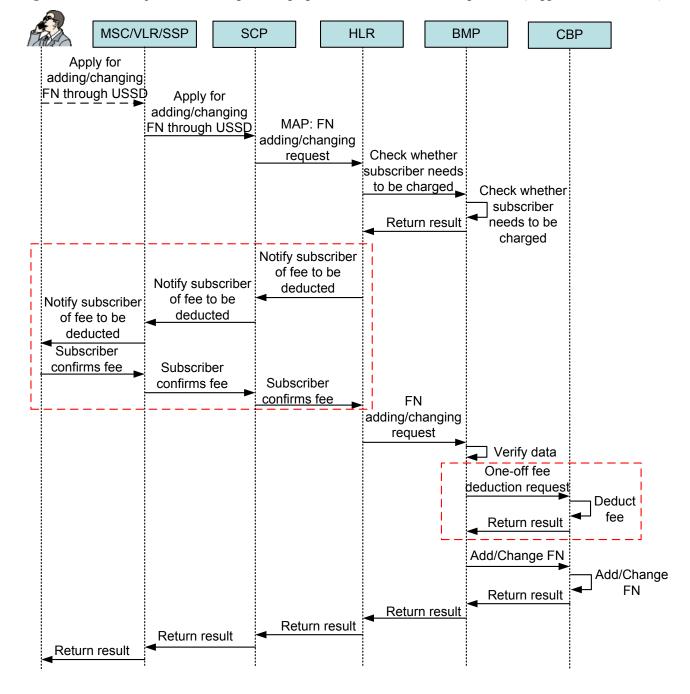
Figure 14-17 Normal process of adding or changing an FN of a subscriber through USSD (triggered in MAP mode)
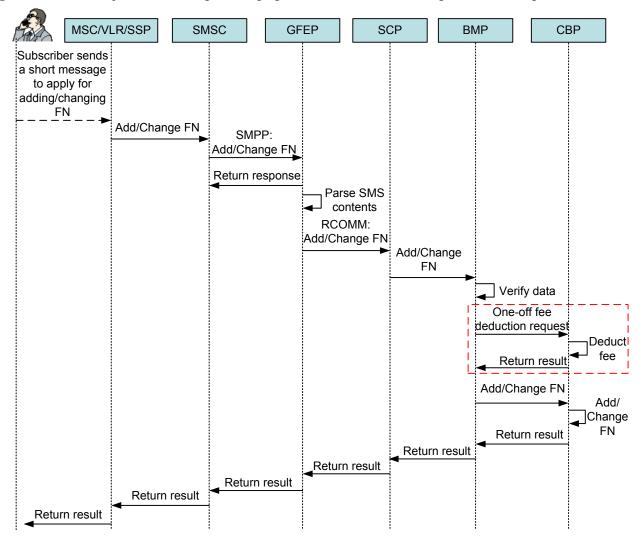
The process of adding or changing an FN of a subscriber through USSD (triggered in MAP mode) is similar to the process of enabling the FN service for a subscriber through USSD (triggered in MAP mode). For the description of the process, see **Process of Enabling the FN Service for a Subscriber Through USSD (Triggered in MAP Mode)**.

14.4.5 Process of Adding or Changing an FN of a Subscriber Through a Short Message

This section describes the process of adding or changing an FN of a subscriber through a short message.

Figure 14-18 shows the normal process of adding or changing an FN of a subscriber through a short message.
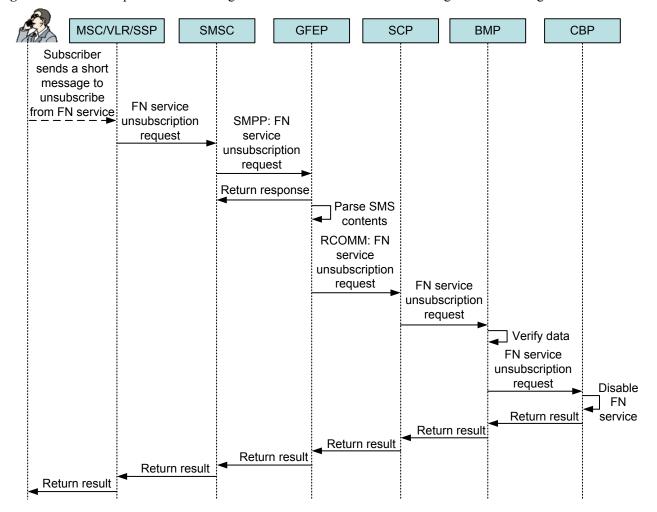
Figure 14-18 Normal process of adding or changing an FN of a subscriber through a short message

The process of adding or changing an FN of a subscriber through a short message is similar to the process of enabling the FN service for a subscriber through a short message. For the description of the process, see **14.2.5 Process of Enabling the FN Service for a Subscriber Through a Short Message**.

14.5 Processes of Querying an FN of a Subscriber
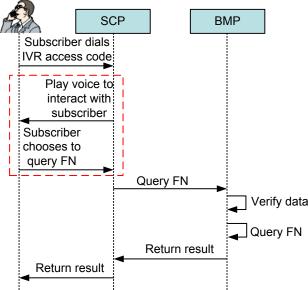
This section describes the processes of querying an FN of a subscriber.

An FN service subscriber can query an FN through the WebService interface, IVR, on the SMAP, USSD, or short messages. The following sections describe each process in detail.

14.5.1 Process of Querying an FN of a Subscriber Through IVR

Figure 14-19 shows the process of querying an FN of a subscriber through IVR.

Figure 14-19 Process of querying an FN of a subscriber through IVR

The process is described as follows:
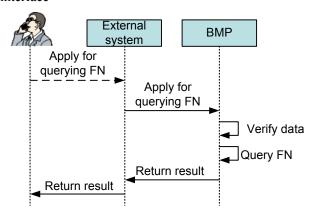
1. A subscriber sends a request of querying an FN through IVR.

2. The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 14-19** shows the interactions. Then the subscriber chooses to query an FN.

3. The SCP forwards the querying request to the BMP.

4. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5. After the subscriber data passes the verification, the BMP querys the FN for the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the subscriber. Then the process of querying an FN of a subscriber through IVR is complete.

14.5.2 Process of Querying an FN of a Subscriber Through the WebService Interface

Figure 14-20 shows the normal process of querying an FN of a subscriber through the WebService interface.

Figure 14-20 Normal process of querying an FN of a subscriber through the WebService interface

The process is described as follows:

1. A subscriber applies for querying an FN. The subscription request reaches an external system.

2. The external system forwards the subscription request to the BMP through the QuerySubscriberServiceInfo interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the FN for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of querying an FN of a subscriber through the WebService interface is complete.

14.5.3 Process of Querying an FN of a Subscriber on the SMAP

Figure 14-21 shows the process of querying an FN of a subscriber on the SMAP.
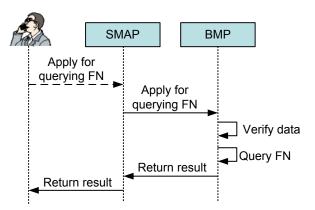
Figure 14-21 Process of querying an FN of a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for querying an FN of a subscriber on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (the QuerySubscriberServiceInfo interface).

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the FN for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of querying an FN of a subscriber on the SMAP is complete.

14.5.4 Processes of Querying an FN of a Subscriber Through USSD

This section describes the process of querying an FN of a subscriber through USSD.

Process of Querying an FN of a Subscriber Through USSD (Triggered in U-CSI Mode)

Figure 14-22 shows the normal process of querying an FN of a subscriber through USSD (triggered in U-CSI mode).
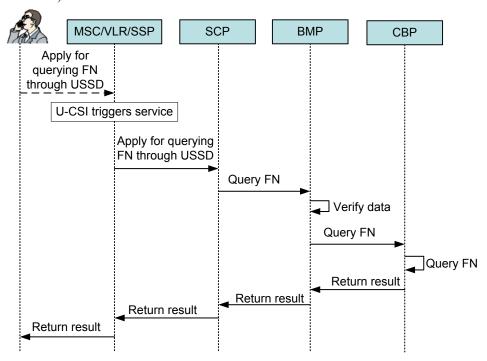
Figure 14-22 Normal process of querying an FN of a subscriber through USSD (triggered in U-CSI mode)

The process of querying an FN of a subscriber through USSD (triggered in U-CSI mode) is similar to the process of disabling the FN service for a subscriber through USSD (triggered in U-CSI mode). For the description of the process, see **Process of Disabling the FN Service for a Subscriber Through USSD (Triggered in U-CSI Mode)**.

Process of Querying an FN of a Subscriber Through USSD (Triggered in MAP Mode)

Figure 14-23 shows the normal process of querying an FN of a subscriber through USSD (triggered in MAP mode).
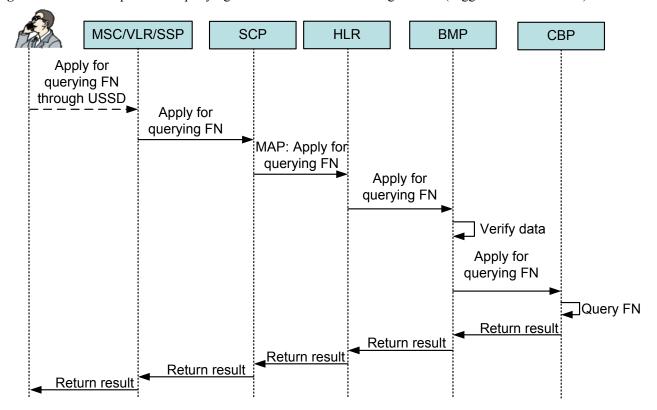
Figure 14-23 Normal process of querying an FN of a subscriber through USSD (triggered in MAP mode)

The process of querying an FN of a subscriber through USSD (triggered in MAP mode) is similar to the process of disabling the FN service for a subscriber through USSD (triggered in MAP mode). For the description of the process, see **Process of Disabling the FN Service for a Subscriber Through USSD (Triggered in MAP Mode)**.

14.5.5 Process of Querying an FN of a Subscriber Through a Short Message

This section describes the process of querying an FN of a subscriber through a short message.

