

ETSI TS 132 275 V8.1.0 (2009-07)

Technical Specification

**Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Charging management;
MultiMedia Telephony (MMTel) charging
(3GPP TS 32.275 version 8.1.0 Release 8)**



Reference

RTS/TSGS-0532275v810

Keywords

LTE, UMTS

ETSI

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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Foreword

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1 Scope

The present document is part of a series of documents that specify charging functionality and charging management in GSM/UMTS networks. The GSM/UMTS core network charging architecture and principles are specified in 3GPP TS 32.240 [1], which provides an umbrella for other charging management TSs that specify:

- the content of the CDRs per domain and subsystem (offline charging),
- the content of real-time charging messages per domain / subsystem (online charging);
- the functionality of online and offline charging for those domains and subsystems;
- the interfaces that are used in the charging framework to transfer the charging information (i.e. CDRs or charging events)

The complete document structure for these TSs is defined in TS 32.240 [1].

The present document specifies the Offline and Online Charging for MultiMedia Telephony (MMTel) service and supplementary services, based on the functional description of MMTel in 3GPP TS 22.173 [200]. Charging for the following supplementary services is specified:

- Communications Diversion (CDIV)
- Communication Hold (HOLD)
- CONFerence (CONF)
- Message Waiting Indication (MWI)
- Originating Identity Presentation (OIP) / Originating Identity Restriction (OIR)
- Terminating Identity Presentation (TIP) / Terminating Identity Restriction (TIR)
- Call Barring (CB)
- Explicit Call Transfer (ECT)
- Communication Wait (CW)

Editor's Note: Specification of other MMTel supplementary services is FFS.

Charging of these supplementary services is performed at the respective MMTel AS. The MMTel charging aspects are an extension of the basic IMS charging capabilities as specified in the TS 32.260 [20].

This charging description includes the offline and online charging architecture and scenarios specific to the MMTel, as well as the mapping of the common 3GPP charging architecture specified in TS 32.240 [1] onto the MMTel. It further specifies the structure and content of the CDRs for offline charging, and the charging events for online charging.

The present document is related to other 3GPP charging TSs as follows:

- The common 3GPP charging architecture is specified in TS 32.240 [1];
- The common IMS charging principles are specified in the TS 32.260 [20].
- The parameters, abstract syntax and encoding rules for these CDR types are specified in TS 32.298 [51].
- A transaction based mechanism for the transfer of CDRs within the network is specified in TS 32.295 [54].
- The file based mechanism used to transfer the CDRs from the network to the operator's billing domain (e.g. the billing system or a mediation device) is specified in TS 32.297 [52].
- The 3GPP Diameter application that is used for MMTel offline and online charging is specified in TS 32.299 [50].

All references, abbreviations, definitions, descriptions, principles and requirements, used in the present document, that are common across 3GPP TSs, are defined in the 3GPP Vocabulary, TR 21.905 [100]. Those that are common across charging management in GSM/UMTS domains or subsystems are provided in the umbrella document TS 32.240 [1]. Finally, those items that are specific to the present document are defined exclusively in the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 32.240: "Telecommunication management; charging management; charging architecture and principles".
- [2]-[19] Void
- [20] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".
- [21]-[49] Void.
- [50] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".
- [51] 3GPP TS 32.298: "Telecommunication management; Charging management; Charging Data Record (CDR) parameter description".
- [52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Record (CDR) file format and transfer".
- [53] 3GPP TS 32.296: "Telecommunication management; Charging management; Online Charging System (OCS) applications and interfaces".
- [54] 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".
- [55]-[99] Void.
- [100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [101] 3GPP TS 22.101: "Service aspects; Service Principles".
- [102] 3GPP TS 22.115: "Service aspects; Charging and billing".
- [103] 3GPP TS 23.002: "Network Architecture".
- [104]-[199] Void.
- [200] 3GPP TS 22.173: " Multimedia Telephony Service and supplementary services;stage 1".
- [201] 3GPP TS 24.173: "IMS multimedia telephony communications service and supplementary services stage3".
- [202] 3GPP TS 24.604: "TISPAN- PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification".

- [203] 3GPP TS 24.605: . "Conference (CONF) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [204] 3GPP TS 24.606: "Message Waiting Indication (MWI) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification". .
- [205] 3GPP TS 24.607: "Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [206] 3GPP TS 24.608: "Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [207] 3GPP TS 24.610: "Communication HOLD (HOLD) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [208] 3GPP TS 24.611: "Anonymous Communication Rejection (ACR) and Communication Barring (CB) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [209] 3GPP TS 24.615: "Communication Waiting (CW) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol Specification".
- [210] 3GPP TS 24.616: "Malicious Communication Identification (MCID) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol specification".
- [211] 3GPP TS 24.623: "Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating Simulation Services".
- [212] 3GPP TS 24.629: "Explicit Communication Transfer (ECT) using IP Multimedia (IM) Core Network (CN) subsystem;; Protocol specification".
- [213] 3GPP TS 24.642: "Completion of Communications to Busy Subscriber (CCBS) and Completion of Communications by No Reply (CCNR) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol Specification".
- [214] 3GPP TS 24.647: "Advice Of Charge (AOC) using IP Multimedia (IM) Core Network (CN) subsystem; Protocol Specification".
- [215] 3GPP TS 24.654: "Closed User Group (CUG) using IP Multimedia (IM) Core Network (CN) subsystem, Protocol Specification".
- [216]-[299] Void.
- [300]- [399] Void.
- [400] Void.
- [401] IETF RFC 3588: "diameter base protocol".
- [402] IETF RFC 4006: "Diameter Credit Control Application".
- [403]-[499] Void.

3 Definitions and abbreviations

For the purposes of the present document, the following terms and definitions given in 3GPP TR 21.905 [100], 3GPP TS 32.240 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations defined in 3GPP TR 21.905 [100], 3GPP TS 32.240 [1] and the following apply:

MMTel	MultiMedia Telephony
CB	Communication session Barring
CCBS	Completion of Communication sessions to Busy Subscriber
CCNR	Completion of Communications on No Reply
CD	Communication Deflection
CDIV	Communication DIVersion
CDIVN	CDIV Notification
CFB	Communication Forwarding Busy
CFU	Communication Forwarding Unconditional
CFNL	Communication Forwarding on Not Logged-in
CFNR	Communication Forwarding No Reply
CFNRc	Communication Forwarding on Subscriber Not Reachable
CFUDB	Communication Forwarding User Determined Busy
CONF	CONFerence
CW	Communication Waiting
ECT	Explicit Communication Transfer
HOLD	Communication HOLD
ICB	Incoming Communication Barring
MWI	Message Waiting Indication
OCB	Outgoing Communication Barring
OIP	Originating Identity Presentation
OIR	Originating Identity Restriction
TIP	Terminating Identity Presentation
TIR	Terminating Identity Restriction

4 Architecture Considerations

4.1 High level MMTel architecture

Figure 4.1 depicts the IMS reference architecture, as described in 3GPP TS 23.002 [103], with "colorized" AS as entity involved in MMTel service and supplementary services charging described in this specification.