Figure 14-24 shows the normal process of querying an FN of a subscriber through a short message.
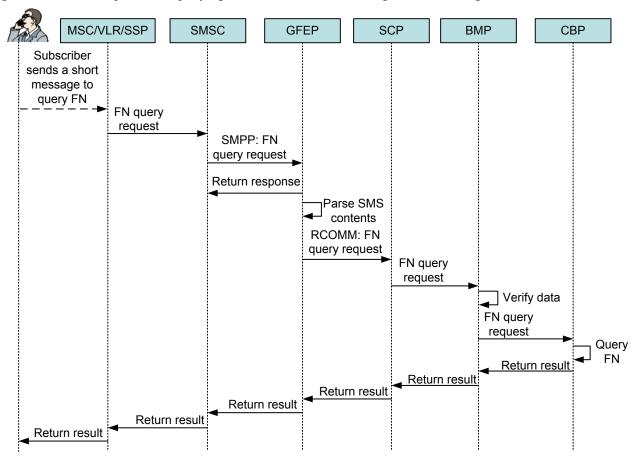
Figure 14-24 Normal process of querying an FN of a subscriber through a short message

The process of querying an FN of a subscriber through a short message is similar to the process of disabling the FN service for a subscriber through a short message. For the description of the process, see **14.3.5 Process of Disabling the FN Service for a Subscriber Through a Short Message**.

14.6 Reference

This section describes the terms used in the FN service processes.

None.

15 ICS Service Processes

About This Chapter

15.1 Overview

This topic describes the Incoming Call Screening (ICS) service and the main processes associated with the service.

The ICS service indicates the service of screening unnecessary incoming calls for subscribers. The service supports blacklists and whitelists.

- Blacklist: When a call is made from a subscriber number that is in a blacklist, the call cannot be connected.

- Whitelist: When a call is made from a subscriber number that is in a whitelist, the call is connected.

The ICS service includes the following processes:

- Processes of enabling the ICS service for a subscriber

- Processes of disabling the ICS service for a subscriber

- Processes of adding or changing an ICS number of a subscriber

- Processes of querying an ICS number of a subscriber

- Process of ICS monthly settlement

15.2 Processes of Enabling the ICS Service for a Subscriber

This section describes the processes of enabling the ICS service for a subscriber.

The ICS service can be enabled through the WebService interface, IVR or on the SMAP. The following sections describe each process in detail.

15.2.1 Processes of Enabling the ICS Service for a Subscriber Through IVR

Figure 15-1 shows the normal process of enabling the ICS service for a subscriber through IVR.
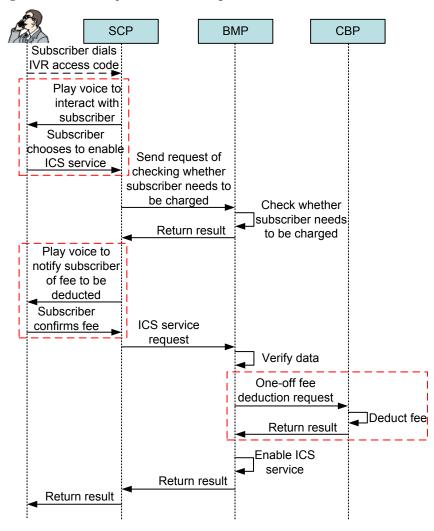
Figure 15-1 Normal process of enabling the ICS service for a subscriber through IVR

The process is described as follows:
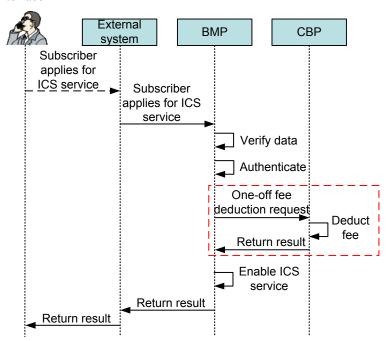
1. A subscriber dials the IVR access code to subscribe to the ICS service.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 15-1** shows the interactions. Then the subscriber chooses to subscribe to the ICS service.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to the ICS service.

4. The BMP determines whether the subscriber needs to be charged for subscribing to the ICS service and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

    -   If the subscriber does not need to be charged for subscribing to the ICS service, step 6 is proceeded with.

    -   If the subscriber needs to be charged for subscribing to the ICS service, the operations in the second dotted red box in **Figure 15-1** are performed. The SCP plays a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6. The SCP forwards the subscription request to the BMP.

7. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP sends a one-off fee deduction request to the CBP to deduct the fee if the subscriber needs to be charged. After deducting the fee, the CBP returns the processing result to the BMP.

9. The BMP enables the ICS service for the subscriber and returns the processing result to the SCP.

10. The SCP returns the processing result to the subscriber. Then the process of enabling the ICS service for a subscriber through IVR is complete.

15.2.2 Processes of Enabling the ICS Service for a Subscriber Through the WebService Interface

Figure 15-2 shows the normal process of enabling the ICS service for a subscriber through the WebService interface.

Figure 15-2 Normal process of enabling the ICS service for a subscriber through the WebService interface

The process is described as follows:

1. A subscriber applies for the ICS service. The subscription request reaches an external system.

2. The external system forwards the subscription request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber.

    - If the subscriber needs to be charged for subscribing to the ICS service, the operations in the dotted red box in **Figure 15-2** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP.

    - If the subscriber does not need to be charged for subscribing to the ICS service, step 5 is proceeded with.

5. The BMP enables the ICS service for the subscriber and returns the processing result to the external system.

6. The external system returns the processing result to the subscriber. Then the process of enabling the ICS service for a subscriber through the WebService interface is complete.

15.2.3 Processes of Enabling the ICS Service for a Subscriber on the SMAP

Figure 15-3 shows the normal process of enabling the ICS service for a subscriber on the SMAP.
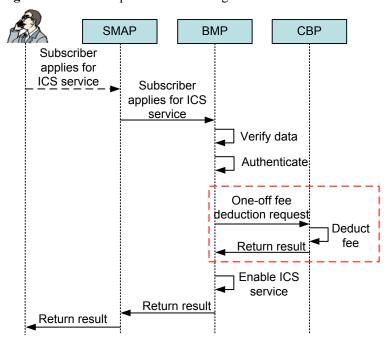
Figure 15-3 Normal process of enabling the ICS service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for the ICS service on the SMAP.

2. The SMAP sends subscriber requests to the BMP.

3. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber. If the subscriber needs to be charged for subscribing to the ICS service, the operations in the

dotted red box in **Figure 15-3** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for subscribing to the ICS service, step 5 is proceeded with.

5. The BMP enables the ICS service for the subscriber and returns the processing result to the SMAP.

6. The SMAP returns the processing result to the subscriber. Then the process of enabling the ICS service for a subscriber on the SMAP is complete.

15.3 Processes of Disabling the ICS Service for a Subscriber

This section describes the processes of disabling the ICS service for a subscriber.

The ICS service can be disabled through the WebService interface, IVR and on the SMAP. The following sections describe each process in detail.

15.3.1 Processes of Disabling the ICS Service for a Subscriber Through IVR

Figure 15-4 shows the normal process of disabling the ICS service for a subscriber through IVR.
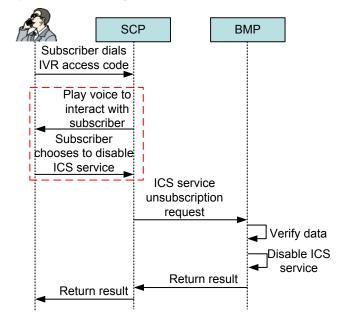
Figure 15-4 Normal process of disabling the ICS service for a subscriber through IVR
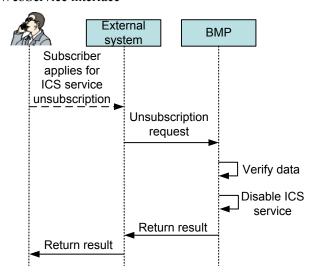
The process is described as follows:

1. A subscriber dials the IVR access code to send a request for unsubscribing from the ICS service.

2. The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 15-4** shows the interactions. Then the subscriber chooses to unsubscribe from the ICS service.

3. The SCP forwards the unsubscription request to the BMP.

4. The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5. After the subscriber data passes the verification, the BMP disables the ICS service for the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the subscriber. Then the process of disabling the ICS service for a subscriber through IVR is complete.

15.3.2 Processes of Disabling the ICS Service for a Subscriber Through the WebService Interface

Figure 15-5 shows the normal process of disabling the ICS service for a subscriber through the WebService interface.

Figure 15-5 Normal process of disabling the ICS service for a subscriber through the WebService interface

The process is described as follows:
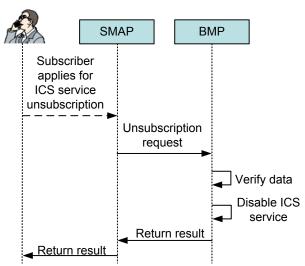
1. A subscriber sends a request for unsubscribing from the ICS service. The unsubscription request reaches an external system.

2. The external system forwards the unsubscription request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the ICS service for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of disabling the ICS service for a subscriber through the WebService interface is complete.

15.3.3 Processes of Disabling the ICS Service for a Subscriber on the SMAP

Figure 15-6 shows the normal process of disabling the ICS service for a subscriber on the SMAP.

**Figure 15-6** Normal process of disabling the ICS service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request for unsubscribing from the ICS service on the SMAP.

2. The SMAP sends subscriber requests to the BMP.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the ICS service for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of disabling the ICS service for a subscriber on the SMAP is complete.

15.4 Processes of Adding or Changing an ICS number of a Subscriber

This section describes the processes of adding or changing an ICS number of a subscriber.

After the ICS service is enabled for a subscriber, the subscriber can add or change an ICS number through the WebService interface, IVR or on the SMAP. The following sections describe each process in detail.

15.4.1 Process of Adding or Changing an ICS number of a Subscriber Through IVR

Figure 15-7 shows the normal process of adding or changing an ICS number of a subscriber through IVR.

Figure 15-7 Normal process of adding or changing an ICS number of a subscriber through IVR

The process is described as follows:

1. A subscriber sends a request of adding or changing an ICS number through IVR.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 15-7** shows the interactions. Then the subscriber chooses to add or change an ICS number.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to add or change an ICS number.

4. The BMP determines whether the subscriber needs to be charged for subscribing to add or change an ICS number and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

   ● If the subscriber does not need to be charged for subscribing to add or change an ICS number, step 6 is proceeded with.

   ● If the subscriber needs to be charged for subscribing to add or change an ICS number, the operations in the second dotted red box in **Figure 15-7** are performed. The SCP plays a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6. The SCP forwards the adding or changing request to the BMP.

7. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP authenticates the ICS number to be added or changed.

9. After the ICS number passes the verification, the BMP adds or changes the ICS number for the subscriber and returns the processing result to the SCP.

   📖 **NOTE**

   If the subscriber needs to be charged for adding or changing the ICS number, the operations in the third dotted red box in **Figure 15-7** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for adding or changing the ICS number, step 9 is proceeded with.

10. The SCP returns the processing result to the subscriber. Then the process of adding or changing an ICS number of a subscriber through IVR is complete.