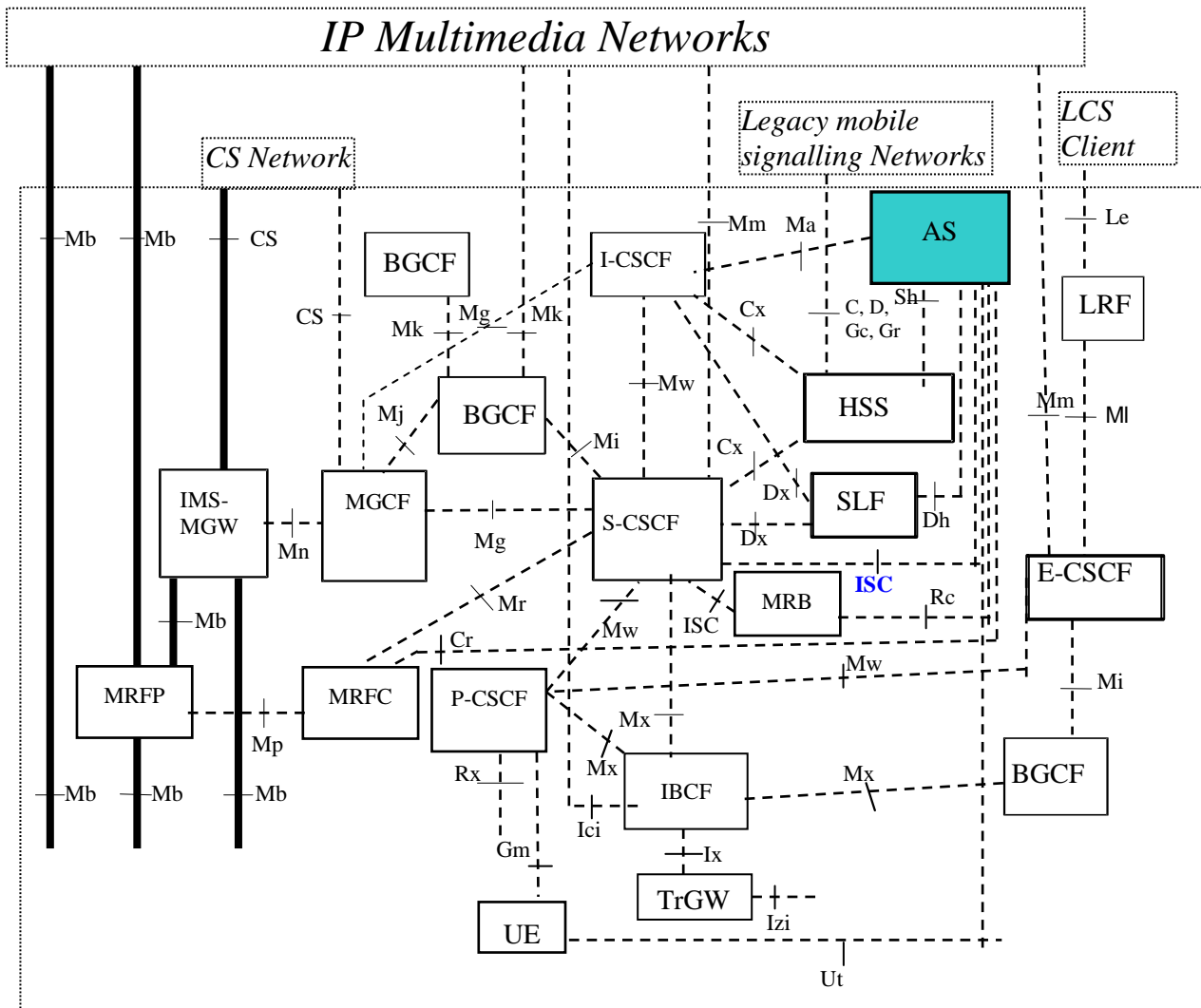


Figure 4.1-1: Entities involved in MMTel service charging in IMS logical architecture

The AS provides the application level network functionality for MMTel service and supplementary services, whereas the overall IMS Network provides the basic IMS capabilities supporting MMTel service.

4.2 MMTel offline charging architecture

Figure 4.2 depicts the MMTel offline charging architecture.

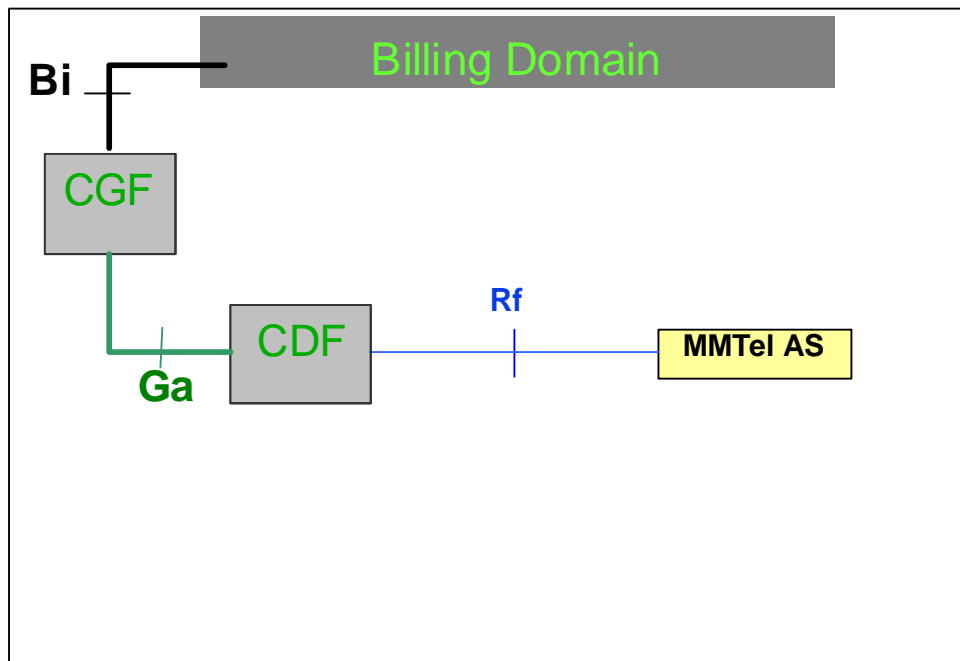


Figure 4.2-1: MMTel Offline Charging architecture

This MMTel Offline Charging architecture is based on the IMS offline charging architecture described in TS 32.260 [20], with service CTFs supporting MMTel specific service charging, interfacing the CDF through the Rf reference point.

The CTFs considered in the MMTel Offline Charging architecture reside in the Application level network functionality providing MMTel service and supplementary services.

The CTFs related to charging for the IMS basic capabilities supporting MMTel service, are described in TS 32.260 [20], and reside in the set of IMS Nodes (S-CSCF, MRFC...) reflected in IMS offline architecture.

4.3 MMTel online charging architecture

The architecture for MMTel online charging is described in the following figure.

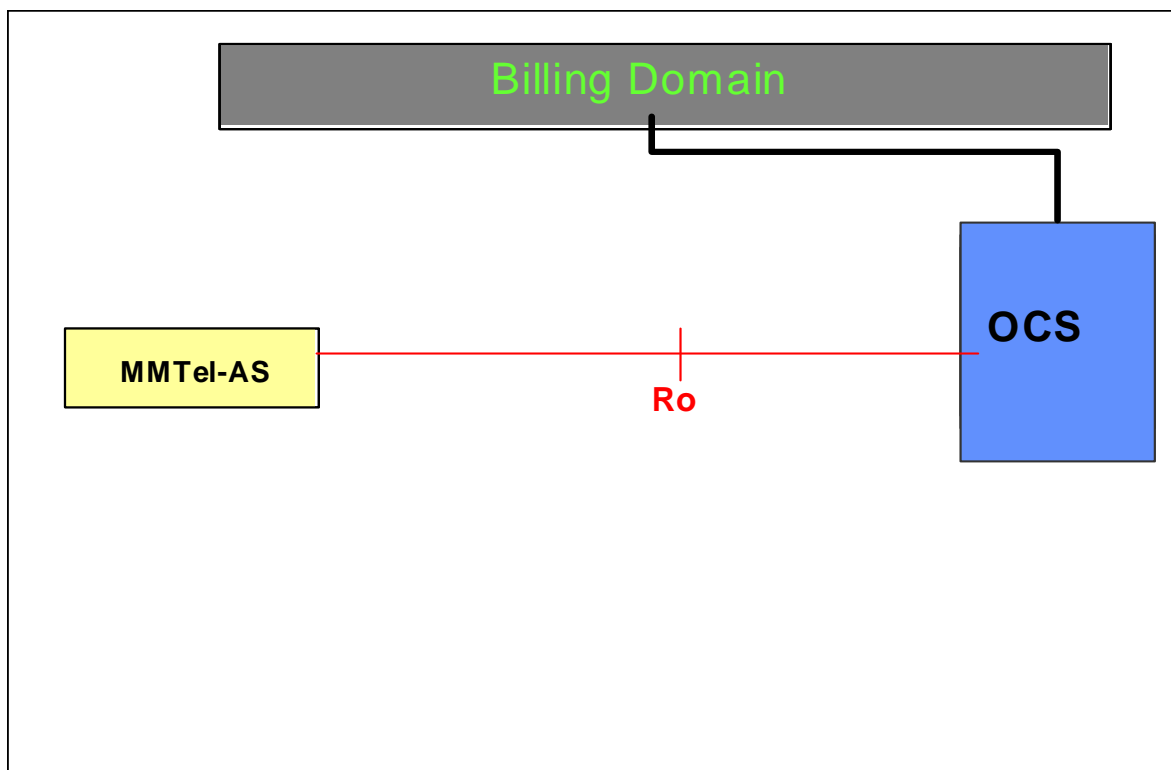


Figure 4.3-1: MMTel Online Charging architecture

This MMTel Online Charging architecture is based on the IMS online charging architecture described in TS 32.260 [20], with service CTFs supporting MMTel specific service charging, interfacing the OCS through the Ro reference point.

The CTFs considered in the MMTel Online Charging architecture reside in the Application level network functionality providing MMTel service and supplementary services.