15.4.2 Process of Adding or Changing an ICS number of a Subscriber Through the WebService Interface

Figure 15-8 shows the normal process of adding or changing an ICS number of a subscriber through the WebService interface.
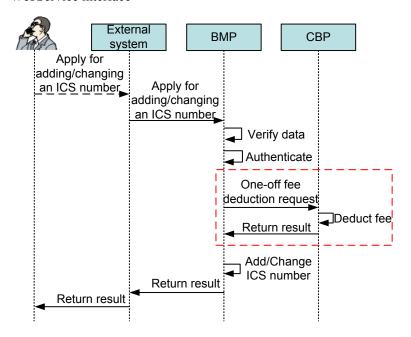
Figure 15-8 Normal process of adding or changing an ICS number of a subscriber through the WebService interface

The process is described as follows:

1. A subscriber sends a request of adding or changing an ICS number. The request reaches an external system.

2. The external system forwards the request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the ICS number to be added or changed.

5. After the ICS number passes the verification, the BMP adds or changes the ICS number for the subscriber and returns the processing result to the external system.

   📖 **NOTE**

   If the subscriber needs to be charged for adding or changing the ICS number, the operations in the dotted red box in **Figure 15-8** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for adding or changing the ICS number, step 5 is proceeded with.

6. The external system returns the processing result to the subscriber. Then the process of adding or changing an ICS number of a subscriber through the WebService interface is complete.

15.4.3 Process of Adding or Changing an ICS number of a Subscriber on the SMAP

Figure 15-9 shows the normal process of adding or changing an ICS number of a subscriber on the SMAP.
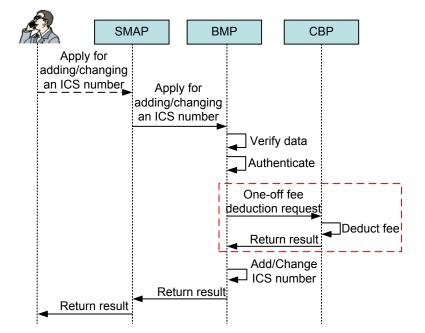
Figure 15-9 Normal process of adding or changing an ICS number of a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request of adding or changing an ICS number on the SMAP.

2. The SMAP sends subscriber requests to the BMP.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the ICS number to be added or changed.

5. After the ICS number passes the verification, the BMP adds or changes the ICS number for the subscriber and returns the processing result to the SMAP.

   📖 **NOTE**

   If the subscriber needs to be charged for adding or changing the ICS number, the operations in the dotted red box in **Figure 15-9** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for adding or changing the ICS number, step 5 is proceeded with.

6. The SMAP returns the processing result to the subscriber. Then the process of adding or changing an ICS number of a subscriber on the SMAP is complete.

15.5 Processes of Querying an ICS number of a Subscriber

This section describes the processes of querying an ICS number of a subscriber.

An ICS service subscriber can query an ICS number through the WebService interface, IVR or on the SMAP. The following sections describe each process in detail.

15.5.1 Processes of Querying an ICS number of a Subscriber Through IVR

Figure 15-10 shows the process of querying an ICS number of a subscriber through IVR.
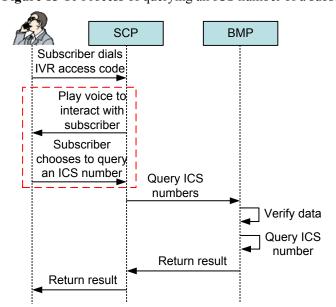
Figure 15-10 Process of querying an ICS number of a subscriber through IVR

The process is described as follows:

1. A subscriber sends a request of querying an ICS number through IVR.

2. The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 15-10** shows the interactions. Then the subscriber chooses to query an ICS number.

3. The SCP forwards the querying request to the BMP.

4. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5. After the subscriber data passes the verification, the BMP querys the ICS number for the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the subscriber. Then the process of querying an ICS number of a subscriber through IVR is complete.

15.5.2 Processes of Querying an ICS number of a Subscriber Through the WebService Interface

Figure 15-11 shows the normal process of querying an ICS number of a subscriber through the WebService interface.

Figure 15-11 Normal process of querying an ICS number of a subscriber through the WebService interface

The process is described as follows:
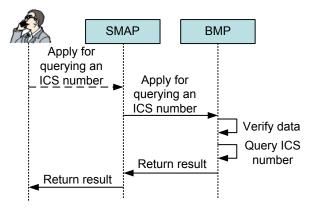
1. A subscriber applies for querying an ICS number. The subscription request reaches an external system.

2. The external system forwards the subscription request to the BMP through the QuerySubscriberServiceInfo interface of the WebService interface.

3. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the ICS number for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of querying an ICS number of a subscriber through the WebService interface is complete.

15.5.3 Processes of Querying an ICS number of a Subscriber on the SMAP

Figure 15-12 shows the process of querying an ICS number of a subscriber on the SMAP.

Figure 15-12 Process of querying an ICS number of a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for querying an ICS number of a subscriber on the SMAP.

2. The SMAP sends subscriber requests to the BMP.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the ICS number for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of querying an ICS number of a subscriber on the SMAP is complete.

15.6 Process of ICS Monthly Settlement

This topic describes the process of performing monthly settlement of the ICS service.

An operator can set the monthly or daily settlement function for each ICS product. The rental of an ICS product is collected by a scheduled event. After the rental is collected, the system generates associated CDRs.

15.7 Reference

This section describes the terms used in the ICS service processes.

None.

16 Home Zone Service Processes

About This Chapter

16.1 Overview

This section describes the Home Zone service and the Home Zone service processes.

The system sets a home zone based on the Cell Identification (ID). A home zone can contain one or several cells. A subscriber can set the zone where the call is initiated to home zone through the management process, or select a zone to be home zone in the business hall. The common FN service processes are as follows:

- Processes of enabling the Home Zone service for a subscriber

- Processes of cancelling the Home Zone service for a subscriber

- Processes of adding or changing the Home Zone service for a subscriber

- Processes of querying the Home Zone service for a subscriber

The Home Zone service can be processed on the SMAP, through the WebService interface, IVR.

16.2 Processes of Enabling the Home Zone Service for a Subscriber

This section describes the processes of enabling the Home Zone service for a subscriber.

The Home Zone service can be enabled through the WebService interface, IVR, on the SMAP. The following sections describe each process in detail.

16.2.1 Process of Enabling the Home Zone Service for a Subscriber Through IVR

Figure 16-1 shows the normal process of enabling the Home Zone service for a subscriber through IVR.

Figure 16-1 Normal process of enabling the Home Zone service for a subscriber through IVR
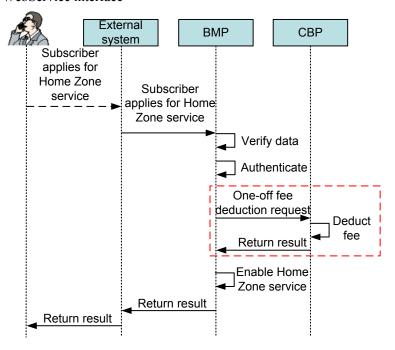
The process is described as follows:

1. A subscriber dials the IVR access code to subscribe to the Home Zone service.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 16-1** shows the interactions. Then the subscriber chooses to subscribe to the Home Zone service.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to the Home Zone service.

4. The BMP determines whether the subscriber needs to be charged for subscribing to the Home Zone service and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

   - If the subscriber does not need to be charged for subscribing to the Home Zone service, step 6 is proceeded with.

   - If the subscriber needs to be charged for subscribing to the Home Zone service, the operations in the second dotted red box in **Figure 16-1** are performed. The SCP plays a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6.   The SCP forwards the subscription request to the BMP.

7.   The BMP verifies the subscriber data.

     The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8.   After the subscriber data passes the verification, the BMP sends a one-off fee deduction request to the CBP to deduct the fee if the subscriber needs to be charged. After deducting the fee, the CBP returns the processing result to the BMP.

9.   The BMP enables the Home Zone service for the subscriber and returns the processing result to the SCP.

10. The SCP returns the processing result to the subscriber. Then the process of enabling the Home Zone service for a subscriber through IVR is complete.

16.2.2 Process of Enabling the Home Zone Service for a Subscriber Through the WebService Interface

Figure 16-2 shows the normal process of enabling the Home Zone service for a subscriber through the WebService interface.

Figure 16-2 Normal process of enabling the Home Zone service for a subscriber through the WebService interface

The process is described as follows:

1.   A subscriber applies for the Home Zone service. The subscription request reaches an external system.

2.   The external system forwards the subscription request to the BMP through the changeservice interface of the WebService interface.

3.   The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber.

   - If the subscriber needs to be charged for subscribing to the Home Zone service, the operations in the dotted red box in **Figure 16-2** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP.

   - If the subscriber does not need to be charged for subscribing to the Home Zone service, step 5 is proceeded with.

5. The BMP enables the Home Zone service for the subscriber and returns the processing result to the external system.

6. The external system returns the processing result to the subscriber. Then the process of enabling the Home Zone service for a subscriber through the WebService interface is complete.

16.2.3 Process of Enabling the Home Zone Service for a Subscriber on the SMAP

Figure 16-3 shows the normal process of enabling the Home Zone service for a subscriber on the SMAP.
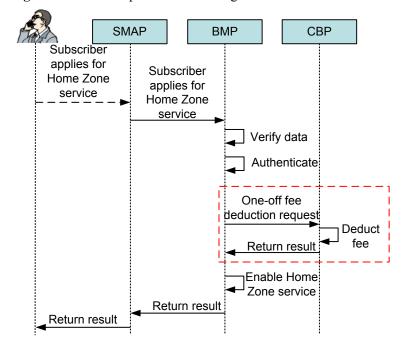
Figure 16-3 Normal process of enabling the Home Zone service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for the Home Zone service on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

3. The BMP verifies the subscriber data.

The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the subscriber. If the subscriber needs to be charged for subscribing to the Home Zone service, the operations in the dotted red box in **Figure 16-3** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for subscribing to the Home Zone service, step 5 is proceeded with.

5. The BMP enables the Home Zone service for the subscriber and returns the processing result to the SMAP.

6. The SMAP returns the processing result to the subscriber. Then the process of enabling the Home Zone service for a subscriber on the SMAP is complete.

16.3 Processes of Disabling the Home Zone Service for a Subscriber

This section describes the processes of disabling the Home Zone service for a subscriber.

The Home Zone service can be disabled through the WebService interface, IVR, on the SMAP. The following sections describe each process in detail.

16.3.1 Process of Disabling the Home Zone Service for a Subscriber Through IVR

Figure 16-4 shows the normal process of disabling the Home Zone service for a subscriber through IVR.
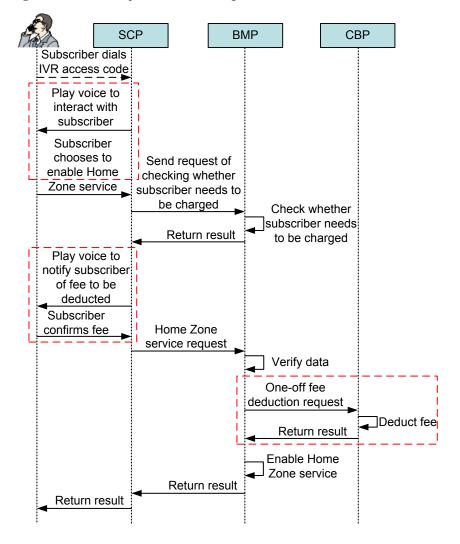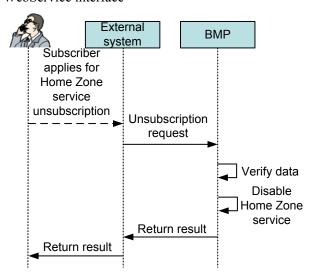
Figure 16-4 Normal process of disabling the Home Zone service for a subscriber through IVR

The process is described as follows:

1. A subscriber dials the IVR access code to send a request for unsubscribing from the Home Zone service.

2. The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 16-4** shows the interactions. Then the subscriber chooses to unsubscribe from the Home Zone service.

3. The SCP forwards the unsubscription request to the BMP.

4. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5. After the subscriber data passes the verification, the BMP disables the Home Zone service for the subscriber and returns the processing result to the SCP.

6. The SCP returns the processing result to the subscriber. Then the process of disabling the Home Zone service for a subscriber through IVR is complete.

16.3.2 Process of Disabling the Home Zone Service for a Subscriber Through the WebService Interface

Figure 16-5 shows the normal process of disabling the Home Zone service for a subscriber through the WebService interface.

Figure 16-5 Normal process of disabling the Home Zone service for a subscriber through the WebService interface

The process is described as follows:

1. A subscriber sends a request for unsubscribing from the Home Zone service. The unsubscription request reaches an external system.

2. The external system forwards the unsubscription request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the Home Zone service for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of disabling the Home Zone service for a subscriber through the WebService interface is complete.

16.3.3 Process of Disabling the Home Zone Service for a Subscriber on the SMAP

Figure 16-6 shows the normal process of disabling the Home Zone service for a subscriber on the SMAP.

**Figure 16-6** Normal process of disabling the Home Zone service for a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request for unsubscribing from the Home Zone service on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP disables the Home Zone service for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of disabling the Home Zone service for a subscriber on the SMAP is complete.

16.4 Processes of Adding or Changing a Home Zone of a Subscriber

This section describes the processes of adding or changing a Home Zone of a subscriber.

After the Home Zone service is enabled for a subscriber, the subscriber can add or change a Home Zone through the WebService interface, IVR, on the SMAP. The following sections describe each process in detail.

16.4.1 Process of Adding or Changing a Home Zone of a Subscriber Through IVR

Figure 16-7 shows the normal process of adding or changing a Home Zone of a subscriber through IVR.
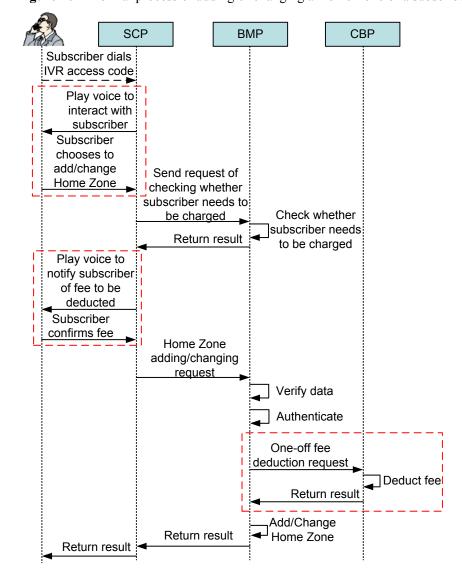
Figure 16-7 Normal process of adding or changing a Home Zone of a subscriber through IVR

The process is described as follows:

1. A subscriber sends a request of adding or changing a Home Zone through IVR.

2. The SCP plays voices to interact with the subscriber. The first dotted red box in **Figure 16-7** shows the interactions. Then the subscriber chooses to add or change a Home Zone.

3. The SCP requests the BMP to check whether the subscriber needs to be charged for subscribing to add or change a Home Zone.

4. The BMP determines whether the subscriber needs to be charged for subscribing to add or change a Home Zone and returns a result to the SCP.

5. The SCP processes the subscription request according to the result returned by the BMP.

   ● If the subscriber does not need to be charged for subscribing to add or change a Home Zone, step 6 is proceeded with.

   ● If the subscriber needs to be charged for subscribing to add or change a Home Zone, the operations in the second dotted red box in **Figure 16-7** are performed. The SCP plays a voice to notify the subscriber of the fee that needs to be deducted for the service subscription. After the subscriber confirms the fee deduction, step 6 is proceeded with.

6. The SCP forwards the adding or changing request to the BMP.

7. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

8. After the subscriber data passes the verification, the BMP authenticates the Home Zone to be added or changed.

   The BMP accumulates the Home Zone that needs to be added or changed by group to check whether the number of Home Zones reaches the maximum, and whether the Home Zone can be added or changed according to the restrictions of the system on Home Zones.

9. After the Home Zone passes the verification, the BMP adds or changes the Home Zone for the subscriber and returns the processing result to the SCP.

   📖 **NOTE**

   If the subscriber needs to be charged for adding or changing the Home Zone, the operations in the third dotted red box in **Figure 16-7** are performed. That is, the BMP invokes the one-off real-time fee deduction interface to deduct the fee on the CBP. If the subscriber does not need to be charged for adding or changing the Home Zone, step 9 is proceeded with.

10. The SCP returns the processing result to the subscriber. Then the process of adding or changing a Home Zone of a subscriber through IVR is complete.

16.4.2 Process of Adding or Changing a Home Zone of a Subscriber Through the WebService Interface

Figure 16-8 shows the normal process of adding or changing a Home Zone of a subscriber through the WebService interface.
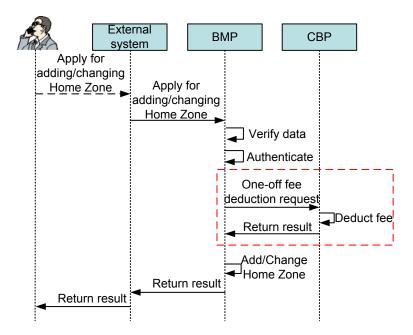
Figure 16-8 Normal process of adding or changing a Home Zone of a subscriber through the WebService interface

The process is described as follows:

1. A subscriber sends a request of adding or changing a Home Zone. The request reaches an external system.

2. The external system forwards the request to the BMP through the changeservice interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the Home Zone to be added or changed.

   The BMP accumulates the Home Zone that needs to be added or changed by group to check whether the number of Home Zones reaches the maximum, and whether the Home Zone can be added or changed according to the restrictions of the system on Home Zones.

5. After the Home Zone passes the verification, if the subscriber needs to be charged for adding or changing the Home Zone, the operations in the dotted red box in **Figure 16-8** are performed. That is, the BMP adds or changes a Home Zone for the subscriber and returns the processing result to the external system. If the subscriber does not need to be charged for adding or changing the Home Zone, step 5 is proceeded with.

6. The external system returns the processing result to the subscriber. Then the process of adding or changing a Home Zone of a subscriber through the WebService interface is complete.

16.4.3 Process of Adding or Changing a Home Zone of a Subscriber on the SMAP

Figure 16-9 shows the normal process of adding or changing a Home Zone of a subscriber on the SMAP.

Figure 16-9 Normal process of adding or changing a Home Zone of a subscriber on the SMAP

The process is described as follows:

1. A subscriber sends a request of adding or changing a Home Zone on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (changeservice interface).

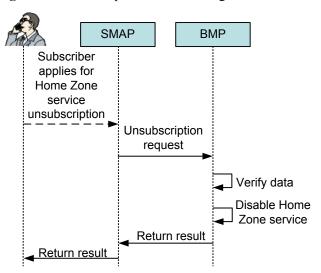3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP authenticates the Home Zone to be added or changed.

   The BMP accumulates the Home Zone that needs to be added or changed by group to check whether the number of Home Zones reaches the maximum, and whether the Home Zone can be added or changed according to the restrictions of the system on Home Zones.

5. After the Home Zone passes the verification, if the subscriber needs to be charged for adding or changing the Home Zone, the operations in the dotted red box in **Figure 16-9** are performed. That is, the BMP adds or changes a Home Zone for the subscriber and returns the processing result to the SMAP. If the subscriber does not need to be charged for adding or changing the Home Zone, step 5 is proceeded with.

6. The SMAP returns the processing result to the subscriber. Then the process of adding or changing a Home Zone of a subscriber on the SMAP is complete.

16.5 Processes of Querying a Home Zone of a Subscriber

This section describes the processes of querying a Home Zone of a subscriber.

a Home Zone service subscriber can query a Home Zone through the WebService interface, IVR, on the SMAP. The following sections describe each process in detail.
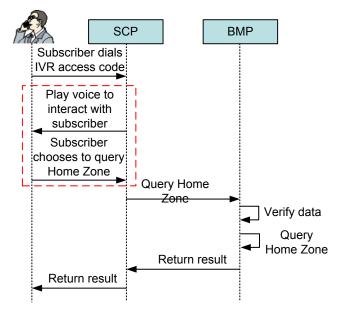
16.5.1 Process of Querying a Home Zone of a Subscriber Through IVR

16.5.2 Process of Querying a Home Zone of a Subscriber Through the WebService Interface

16.5.1 Process of Querying a Home Zone of a Subscriber Through IVR

**Figure 16-10** shows the process of querying a Home Zone of a subscriber through IVR.

Figure 16-10 Process of querying a Home Zone of a subscriber through IVR

The process is described as follows:
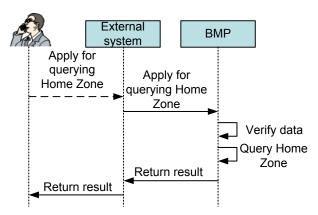
1.   A subscriber sends a request of querying a Home Zone through IVR.

2.   The SCP plays voices to interact with the subscriber. The dotted red box in **Figure 16-10** shows the interactions. Then the subscriber chooses to query a Home Zone.

3.   The SCP forwards the querying request to the BMP.

4.   The BMP verifies the subscriber data.

      The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

5.   After the subscriber data passes the verification, the BMP querys the Home Zone for the subscriber and returns the processing result to the SCP.

6.   The SCP returns the processing result to the subscriber. Then the process of querying a Home Zone of a subscriber through IVR is complete.

16.5.2 Process of Querying a Home Zone of a Subscriber Through the WebService Interface

Figure 16-11 shows the normal process of querying a Home Zone of a subscriber through the WebService interface.