The CTFs related to charging for the IMS basic capabilities supporting MMTel service, are described in TS 32.260 [20], and reside in the set of IMS Nodes (S-CSCF, MRFC...) reflected in IMS online architecture.

5 MMTel charging principles and scenarios

There are a variety of multimedia telephony supplementary services implemented at different IMS nodes. All the services should support subscription based charging, and some also consumption based charging. The subscription based charging is out of the scope of the present specifications.

The following table 5.1 summarizes which of the services are applicable for offline and online charging.

Table 5.1: Relevance of the services for offline and online charging

Supplementary services	Offline Charging	Online Charging
OIP	X	-
OIR	X	-
TIP	X	-
TIR	X	-
CW	X	-
HOLD	X	-
CB	X	-
MWI	X	-
CONF	X	X
CDIV	X	X
CDIVN	X	X
ECT	X	X

5.1 MMTel charging principles

The MMTel charging encompasses the Multimedia telephony service (e.g. multimedia conversational communications between two or more users, with speech as a typical usage, and also others combinations of media) together with the associated supplementary services charging aspects.

Every Supplementary services described in TS 22.173 [202] are subject to be involved in MMTel charging function description.

Editor's note:

The whole IMS supplementary services list from 22.173 [202] is considered, although some of them could have no implication on charging: this need to be investigated and to be captured.

MMTel service and supplementary services charging function focuses on charging information provided by the CTFs supporting MMTel specific service charging: calling user identification, called user identification, media component characteristics and usage (speech only, speech with other component, add/retrieve components..), supplementary services applied ...It enables to apply different flexible charging based on supplementary service type and options.

All the CTFs supporting MMTel specific service charging (AS) pertain to IMS domain, and as explained in TS 32.260 [20], it is possible to correlate session/transaction related charging data generated from these different Nodes (AS), and others IMS Nodes involved in the session used for MMTel service handling, based on IMS Charging Identifier (ICID).

5.1.1 Supplementary services invocation

Editor's note:

This chapter will specify for each supplementary service, if the invocation need to trigger charging, and which possible relevant information need to be provided during the service execution for charging.

5.1.1.1 OIP charging

The OIP service provides the terminating user with the possibility of receiving trusted (i.e. network-provided) identity information in order to identify the originating user.

The charging of the OIP subscribers is measured by the MMTel AS handling OIP in offline charging only.

5.1.1.2 OIR charging

The OIR service is a service offered to the originating user. It restricts presentation of the originating user's identity information to the terminating user.

The charging of the OIR subscribers is measured by the MMTel AS handling OIR in offline charging only.

5.1.1.3 TIP charging

The Terminating Identification Presentation (TIP) service provides the originating party with the possibility of receiving trusted information in order to identify the terminating party.

The charging of the TIP subscribers is measured by the MMTel AS handling TIP in offline charging only.

5.1.1.4 TIR charging

The Terminating Identification Restriction (TIR) is a service offered to the terminating party which enables the terminating party to prevent presentation of the terminating identity information to originating party.

The charging of the TIP subscribers is measured by the MMTel AS handling TIR in offline charging only.

5.1.1.5 HOLD charging

The Communication Hold supplementary service enables a user to suspend the media stream(s) of an established IP multimedia session, and resume the media stream(s) at a later time.

The charged parties may be any of the Hold parties. These roles are:

- Calling Party;
- Called Party;

Editor's note: When one of the parties originates a new call to a third party and the new call overbooks the bearer resource reserved by the held call, overbooking may be taken into account in charging. The solution for that is ffs

5.1.1.6 CB charging

The Communication Barring (CB) service offers the following services:

- The Incoming Communications Barring (ICB) is a service that rejects incoming communications that fulfil certain provisioned or configured conditions on behalf of the terminating user.
- The Anonymous Communication Rejection (ACR) is a particular case of the ICB service, that allows barring of incoming communications from an anonymous originator on behalf of the terminating user.
- The Outgoing Communication Barring (OCB) is a service that rejects outgoing communications that fulfil certain provisioned or configured conditions on behalf of the originating user.

The charging of the CB subscribers is measured by the MMTel AS handling CB in offline charging only.

5.1.1.7 CDIV charging

The Communications Diversion (CDIV) services enables the diverting user, to divert the communications addressed to the diverting user to another destination.

There are three actors active in a CDIV service of one diversion with the following roles:

- Diverting user; the party that initiates the diversion of an incoming communication.
- Originating user; the party which has initiated the communication and that stays in the communication which is diverted;
- Diverted to user;

In case there is another diversion, the user that was first the diverting user (user B), will be the originating user in the second diversion. The diverted to user of the first diversion (user C) will be the diverting user of the second diversion.

The charging of the diverting user for the B-C leg is measured by the MMTel AS handling the CDIV service, i.e. by the MMTel AS of the diverting user (user B). For the diverting user a separate charging dialog (online and/or offline charging) is needed. Charging of the originating and the terminating user (user C) is done in alignment with the TS 32.260 [20].

Typically the diverting user is charged for the forwarded leg (B-C leg), however, normal roaming charging principles apply for the diverted to user also in case of communication diversion. If there is another diversion, the user that performs the second diversion (user C) is charged (typically) for the new forwarded leg (C-D leg).

Charging at the S-CSCF is done in alignment with the TS 32.260 [20] but the S-CSCF has no knowledge of the CDIV service.

5.1.1.8 CW charging

The CW (Communication Waiting) service enables the application server to indicate to the subscriber, that there is at least one new communication is requested, and that no resources are available for that incoming communication. The user has then the choice of accepting, rejecting or ignoring the incoming communication. The maximum number of communications that may be waiting is a service provider option. If the current number of communications waiting is equal to the maximum, then any new attempted incoming communication request shall be rejected with a busy cause.

The charging of the CW subscribers is measured by the MMTel AS handling CW in offline charging only.

5.1.1.9 ECT charging

The Explicit Communication Transfer (ECT) service provides a party involved in a communication to transfer that communication to a third party.

There are three actors active in a transfer, they are acting in the following roles:

- transferor: the party that initiates the transfer of the active communication that it has with the transferee;
- transferee: the party which stays in the communication which is transferred;
- transfer target: the party which the communication is transferred to and which replaces the transferor in the communication.

The charging of the Transferor is measured by the MMTel AS handling the ECT service for the Transferor. The charging of the Transferee is measured by the MMTel AS handling the ECT service for the Transferee.

5.1.1.10 MWI charging

The MWI service enables the application server to indicate to the subscriber, that there is at least one message waiting. The indication is delivered to the subscriber's UE after successful subscription to the Message Waiting Indication service as described in the present document.

The charging of the MWI subscribers is measured by the MMTel AS handling MWI in offline charging only.

5.1.1.11 CONF charging

The CONFERENCE (CONF) service enables a user to participate in and control a simultaneous communication involving a number of users.

CONF Charging for the conference owner could be based on:

- establishment of the conference
- number of participants
- duration

CONF Charging for the conference participants could be based on:

- duration

The charging of the conference owners and participants is measured by the SIP AS and MRFC handling conference service. For each participant (call leg) a separate charging dialog (online and/or offline charging) at the SIP AS is needed.

5.1.2 Supplementary services management by User

When an IMS supplementary service control can be provided to the UE as a subscription option, every action performed by the user for this service (Provision/Withdrawal, Registration/Erasure, Activation/Deactivation, interrogation) may be subject to produce charging information, but this aspect is out of the scope of the present specification.

5.2 MMTel offline charging scenarios

5.2.1 Basic principles

The MMTel offline charging functionality is based on the CTFs reporting accounting information, by sending Diameter *Accounting Requests* (ACR) [Start, Interim, Stop and Event] to the CDF.

The circumstances on which the Diameter client uses ACR Start, Interim and Stop, or Events depend on the supplementary service type and is determined for each of them. Further details are specified in clause 5.2.2.

These Diameter Accounting Request triggers may be configured in such a way several MMTel supplementary services can be regrouped. Providing this flexibility will allow to improve situations where several MMTel supplementary services are handled within the same AS for complying with interactions requirements associated to these MMTel supplementary services.

5.2.2 Diameter message flows

The flows described in the present document specify the charging communications between the different CTF entities and the charging functions for different charging scenarios. The SIP messages and Diameter transactions associated with these charging scenarios are shown primarily for general information and to illustrate the charging triggers. They are not intended to be exhaustive of all the SIP message flows discussed in TS 24.228 [200] and they depend on the Diameter Accounting Requests triggers configured by the operator.

Although each MMTel supplementary service is described by separated flows illustrating the dedicated trigger(s) for this MMTel supplementary service, the Diameter Accounting Request triggers (as stated in 5.2.1), may be configured with several MMTel supplementary services information.

5.2.2.1 Message Flows - Successful Cases and Scenarios

Following message flows are defined in TS 32.260 [20], and can be re-used for charging the basic multimedia telephony capabilities:

- Session Establishment - IMS Origination
- Session Establishment – IMS Termination
- Mid-Session Procedures
- Session Release - Mobile Initiated

5.2.2.1.1 OIP Originating Identification Presentation

Figure 5.2.2.1.1-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the OIP service, and CDF after service execution.

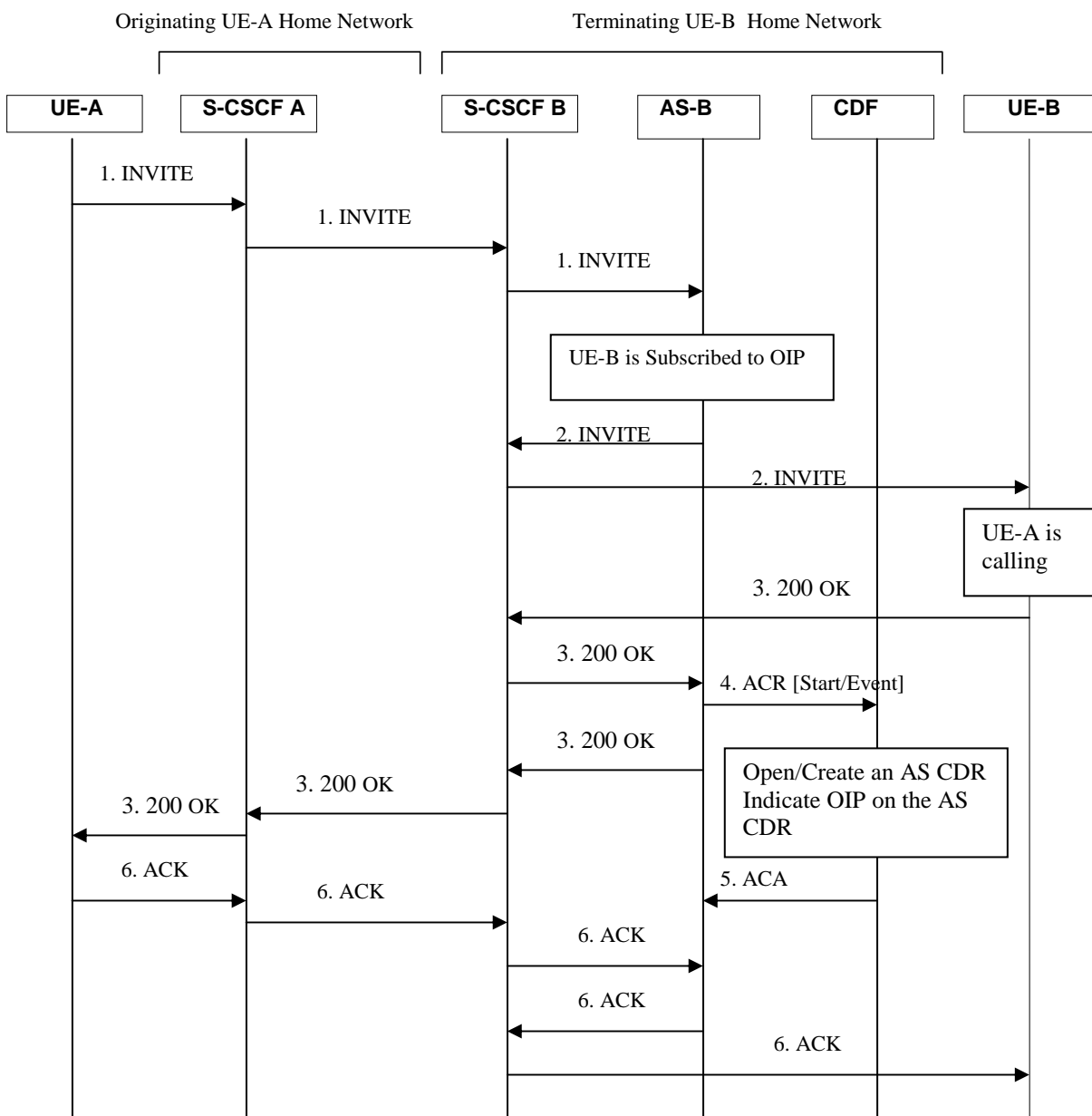


Figure 5.2.2.1.1-1: Message Sequence Chart for Offline charging of OIP service.

5.2.2.1.2 Originating Identification Restriction (OIR)

Figure 5.2.2.1.2-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the OIR service, and CDF after service execution.

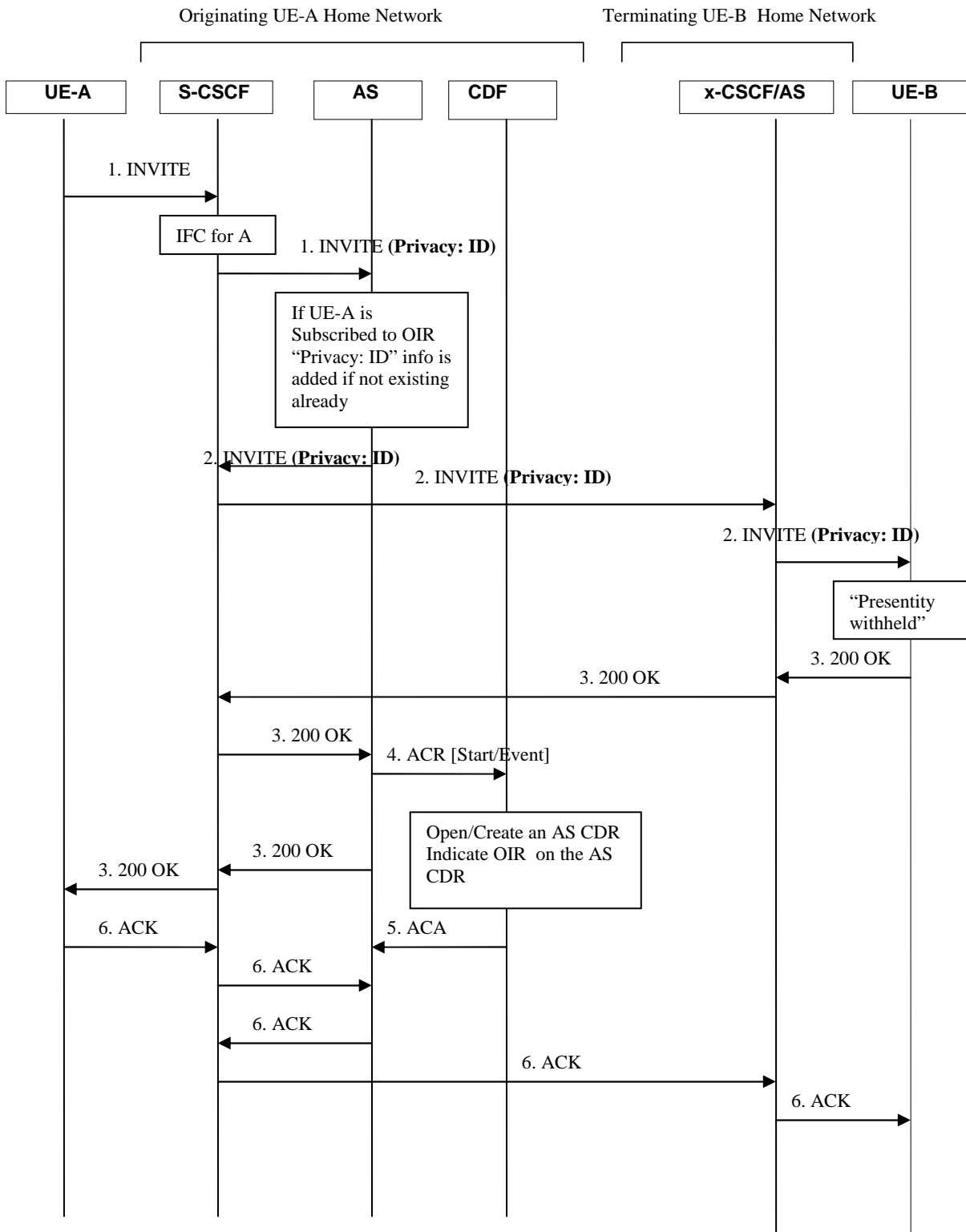


Figure 5.2.2.1.2-1: Message Sequence Chart for Offline charging of OIR service.

5.2.2.1.3 Terminating Identification Presentation (TIP)

Figure 5.2.2.1.3-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the TIP service, and CDF after service execution.