Figure 16-11 Normal process of querying a Home Zone of a subscriber through the WebService interface

The process is described as follows:

1. A subscriber applies for querying a Home Zone. The subscription request reaches an external system.

2. The external system forwards the subscription request to the BMP through the QuerySubscriberServiceInfo interface of the WebService interface.

3. The BMP verifies the subscriber data.

   The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the Home Zone for the subscriber and returns the processing result to the external system.

5. The external system returns the processing result to the subscriber. Then the process of querying a Home Zone of a subscriber through the WebService interface is complete.

16.5.3 Process of Querying a Home Zone of a Subscriber on the SMAP

Figure 16-12 shows the process of querying a Home Zone of a subscriber on the SMAP.
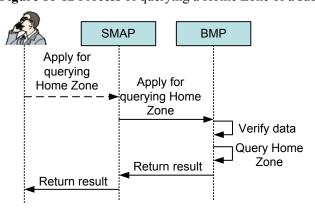
Figure 16-12 Process of querying a Home Zone of a subscriber on the SMAP

The process is described as follows:

1. A subscriber applies for querying a Home Zone of a subscriber on the SMAP.

2. The SMAP sends subscriber requests to the BMP by invoking the WebService interface (the QuerySubscriberServiceInfo interface).

3. The BMP verifies the subscriber data.

    The subscriber data includes the MSISDN of the subscriber, subscriber state, operation type, and validity of the service ID, which are transferred by the interface.

4. After the subscriber data passes the verification, the BMP querys the Home Zone for the subscriber and returns the processing result to the SMAP.

5. The SMAP returns the processing result to the subscriber. Then the process of querying a Home Zone of a subscriber on the SMAP is complete.

16.6 Reference

This section describes the terms used in the Home Zone service processes.

None.

17 Child-Parent Card Service Processes

About This Chapter

17.1 Overview

This section describes the child-parent card service and the associated processes.

In the child-parent card service, multiple child cards can be affiliated to a parent card and share the same account with the parent card. A subscriber with a parent card can set a monthly consumption limit for each child card. When a subscriber with a child card uses the resources in the account of the parent card, the subscriber uses the free sources first. The free resources of the parent card are not restricted by the consumption limit. After a card is set as a child card, it cannot be set as the parent card.

Child cards are divided into common child cards and special child cards:

- A common child card has no separate account. The fees of all the services used by the subscriber with a common child card are deducted from the account of the parent card. If the monthly consumption of the subscriber with a common child card exceeds the limit that is set by the parent card, the services of the common child card will be suspended. If the balance of the parent card is insufficient or the parent card is in non-active state, a subscriber with a common child card cannot use the account of the parent card for payment. In addition, the services of the common child card will also be suspended.

- A special child card has a separate account. The system supports the function of setting the sequence for using the account of a special child card and the account of the parent card.

- A subscriber with a parent card can apply to the system for canceling a normal child card. After the cancellation is successful, the child card is deleted from the child card list of the parent card, and the lifecycle status of the child card is changed to disabled.

📖 **NOTE**

A card cannot function as a child card and the parent card at the same time. One child card can correspond to only one parent card, but one parent card can correspond to multiple child cards. Moreover, the number of child cards can be configured.

Common child-parent card service processes are as follows:

- Process of subscribing to a product

- Process of unsubscribing from a product

- Process of changing a consumption limit

- Process of querying the balance of a common child card

- Process of recharging a child card and a parent card

- Process of performing monthly settlement for a child card and a parent card

The following sections describe the preceding child-parent card service processes in detail.
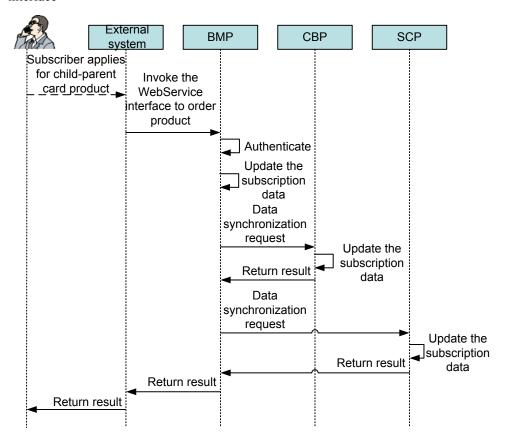
17.2 Process of Subscribing to a Product

After a subscriber subscribes to a child-parent card product, the association between child cards and the parent card is set up. This section describes the process of subscribing to a child-parent card product.

17.2.1 Process of Subscribing to a Child-Parent Card Product Through the WebService Interface

Figure 17-1 shows the process of subscribing to a child-parent card product through the WebService interface.

Figure 17-1 Process of subscribing to a child-parent card product through the WebService interface

The process description is as follows:

1. A subscriber subscribes to a child-parent card product. The product subscription request is sent to an external system.

2. By invoking the WebService interface, the external system sends the product subscription request to the BMP.

3. After receiving the product subscription request, the BMP performs authentication to check whether the subscriber has any child-parent card product.

4. After the authentication is passed, the BMP updates the subscription data of the child-parent card products of the subscriber in the physical database.

5. At the same time, the BMP sends a data synchronization request to the CBP.

6. The CBP updates the child-parent card product data in the memory database, and then returns the result to the BMP.

7. The BMP sends a data synchronization request to the SCP.

8. The SCP updates data, and then returns the result to the BMP.

9. The BMP returns the product subscription result to the external system. Then, the external system returns the result to the subscriber. The process of subscribing to a child-parent card product through the WebService interface ends.

📖 **NOTE**

A subscriber who subscribes to a child-parent card product automatically becomes the parent card subscriber.
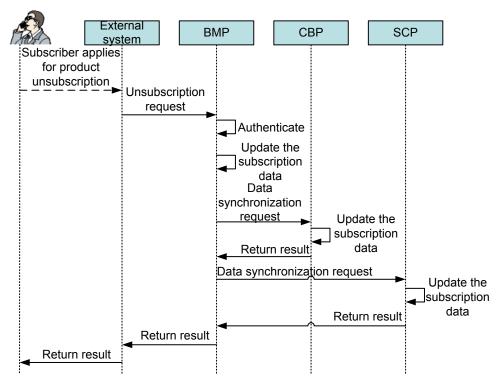
17.3 Process of Unsubscribing from a Product

This section describes the processes of unsubscribing from a child-parent card product.

17.3.1 Process of Unsubscribing from a Child-Parent Card Product Through the WebService Interface

Figure 17-2 shows the process of unsubscribing from a child-parent card product through the WebService interface.

Figure 17-2 Process of unsubscribing from a child-parent card product through the WebService interface

📖 **NOTE**

Before unsubscribing from a child-parent card product, you must cancel all the child cards bound to the parent card.

The process of unsubscribing from a child-parent card product is similar to the process of subscribing to a child-parent card product. The only difference is that the external system invokes

the WebService interface to perform product unsubscription on the BMP in the process of unsubscribing from a child-parent card product. For process details, see **17.2.1 Process of Subscribing to a Child-Parent Card Product Through the WebService Interface**.

17.4 Process of Changing a Consumption Limit

This section describes the process of changing a consumption limit of a child card.

A subscriber with a parent card can set a monthly consumption limit for each child card. If the subscriber with the parent card sets **Support Consumption Limit on Child Card** to **No**, it indicates that a subscriber with a child card can use the balance of the parent card account without limit. The subscriber with the parent card can set the consumption limit of each child card through the IVR or WebService interface. After the accumulated consumption of a child card reaches the consumption limit, the subscriber with the child card cannot use the account of the parent card for consumption. The OCS will notify the subscriber with the child card of this case by playing a voice or sending a short message. The cycle of the consumption limit is the same as the bill cycle. Therefore, the OCS clears the consumption amount of the subscriber with the child card after the bill cycle ends.
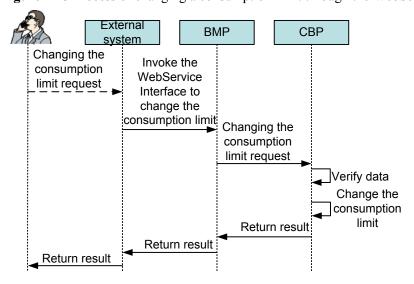
The common methods of changing a consumption limit are as follows:

- Through the WebService interface
- On the SMAP
- Through the IVR

17.4.1 Process of Changing a Consumption Limit Through the WebService Interface

Figure 17-3 shows the process of changing a consumption limit through the WebService interface.

Figure 17-3 Process of changing a consumption limit through the WebService interface

The process description is as follows:
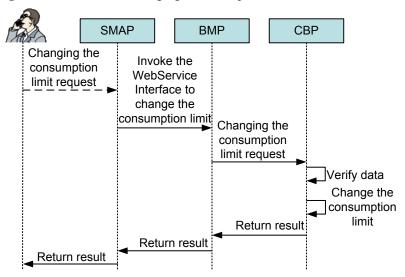
1. A subscriber sends a request for changing the consumption limit of a child card. The request is sent to an external system.

2. After receiving the request, the external system sends the request to the BMP through the WebService interface.

3. The BMP receives the request, and then sends it to the CBP.

4. After receiving the request, the CBP verifies data to check whether the child-parent card service is enabled for the subscriber.

5. After the verification is passed, the CBP changes the consumption limit, and then returns the result to the BMP.

6. The BMP returns the result to the external system, and then the external system returns the result to the subscriber. The process of changing the consumption limit through the WebService interface ends.

17.4.2 Process of Changing a Consumption Limit on the SMAP

Figure 17-4 shows the process of changing a consumption limit on the SMAP.

Figure 17-4 Process of changing a consumption limit on the SMAP

The process of changing a consumption limit on the SMAP is similar to the process of changing a consumption limit through the WebService interface. For process details, see **17.4.1 Process of Changing a Consumption Limit Through the WebService Interface**.

17.4.3 Process of Changing a Consumption Limit Through the IVR

Figure 17-5 shows the process of changing a consumption limit through the IVR.
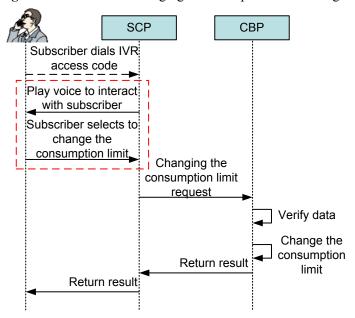
Figure 17-5 Process of changing a consumption limit through the IVR

The process description is as follows:

1. A subscriber dials the IVR access code. The call reaches the SCP.

2. The SCP interacts with the subscriber by playing a voice. The subscriber selects to change the consumption limit.

3. The SCP sends the subscriber request to the CBP.

4. The CBP receives the subscriber request, and then verifies data, such as checking whether the subscriber has any child-parent card product.