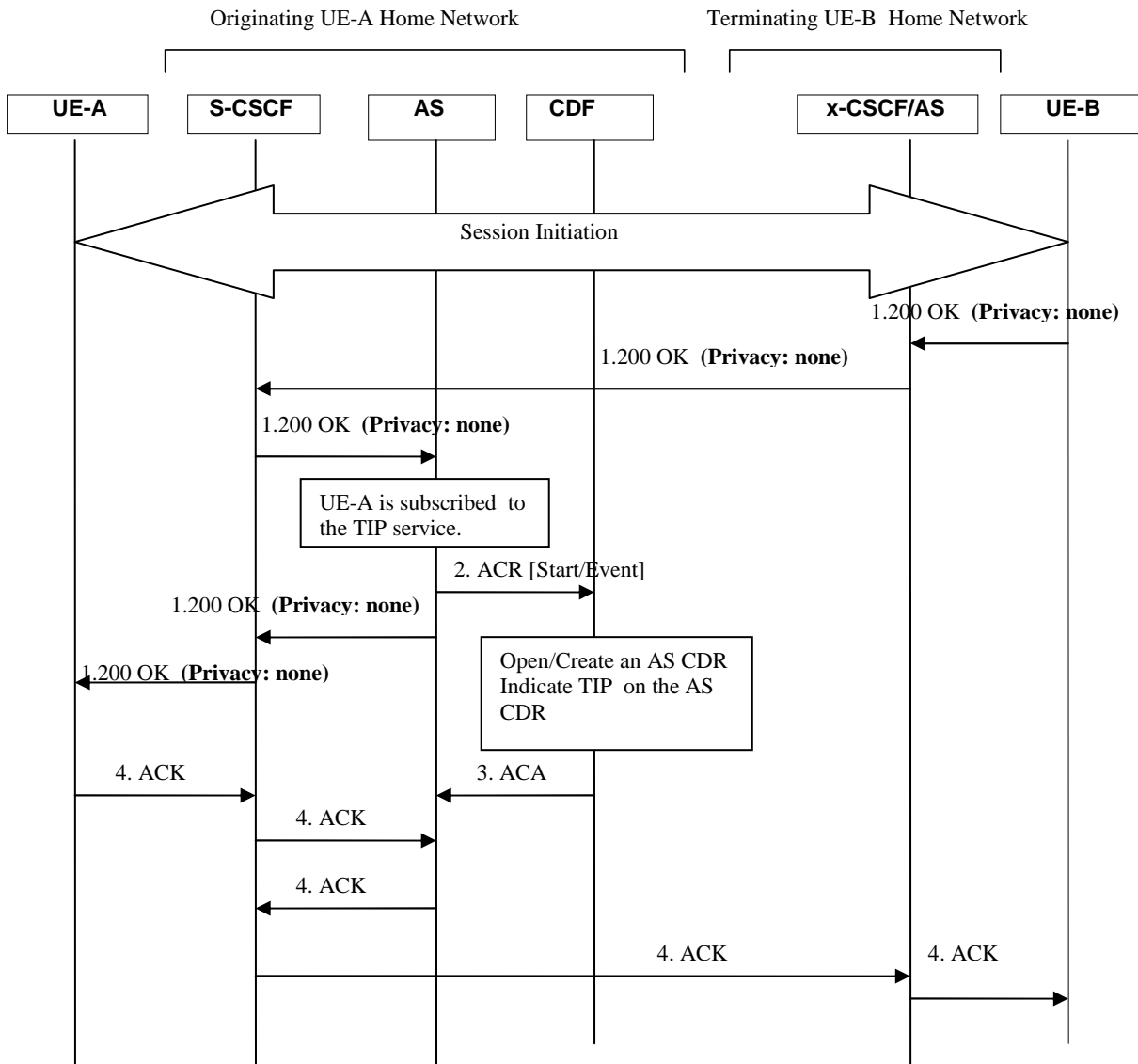


Figure 5.2.2.1.3-1: Message Sequence Chart for Offline charging of TIP service.

5.2.2.1.4 Terminating Identification Restriction (TIR)

Figure 5.2.2.1.4-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the TIR service, and CDF after service execution.

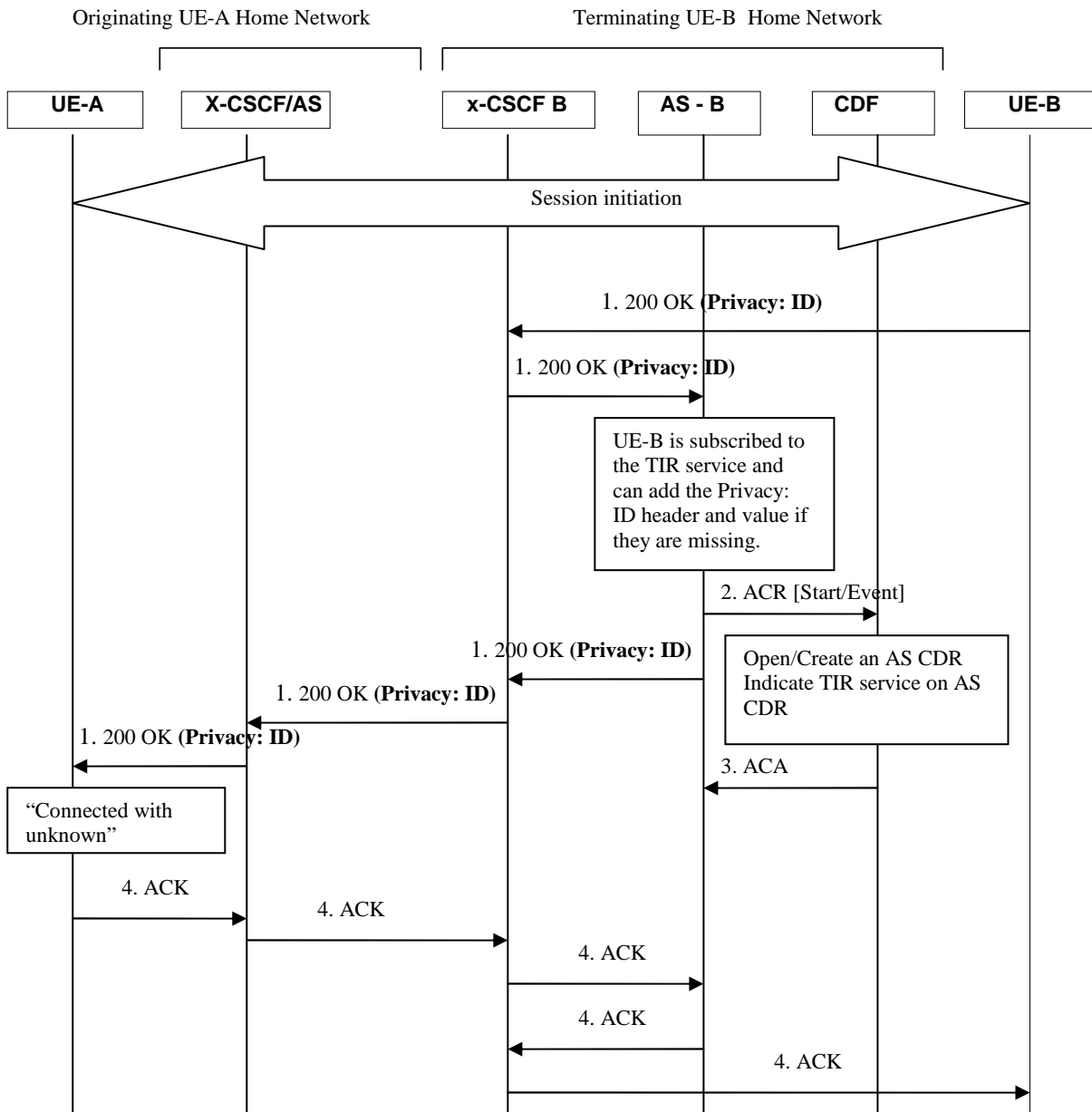


Figure 5.2.2.1.4-1: Message Sequence Chart for Offline charging of TIR service.

5.2.2.1.5 Communication Hold (HOLD)

Figure 5.2.2.1.5-1 shows the Diameter transactions that are required between AS which implements the HOLD service, and CDF after service execution. The involvement of the AS is optional as it is involved to the HOLD service provision only for announcement purposes.

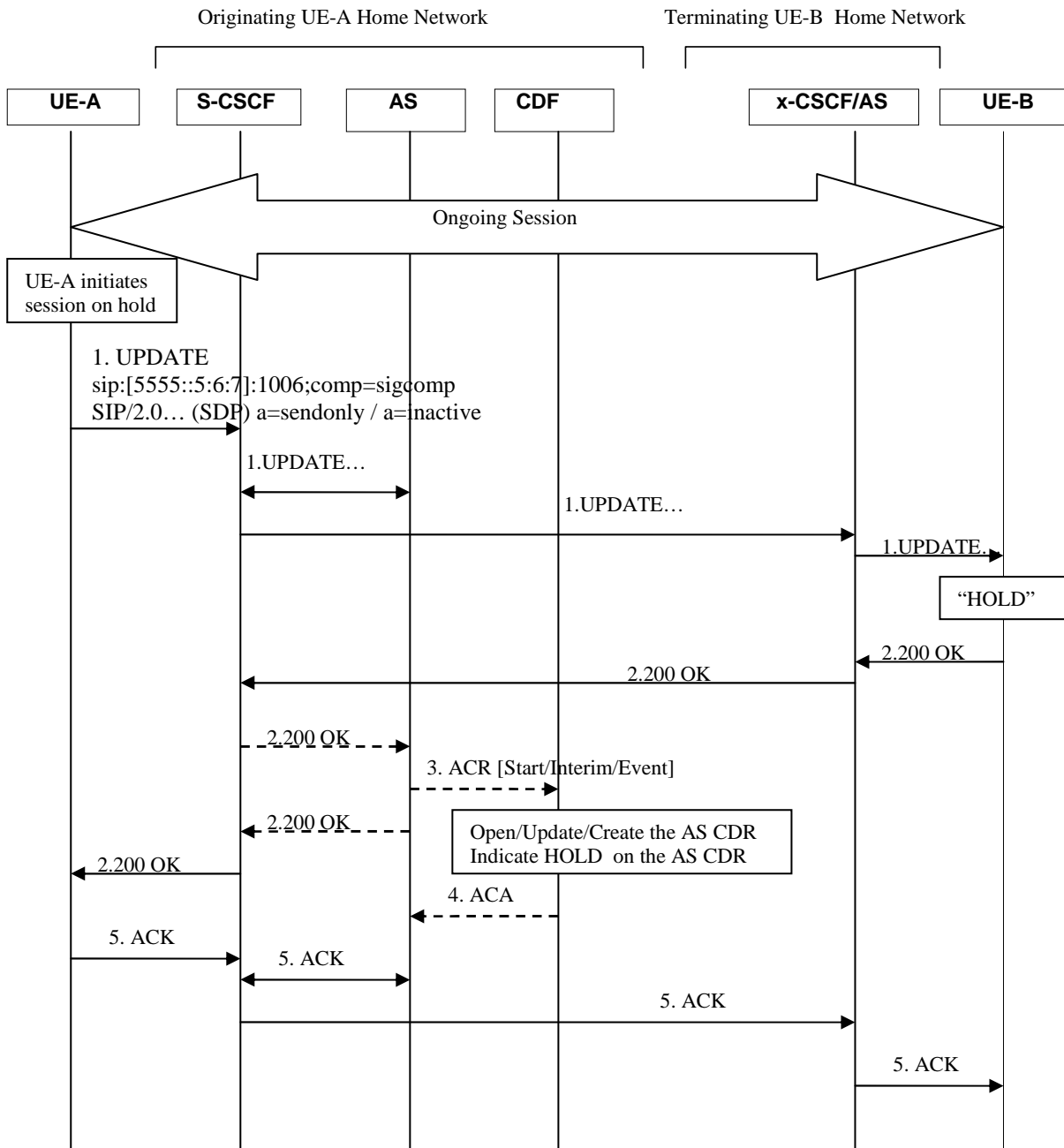


Figure 5.2.2.1.5-1: Message Sequence Chart for Offline charging of HOLD service.

Note: Based on TS 24.610 a scenario triggered by Re-Invite is also possible.

5.2.2.1.6 Communication Barring – CB (ICB/ACB)

5.2.2.1.6.1 Communication Barring (CB) – ICB and ACR

Figure 5.2.2.1.6.1-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the CB service, and CDF after service execution.

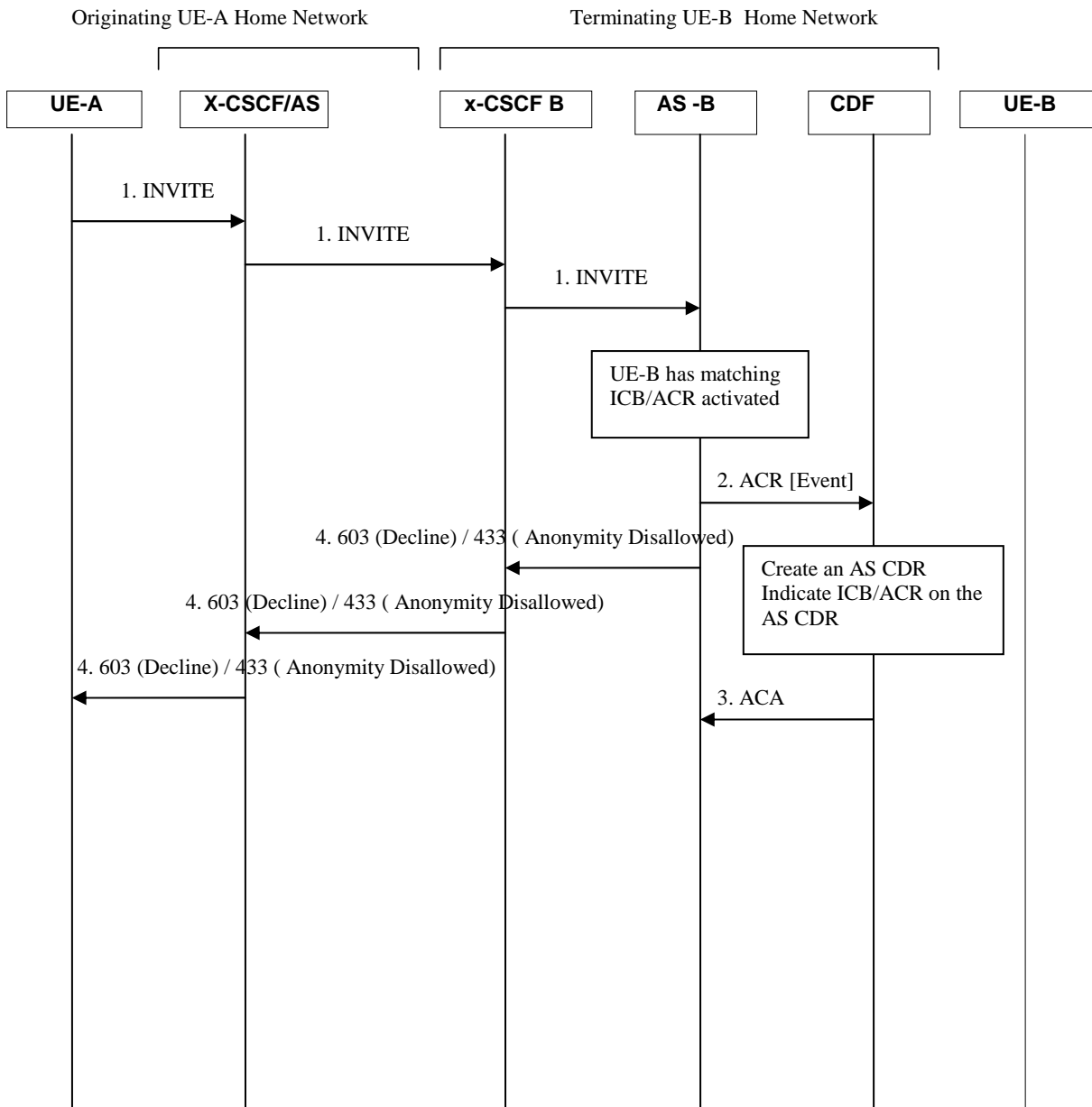


Figure 5.2.2.1.6.1-1: Message Sequence Chart for Offline charging of CB service.

5.2.2.1.6.2 Communication Barring (CB) – OCB

Figure 5.2.2.1.6.2-1 shows the Diameter transactions that are required between Application Server and CDF, which implements the CB service, and CDF after service execution.