5. After the verification is passed, the CBP changes the consumption limit for the subscriber. Then, the CBP returns the result to the SCP.

6. The SCP returns the result to the subscriber. The process of changing a consumption limit through the IVR ends.

17.5 Process of Recharging a Child Card and a Parent Card

This section describes the process of recharging a child card and a parent card.

The process of recharging a child-parent card account is the same as the process of recharging a common account. The recharge includes recharging a parent card, common child cards, and special child cards.

● In the case of recharging a parent card, the process is the same as the process of recharging a common account through recharge cards.

● In the case of recharging a common child card, the recharge amount is directly added to the account of the parent card because the common child card has no separate account.

● In the case of recharging a special child card, system processing varies according to recharge modes.
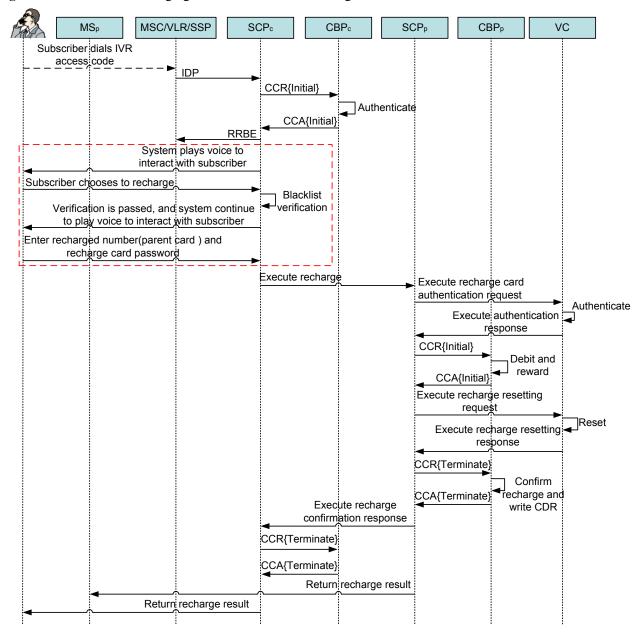
The processes of recharging a common child card and a special child card are described respectively according to the IVR and USSD recharge modes.

17.5.1 Process of Recharging a Child Card and a Parent Card Through the IVR

Process of Recharging a Common Child Card Through the IVR

Figure 17-6 shows the process of recharging a common child card through the IVR.

Figure 17-6 Process of recharging a common child card through the IVR

> **NOTE**
>
> A subscriber with a common child card initiates a recharge request. In the preceding figure, the subscript c indicates the NE corresponding to the subscriber with a common child card, and the subscript p indicates the NE corresponding to the subscriber with the parent card.

The process of recharging a common child card through the IVR is similar to the process of recharging another account through the IVR. When recharging a common child card, enter the number of the parent card as the recharged number. After the recharge succeeds, the system notifies both the subscriber with the child card and the subscriber with the parent card of the recharge result at the same time. For process details, see the process of recharging another account in **5.2 Process of Recharging an Account by Using a Recharge Card Through IVR**.

Process of Recharging a Special Child Card Through the IVR

When a subscriber with a special child card initiates a recharge request, the subscriber can select to recharge the account of the parent card or the personal account. If the subscriber selects to recharge the personal account, the recharge process is the same as the process of recharging the personal account through the IVR. If the subscriber selects to recharge the account of the parent card, the recharge process is the same as the process of recharging another account through the IVR. For process details, see the process of recharging another account and the process of recharging the personal account in **5.2 Process of Recharging an Account by Using a Recharge Card Through IVR**.

17.5.2 Process of Recharging a Child Card and a Parent Card Through the USSD

Process of Recharging a Common Child Card Through the USSD

A subscriber with a common child card can send one of the following recharge codes to recharge the account:

- *USSD access code*password of a recharge card*#: In this case, the recharge amount goes to the account of the parent card, and the recharged number is changed to the number of the parent card.

- *USSD access code*password of a recharge card*mobile phone number#: In this case, the recharge amount goes to the corresponding mobile phone number. If the CBP checks that the mobile phone number is bound to a child card but the child card does not have a separate account, the recharge amount goes to the account of the corresponding parent card.

For process details, see **5.3 Process of Recharging an Account by Using a Recharge Card Through USSD**.

Process of Recharging a Special Child Card Through the USSD

A subscriber with a special child card can send one of the following recharge codes to recharge the account:

- *USSD access code*password of a recharge card#: In this case, the recharge amount directly goes to the account of the child card.

- *USSD access code*password of a recharge card*mobile phone number#: In this case, the recharge amount goes to the corresponding mobile phone number. If the CHG checks that the mobile phone number is bound to a child card but the child card does not have a separate account, the recharge amount goes to the account of the corresponding parent card.

For process details, see **5.3 Process of Recharging an Account by Using a Recharge Card Through USSD**.

17.6 Process of Performing Monthly Settlement for a Child Card and a Parent Card

This section describes the process of performing monthly settlement for a child card and a parent card.

The rules of deducting rentals of a child card and a parent card are as follows:

- Common child card

  If the system fails to deduct the monthly rental of the child-parent card product of the parent card, the account of the parent card cannot be used to pay fees for the child card, and all the services cannot be used.

- Special child card

  The rental deduction method of a special child card is the same as that of a common child card. When the system fails to deduct the monthly rental of the child-parent card product of the parent card, the account of the parent card cannot be used to pay fees for the child card. If deducting other monthly rentals of the parent card fails, the function of using the account of the parent card to pay fees for the child card is not affected.

After recharge is successful, the rules of deducting owing monthly rentals are as follows:

- Recharging a common child card

  The process of deducting the owing monthly rental of the parent card is triggered. If the child card also owes the monthly rental, the owing monthly rental of the child card is deducted when the child card uses services or a scheduled task periodically deducts the owing monthly rental.

- Recharging the parent card by the subscriber with a special child card

  The process of deducting the owing monthly rental of the parent card is triggered. If the child card also owes the monthly rental, the owing monthly rental of the child card is deducted when the child card uses services or a scheduled task periodically deducts the owing monthly rental.

- Recharging the parent card

  The sequence of deducting the owing monthly rentals for different child cards depends on the sequence in which the child cards use services. If no child cards use services, a scheduled task periodically deducts the owing monthly rentals.

17.7 Reference

This section describes the terms used in child-parent card service processes.

None.

18 Passby Processes

About This Chapter

18.1 Overview

In the OCS system, service passby refers to a solution to connecting services such as the call service and SMS directly in certain cases so that subscribers can use the services normally.

A service can be passed by in any of the following ways:

- Manually

    When the carrier performs an operation such as upgrade, capacity expansion, inspection, and migration on a device, the carrier can pass by certain subscribers or number segments. When the operation is complete, an operator needs to manually instruct the SCP to end the service passby. If no operator instructs the SCP to end the service passby, the subscribers and number segments remain in passby state.

- Automatically

    When the CBP is busy, a system fault occurs in the CBP, or a fault occurs in the communication link between the SCP and CBP, the OCS system automatically passes by the services such as calls and short messages so that subscribers can use the services normally. The passby ends when the fault is rectified.

- By the SCP database

    When an exception occurs in the SCP database, the SCP database passes by services so that subscribers can use the services normally. In this case, the effect of the fault on subscriber experience can be reduced. The passby ends when the database fault is rectified.

- By the physical database of the CBP

    The physical database of the CBP is used in certain cases, for example, recharge rollback. If the physical database of the CBP is faulty, the service use of subscribers may be affected. In this case, services are passed by when the physical database of the CBP is faulty to reduce the effect of the fault on the service use of subscribers. The passby ends when the database fault is rectified.

- By the MDSP

    MDSP passing by data services means that the MDSP decides whether to pass by services according to configuration information when an exception occurs on the message links between the MDSP and the CBP.

When the passby ends, the OCS system charges the subscriber based on the offline CDRs generated during the passby.

18.2 Process of Passing by a Service Manually

This section describes the concept of manual passby and the process of passing by a service manually.

The manual passby modes include the following:

- Passing by services according to service types

    For example, the SCP can pass by voice calls and short messages.

- Passing by services according to CBP nodes

When the SCP connects to multiple CBP nodes, if a CBP node restricts calls, the SCP may consider that all the CBP nodes restrict calls. In this case, the OCS system supports passing by services according to the ID of a CBP node.

- Pass by services unconditionally

- Passing by services according to number segments

  The SCP can pass by services according to a specific number segment.

- Passing by services according to discrete numbers

  The SCP can pass by services according to a specific number.
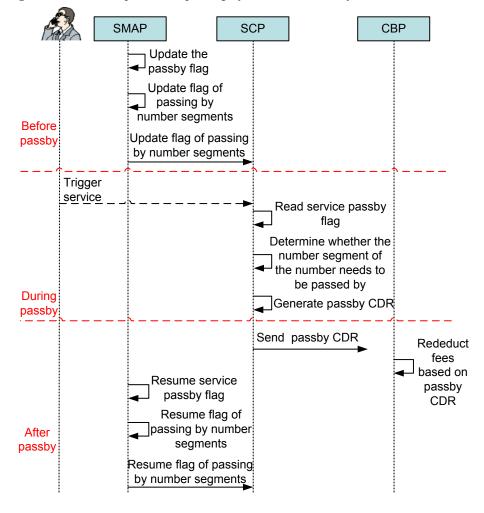
Normal Process

The process of passing by a service manually, which corresponds to the three procedures in red in **Figure 18-1**, is described as follows:

1. Before the passby, determine the number segments that need to be passed by or data such as CBP node IDs, and then update the number segments or data to the SCP.

2. During the passby, when a call of a subscriber is passed by, the CBP rededucts fees according to the passby CDRs generated by the SCP.

3. After the passby ends, disable the passby flags on the SCP.

Figure 18-1 shows the normal process of passing by a service manually.

Figure 18-1 Normal process of passing by a service manually

The process is described as follows:

1. An operator updates the passby flag on the SMAP at the service maintenance website and marks the data such as the number segments that need to be passed by.

2. The SMAP synchronizes the updated passby flag to the SCP through the BMP.

3. A subscriber makes a call. Then the service is triggered to the SCP.

4. The SCP reads the passby flag and determines whether the number segment that the subscriber number belongs to needs to be passed by. If the number segment does not need to be passed by, the SCP processes the call according to the normal service process. Otherwise, the SCP passes by the call and connects the call directly, and the CBP will not process the call.

5. When the call ends, the SCP generates a passby CDR.

6. The SCP sends the passby CDR to the CBP. Then the CBP rededucts fees based on the passby CDR.

7. After the passby ends, the operator needs to update the passby flag on the SMAP at the service maintenance website and disable the passby flag.

8. The SMAP synchronizes the updated flag of passing by number segments to the SCP.

    After the flag of passing by number segment is disabled, the subsequent service process runs according to the normal service process.

Exception Handling Process

When the CBP rededucts fees based on the passby CDR, if the account balance of the subscriber is insufficient, the fee rededuction fails, and the CBP changes the subscriber state to suspend. The subscriber state becomes normal only after the subscriber recharges the account and the fee rededuction is successful.

18.3 Process of Passing By a Service Automatically

This section describes the process of passing by a service automatically.

Normal Process

The OCS system provides a fault tolerance mechanism. When the CBP is busy, a system fault occurs in the CBP, or a fault occurs in the communication link between the SCP and CBP, the OCS system automatically passes by the services such as calls and short messages as configured so that subscribers can use the services normally. In addition, the corresponding passby CDRs are generated on the SCP. After the fault is rectified, the CBP performs rating and charging on the subscribers based on the passby CDRs, and the passby ends automatically.

Exception Handling Process

When the CBP rededucts fees based on the passby CDR, if the account balance of the subscriber is insufficient, the fee rededuction fails, and the CBP changes the subscriber state to suspend. The subscriber state becomes normal only after the subscriber recharges the account and the fee rededuction is successful.

18.4 Process of Passing by a Service by the SCP Database

This section describes the process of passing by a service by the SCP database.

When an exception occurs in the SCP database, the SCP database passes by services so that subscribers can use the services normally. When the SCP passes by services, the simplified voice call service or SMS service based on CAMEL2/3 needs to be enabled to support the calls and short messages initiated by subscribers. After the simplified voice call service or SMS service based on CAMEL2/3 is enabled, the system does not perform service operations involving the database, for example, number analysis and fee calculation. The CDRs are recorded directly.

Process of Passing By a CAMEL2 Short Message by the SCP Database

If the SCP database is configured to pass by a CAMEL2 short message sent by a subscriber, the SCP determines whether the process is the SMS process according to the service key value. If yes, the SCP records a w_smo offline CDR.

Process of Passing By a CAMEL2 Voice Call by the SCP Database in the Calling Process

Figure 18-2 shows the process of passing by a CAMEL2 voice call by the SCP database in the calling process.
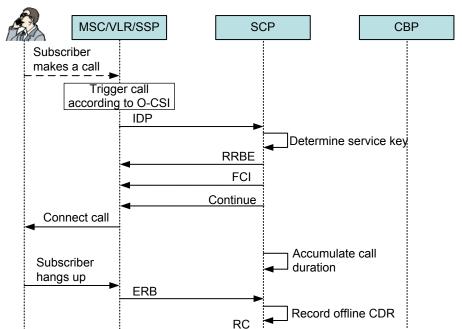
Figure 18-2 Process of passing by a CAMEL2 voice call by the SCP database in the calling process

The process is described as follows:

1. A subscriber makes a CAMEL2 voice call when the SCP database is configured to pass by CAMEL2 voice calls. Then the call reaches the MSC/VLR/SSP.

   The MSC/VLR/SSP determines the subscriber type according to the number segment of the subscriber. If the subscriber is a postpaid subscriber, the MSC/VLR/SSP delivers the Connection message. If the subscriber is a prepaid subscriber, the MSC/VLR/SSP sends an SRI message to the HLR and obtains the O-CSI of the subscriber from the HLR. Then the MSC/VLR/SSP determines the SCP that the subscriber belongs to and the service that needs to be triggered according to the GT code and service key in the O-CSI.

2. The MSC/VLR/SSP reports an IDP message to the SCP to start call control.

   The IDP message contains the information such as the service key, calling number, and called number.

3. The SCP determines whether the service is a call service according to the service key value and whether the SCP database is configured to pass by voice calls. If yes, the SCP delivers an RRBE message to the MSC/VLR/SSP to request the dynamic configuration of the EDP.

   📖 **NOTE**

   The MSC/VLR/SSP creates a BCSM for each call. Each call has a series of states. A detection point is set between two states, that is, a breakpoint in a call.

4. The SCP sends a Continue message to prompt the MSC/VLR/SSP to connect the call. In addition, the SCP delivers an FCI message.

5. When the calling party or called party hangs up, the MSC/VLR/SSP reports an ERB message to the SCP, and the SCP records an offline CDR (w_abr CDR).

6. The SCP sends an RC message to prompt the MSC/VLR/SSP to disconnect the call. Then the call ends.

Process of Passing By a CAMEL2 Voice Call by the SCP Database in the Called Process

Figure 18-3 shows the process of passing by a CAMEL2 voice call by the SCP database in the called process.
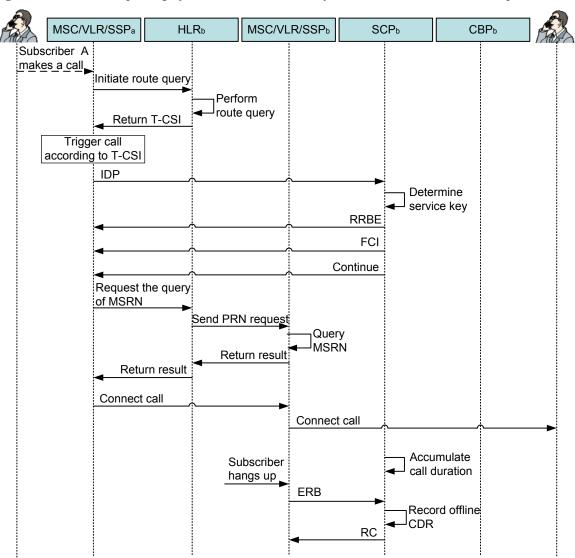
Figure 18-3 Process of passing by a CAMEL2 voice call by the SCP database in the called process

The process is described as follows:

1. When the SCP database is configured to pass by CAMEL2 voice calls, subscriber A makes a call to subscriber B. The call reaches MSC/VLR/SSP$_a$.

   📖 **NOTE**

   Assume that:

   ● Subscriber A and subscriber B are OCS subscribers.

   ● Subscriber A is the calling party, and subscriber B is the called party.

   If the calling party is a non-OCS subscriber, the called process of an OCS subscriber is similar to this process.

2. MSC/VLR/SSP$_a$ sends an SRI request to HLR$_b$. HLR$_b$ returns the T-CSI of subscriber B to MSC/VLR/SSP$_a$.

3. MSC/VLR/SSP$_a$ triggers the call to SCP$_b$ according to the T-CSI.

4. SCP_b determines whether the service is a call service according to the service key value and whether the SCP database is configured to pass by voice calls. If yes, the SCP_b delivers an RRBE message to $MSC/VLR/SSP_a$ to request the dynamic configuration of the EDP.

5. SCP_b sends a Continue message to prompt $MSC/VLR/SSP_a$ to connect the call. In addition, the SCP_b delivers an FCI message.

6. $MSC/VLR/SSP_a$ sends an SRI request to HLR_b again to request HLR_b to return the MSRN (Mobile Station Roaming Number) of subscriber B.

7. HLR_b sends a PRN request to $MSC/VLR/SSP_b$ to query the MSRN of subscriber B.

8. $MSC/VLR/SSP_b$ finds the MSRN of subscriber B and returns the MSRN to HLR_b.

9. HLR_b returns the MSRN to $MSC/VLR/SSP_a$.

10. $MSC/VLR/SSP_a$ connects the call to $MSC/VLR/SSP_b$.

11. $MSC/VLR/SSP_b$ connects the call to subscriber B. Then the call is connected.

12. When the calling party or called party hangs up, $MSC/VLR/SSP_b$ reports an ERB message to the SCP_b, and the SCP_b records an offline CDR (w_abr CDR).

13. The SCP_b sends an RC message to prompt the $MSC/VLR/SSP_b$ to disconnect the call. Then the call ends.

Process of Passing By a CAMEL3 Short Message by the SCP Database

If the SCP database is configured to pass by CAMEL3 short messages, when a subscriber sends a CAMEL3 short message, the SCP determines whether the service is the SMS service according to the service key value. If yes, the SCP connects the CAMEL3 short message directly and records a w_smo offline CDR.

18.5 Process of Passing by a Service by the Physical Database of the CBP

This section describes the process of passing by a service by the physical database of the CBP.

When the CBP database is faulty, for example, the database is busy, or the database is disconnected, the physical database of the CBP passes by services to ensure that the services not accessing the physical database are not affected. In this case, the effect of the fault on the service use of subscribers can be reduced.

The processes that need to use the physical database of the CBP include the following: SMS confirmation process, recharge rollback process, fee rededuction process, product unsubscription process (the rental table needs to be queried), and idle-subscriber load process. When the physical database is faulty, the insert, update, delete, and query operations involved in the preceding processes can still be performed.

18.6 Process of Passing by Data Services by the MDSP
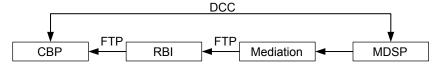
This section describes the process of passing by data services by the MDSP.

MDSP passing by data services means that the MDSP decides whether to pass by services according to configuration information when an exception occurs on the message links between the MDSP and the CBP.

If the MDSP decides to pass by data services, all the services are not authenticated and charged by the CBP, and the MDSP generates pass-by CDRs. After the CBP is recovered, the MDSP does not pass by services, and all the services are authenticated and charged on the CBP in normal DCC message mode. The pass-by CDRs generated on the MDSP during the pass-by process are collected by the Mediation and are sent to the CBP for rating and fee deduction.

Figure 18-4 shows the networking about the pass-by of data services on the MDSP.

Figure 18-4 Networking about passing by data services by the MDSP

According to the preceding figure, when the communication between the MDSP and the CBP is normal, interaction is carried out through DCC messages. When the communication is abnormal, the MDSP passes by services, the Mediation collects offline CDRs, and then the CDRs are sent to the CBP through the RBI for rating and fee deduction.

18.7 Reference

This section briefly describes the basic terms related to the passby processes.

None.

19 Audit Process

About This Chapter

19.1 Overview

This section describes the audit process of the OCS system.

The OCS system supports auditing accounting and CDRs.

- Auditing accounting

  The accounting audit function includes the functions of balancing accounting and balancing fund account data. The function of balancing accounting refers to the function of balancing the general ledger of the system. The function of balancing fund account data refers to the function of checking whether accounting data is balanced according to the formula of balancing fund account data.

- Auditing CDRs

  The CDRs that can be audited include the following types:

  - CDRs of the UVC and CBP

  - Call CDRs of the SCP and CBP

  - Transfer CDRs

  - Offline CDRs of the SCP

  - CDRs of the EVC and CBP

19.2 Audit Process

This section describes the audit process.