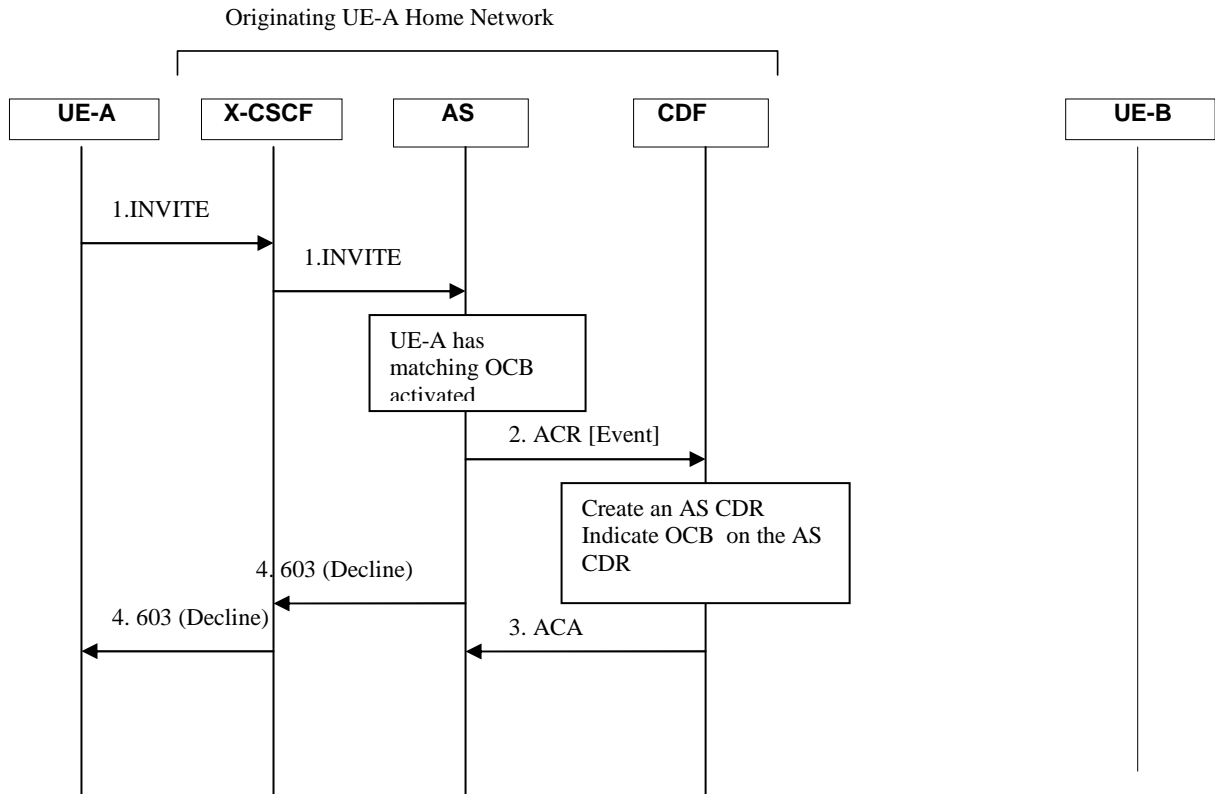


Figure 5.2.2.1.6.2-1: Message Sequence Chart for Offline charging of CB service.

5.2.2.1.7 Communications Diversion (CDIV)

5.2.2.1.7.1 Communications Diversion (CDIV) – successful establishment

The following figure shows the Diameter transactions that are required between Application Server, implementing the CDIV service and CDF for a successful communication forwarding on no reply.

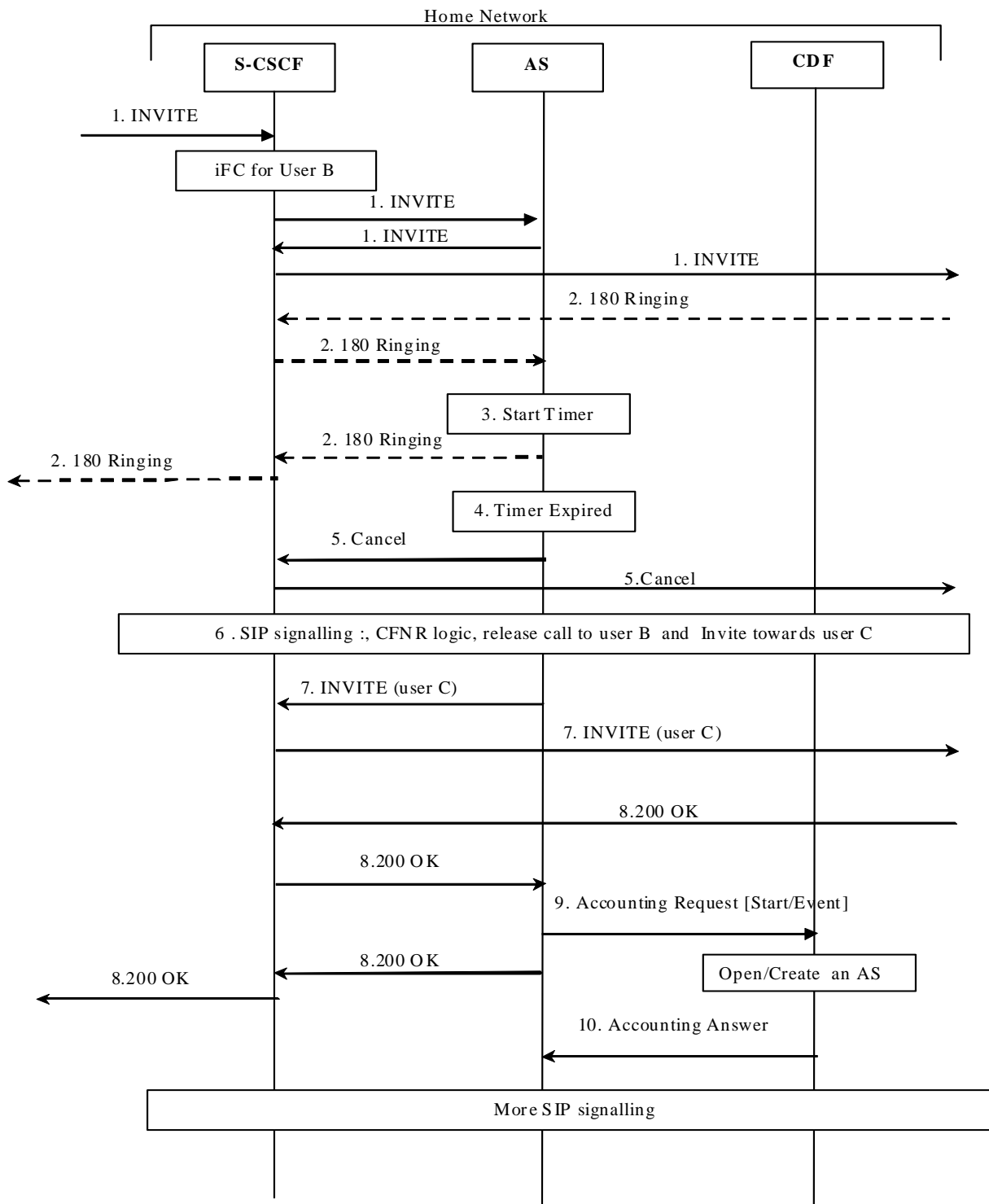


Figure 5.2.2.1.7.1-1 : Message Sequence Chart for Offline charging of CDIV service - establishment

A communication is requested towards User B, user B has activated the CFNR

- 1) INVITE request incoming for User B. Based on the Initial Filter Criteria (IFC) Rules, indicating that User B is subscribed to the CDIV supplementary services, the communication is forwarded to an AS implementing CDIV. Then INVITE is forwarded to User B,

- 2) 180 ringing is sent back from User B.
- 3) The non-reply timer in the AS is started .
- 4) The timer expires.
- 5 to 7) The AS implementing the CDIV service performs the Call Forwarding No Reply logic : release the communication to User B, and forward the call towards user C (INVITE request including URI-C as destination).

Depending on the value of subscription option '*Originating* user receives notification that his communication has been diverted (forwarded or deflected)', a 181 (Call Is Being Forwarded) response is sent towards the User A indicating that the communication is diverted (not shown in the call flow).

- 8) The destination User C party answers and a final response is received.
- 9) Upon reception of the final response, the AS implementing the CDIV service sends an *Accounting-Request* with *Accounting-Record-Type* indicating START_RECORD/EVENT_RECORD to record call forwarding execution (start of the forwarded leg from User B to User C): basic communication information are transferred with specific call forwarding information (service mode= 'CFNR', associated number = ' user B' as the user who invoked the call forwarding).
- 10) The CDF acknowledges the reception of the data and opens/creates an AS CDR to record the forwarded leg from User B to User C.

NOTE : Although only the 'call forwarding on no reply' case is depicted here , it serves as a basis for all other call forwarding modes description (Call Forwarding Unconditional, Call Deflection, Call Forwarding on Busy, Call Forwarding Not Logged-in) for ACR generation : In all these cases, the AS AS implementing the CDIV service sends an *Accounting-Request* with *Accounting-Record-Type* indicating START_RECORD to record call forwarding execution (whatever the mode), when the final response is received from user-C.