Each financial item of a system can be audited through financial methods. The accounting audit function of the OCS system is: The OCS system records the account balance of a subscriber at the beginning of each bill cycle and the account balance of the subscriber at the end of each bill cycle. Then the OCS system uses the accounting balancing formula to check whether the actual account balance of the subscriber is the same as the account balance calculated according to the fees on the CDRs (including the consumption CDRs and payment CDRs) of the subscriber. The accounting balancing formula is as follows:

Account balance of a subscriber at the end of a bill cycle = Account balance of the subscriber at the beginning of this bill cycle + Payment amount of this bill cycle - Consumption amount of this bill cycle

The accounting balancing function is used to audit the charging precision of CDRs. The function is also used to check whether the account balance of a subscriber has been changed abnormally. For example, if the account balance of a subscriber has been changed manually on a day, the accounting data of the subscriber on that day is unbalanced.

19.3 Reference

This section describes the terms used in the audit process.

None.

<div align="right">

A Glossary

</div>

Lists all terms, acronyms, and abbreviations used in the OCS for your reference.

A.1 Numerics

3G   Third Generation Mobile Communication

A.2 A

AAA   Authentication, Authorization and Accounting

AC   Apply Charging

account   An entity through which a customer can pay for the telecommunications services provided by a carrier.

account adjustment   A process to adjust account items on which the two parties of a settlement cannot benefit equally.

account book   A book that records the information about the income and expense of each fee item in the account by class. An account matches one or more account books. An account book often records the information such as account number, bill cycle, and account book subject.

accumulator   The accumulation of the service usage, consumption, and recharge fees of a subscriber.

ACK   Acknowledgement

ACR   Apply Charging Report

activation   An operation that enables a subscriber to use different telecommunications services provided by a carrier. After being activated, a subscriber account enters the active period, and the state of the subscriber is Active.

admission limit   The minimum consumption amount that a carrier sets for a subscriber in a bill cycle. If the consumption amount of a subscriber does not reach the minimum consumption amount that the carrier sets, the OCS system deducts the minimum consumption amount that the carrier sets.

APN   Access Point Name

appendant product   A type of products that are set by carriers, apart from main products. In general, an appendant product includes value-added services or preferential tariffs.

AVP   Attribute Value Pairs

A.3 B

bill   A list through which a carrier provides the service fee information periodically for a subscriber. A bill records the information such as the final balance and the fees for using the services and products. Bills are classified into detail bills and summary bills. A carrier charges a subscriber according to the information on the bill.

bill cycle   Settlement cycle. The interval can be set according to the operation strategy of a carrier and is one month in general. When a bill cycle ends, the OCS calculates the fees that a subscriber needs to pay in the bill cycle and generates a bill.

bill run	A process of calculating the billing result such as the monthly fee, discount, incentive, usage summary, free unit, rebate, and other charge and credit (OCC).
BMP	See **Business Management Point**
brand	A name that a carrier defines for a combination of products after segmenting the markets according to the ages, consumption habits, and consumption levels of users to facilitate the promotion. A carrier sells the combination of products by brand to the specified user groups to make profits.
Business Management Point	A network element that manages the operation of services, such as product management, charging management, resource management.

A.4 C

CAC	Charging Area Cell
call control	A function of processing a call, consisting of creating, monitoring, maintaining, connecting, and releasing a call and providing service features.
call screening	A service of call control. If the service is enabled for a subscriber, the subscriber can maintain a screening table that records information such as discrete numbers, number segments, areas, time segments, and passwords. Before a call is connected, the system determines whether to continue the call according to the current attribute of the calling subscriber and information such as the screening table, screening type, screening strategy, and screening mode.
CAZ	Charging Area Zone
CBS	See **Convergent Billing System**
CC	Customer Care
CCBS	Customer Care & Billing System
CDMA	Code Division Multiple Access
CDR	Call Detail Record
charging event	An event that occurs when a subscriber uses a service provided by the carrier. The event is used for charging by the charging module.
Convergent Billing Point	A network element that receives external charging requests and performs online charging and offline charging.
Convergent Billing System	A system that supports multi-network, multi-service, and multi-charging modes. CBS refers to Convergent Billing System. The key features of the CBS are as follows: 1. Convergence of service networks The convergent charging system provides the exact, real-time, and flexible charging and unified customer services for the products and services that are supported by the networks such as the fixed network, 2G, 3G, NGN, and IPTV. 2. Convergence of multiple services The convergent charging system supports the unified charging of voice services and data services. 3. Convergence of rating categories Subscribers can switch between the prepaid mode and postpaid mode. 4. Convergence of online charging and offline charging The convergence of online charging and offline charging is useful in the integrated network environment, especially when certain components in the network cannot trigger the online charging request in real time.

credit control	A process of controlling the consumption amount of the telecommunications services for a subscriber according to the remaining call fee and credit limit of the subscriber.
credit limit	An amount that a subscriber can overdraw.
CRM	Customer Relationship Management
CUG	Closed User Group
customer	An individual, an enterprise, or a corporation that uses the products or services provided by the carrier or the partner of the carrier.

A.5 D

day end	An operation that is performed by the system to generate journals according to the Double Entry data in the system.
DCC	Diameter Credit Control
deactivation	An operation that disables a postpaid subscriber to use different telecommunications services provided by a carrier. After being deactivated, a subscriber account enters the Disable state.
deregistration	An operation of deregistering a subscriber. After being deregistered, a subscriber cannot use the products and services that are provided by the carrier.
DS	Data Service

A.6 E

e-voucher center	A service that provides recharge and payment functions for subscribers through virtual recharge cards. Carriers can issue the virtual recharge cards by setting up distributor channel in the tree mode. Compared with the traditional recharge through real recharge cards, the recharge through virtual recharge cards can save the card cost and enable carriers to understand the precise information about transactions and inventories in time.
ENIP	Enhanced Network Intelligent Platform

A.7 F

Familiarity Number	A mobile number that a subscriber sets, which can enjoy a preferential tariff when a call is made between this mobile number and the mobile number of the subscriber.
fee item	A detailed item of the consumption fees of a subscriber. For example, the local call fee item and national toll call fee item.
FEP	Front End Processor
FN	See **Familiarity Number**
free resource	A resource that a carrier provides for subscribers for free use. Free resources include a certain number of short messages, the call duration, and the data traffic.
FTP	File Transfer Protocol

A.8 G

GGSN	Gateway GPRS Support Node
GPRS	Generally Packet Radio System
GSM	Global System for Mobile Communications
GUI	Graphic User Interface
GW	Gateway

A.9 H

HLR	Home Location Register
HTTP	Hypertext Transfer Protocol

A.10 I

ICP	Information Content Provider
ID	Identification/Identity
IMSI	International Mobile Subscriber Identity
IN	Intelligent Network
installment rebate	A preference policy with which a carrier returns certain fees to a customer in multiple bill cycles.
IP	Internet Protocol
IPCG	IP Charging Gateway
IPSec	IP Security Protocol
IVR	Interaction Voice Response

A.11 M

main product	Basic product that a subscriber must subscribe to for using network resources before subscribing to appendant products. In general, a main product includes basic network services and basic tariffs. In the OCS, the subscription instance of a main product corresponds to one subscriber.
MCC	Mobile Country Code
MMS	Multimedia Messaging Service
MMSC	Multimedia Messaging Service Center
MO	Mobile Originated
monthly settlement	System operation of generating monthly settlement data on the basis of the double-entry bookkeeping data recorded by the system.

MSC	Mobile Switching Center
MSISDN	Mobile Subscriber International ISDN/PSTN Number
MT	Mobile Terminated

A.12 N

| **NE** | Network Element |

A.13 O

| **OCS** | See **Online Charging System** |
| **Online Charging System** | A system that implements the convergence of online charging and offline charging, voice service charging and data service charging, prepaid subscriber management and postpaid subscriber management. The OCS system provides the functions such as rating, subscriber balance management, and real-time monitor. |

A.14 P

package	A set of services that a carrier uses to propaganda and launch a brand to attract subscribers.
PIN	Personal Identity Number
pool period	A period in which a subscriber of an account that is in Disable state does not recharge the account after the deletion period An account in this period is in Pool state. A subscriber in Pool state cannot perform any operations. The OCS system deletes the subscriber account and reclaims the number resources after the pool period.
POS	Postpaid Subscriber
postpaid	A mode in which a subscriber is allocated a certain credit and the subscriber does not need to pay fees in advance when using a telecommunications service.
PPS	Prepaid Subscriber
prepaid	The mode in which a subscriber pays for the telecommunication services provided by a carrier in advance.
price plan	A set of pricing policies provided by a carrier for a group of telecommunications services. The charging system can calculate the fees for using the service based on the service usage and pricing plan of a subscriber.
PRM	Partner Relationship Management
product	A combination of one or more services with predefined tariff. Carriers can directly sell the combination of services to customers.
PSTN	Public Switched Telephone Network

A.15 R

rating	To perform the fee calculation on the preprocessed service records according to charging resources, tariffs, subscriber information, and product information.
RBT	Ring Back Tone
roaming in	A process for a subscriber to access the home telecommunications network from a non-home telecommunications network.
roaming out	A process for a subscriber to access a non-home telecommunications network from the home telecommunications network.

A.16 S

SDP	Service Data Point
service	A group of functions, material objects, or procedures that a service provider develops for sale in products. A service does not have any price and cannot be sold to subscribers.
settlement	A process of allocating the collected service fees that are generated during the cooperation between partners when a telecommunications service involves the communication resources or value-added service resources of multiple partners. The fee allocation is based on the resource usage and agreement that is signed by the partners in advance.
SIM	Subscriber Identity Module
SMAP	Service Management Access Point
SMG	Short Message Gateway
SMP	Service Management Point
SMS	Short Message Service
SMSC	Short Message Service Center
SP	Service Provider
SSP	Service Switching Point
suspension period	The period in which a subscriber account is not recharged after the activation period. An account in the suspension period is in Suspend state. Generally, the balance and bonus resources of an account in Suspend state are available. The subscriber is restricted in using certain services. For example, a subscriber of an account that is in Suspend state cannot use the free resource account for making calls. If a subscriber recharges an account during the suspension period, the account returns to Active state. At the same time, the validity period of the account is extended.

A.17 T

tariff	The designation of the pricing, discount policies, and applicable rules of a product.
TCP	Transfer Control Protocol

A.18 U

upper limit	The maximum consumption amount that a carrier sets for a subscriber in a bill cycle. If the consumption amount if a subscriber exceeds the maximum consumption amount that the carrier sets, the OCS system still deducts the maximum consumption amount that the carrier sets.
URL	Universal Resource Locator
USSD	Unstructured Supplementary Service Data
UVC	Uniform Voucher Center

A.19 V

VC	Voucher Center
VPN	Virtual Private Network

A.20 W

WISG	Wireless Integrated Service Gateway