5.2.2.1.7.2 Communications Diversion (CDIV) – release

The next figure shows the Diameter transactions occurring on release of the previous established communication, initiated by user C:

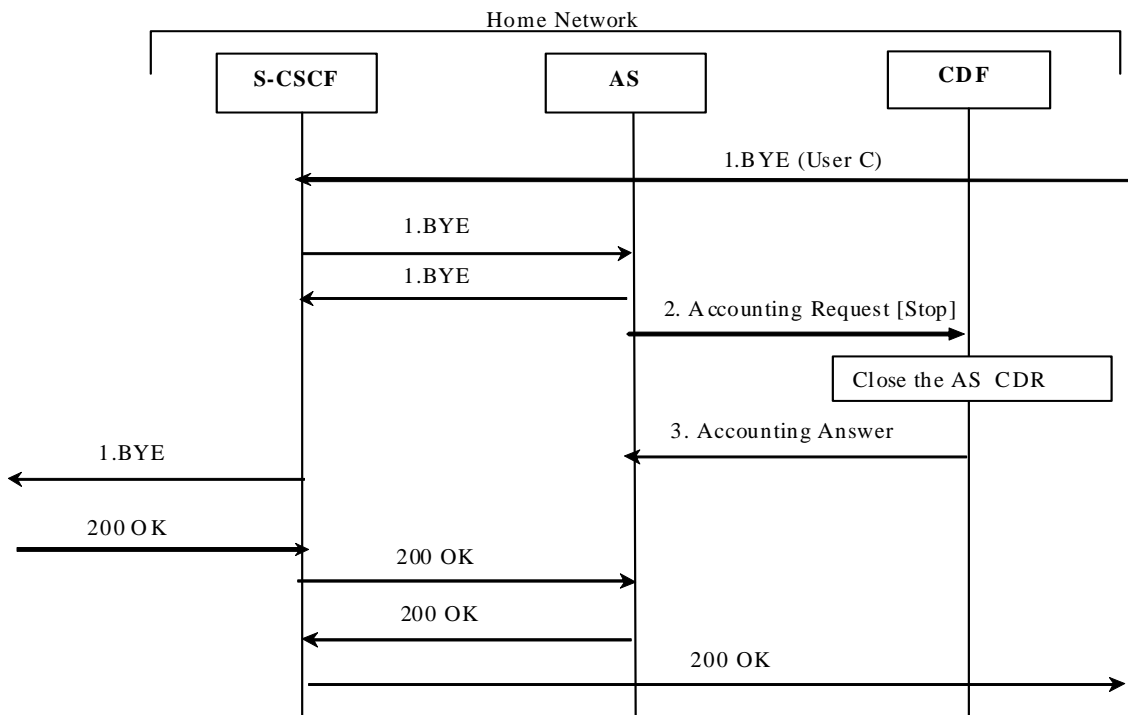


Figure 5.2.2.1.7.2-1: Message Sequence Chart for Offline charging of CDIV service -release

- 1) User C initiates release of the communication
- 2) At session termination the AS implementing the CDIV service, sends an *Accounting-Request* with *Accounting-Record-Type* indicating STOP_RECORD to record stop the call for which User B has been forwarded. The AS CDR is closed.

5.2.2.1.8 Communication Waiting Charging (CW)

The following figure shows the Diameter transactions that are required between Application Server, which implements the CW service and CDF for the callee (subscriber of CW).

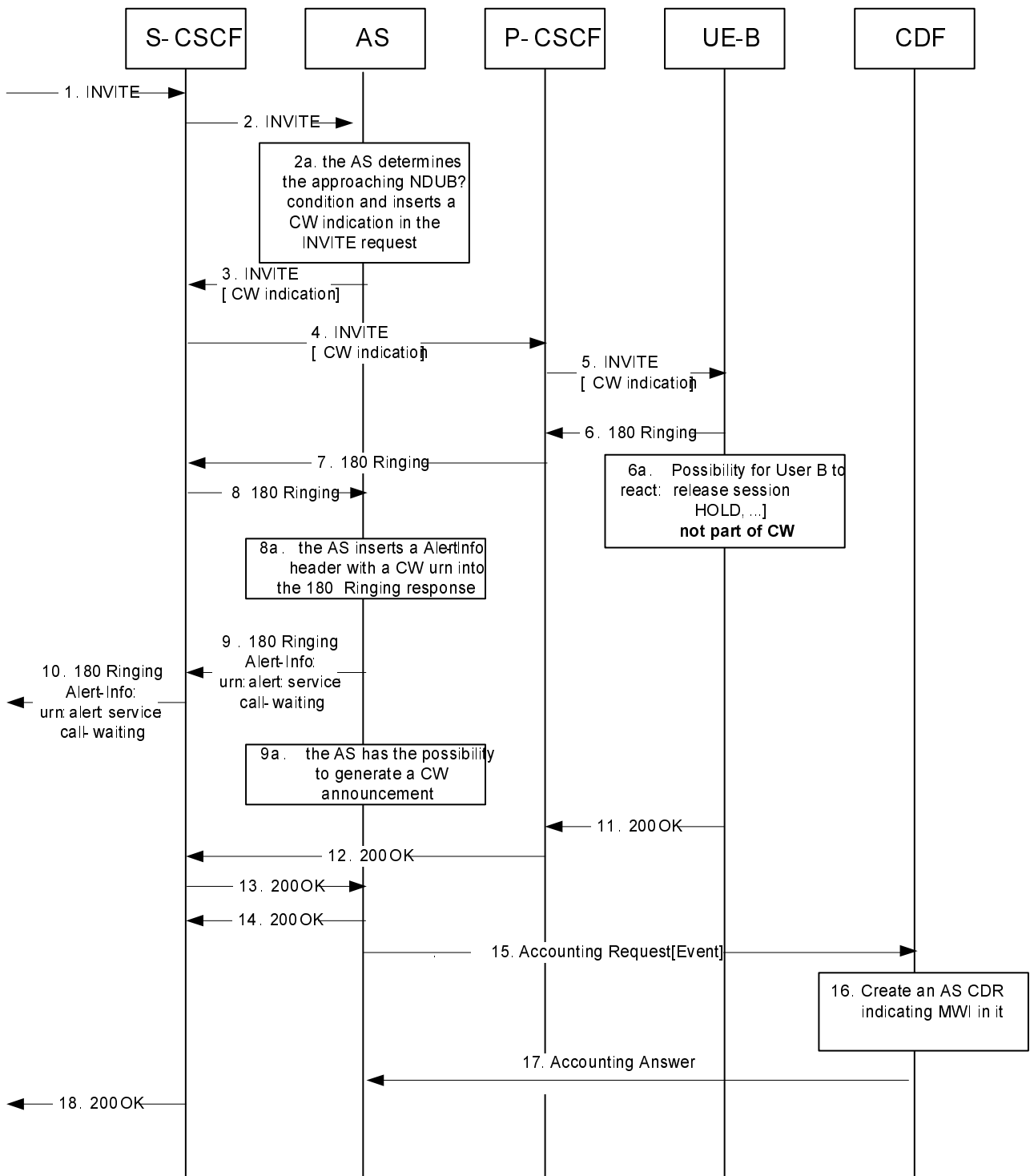


Figure 5.2.2.1.8-1 : Message Sequence Chart for Offline charging of CW service

1-2). The communication is initiated by UE-A by sending an INVITE request. The Request URI will include the URI of UE-B. After IFC evaluation in the S-CSCF the INVITE request is routed to the CW AS.

2a). The AS detects the CW condition and inserts a CW indication into the INVITE request per procedures.

3-4). The INVITE is routed to UE-B.

5). UE-B recognizes the CW indication per procedures.

6). UE-B sends back a 180 (Ringing) response.

[6a. out of scope: user B uses the HOLD service or releases a session in order to free resources]

7-8). The 180 (Ringing) response is routed back to the AS.

8a). The AS optionally inserts a Alert-Info with a 'CW' urn into the 180 (Ringing) response.

9-10). The 180 (Ringing) response is routed back to the communication origin.

[9a. The AS may initiate an announcement to the calling user that the communication is a waiting communication, in accordance with 3GPP TS 24.628 [4].]

11-14). UE-B sends back a 200 (OK) response to the CW AS and CW AS sends it to the S-CSCF.

15-17). The CW AS sends Accounting Request[Event] to CDF, CDF creates an AS CDR and returns Accounting Answer to the CW AS.

18). S-CSCF sends back a 200(OK) response to UE-A.

5.2.2.1.9 Explicit Communication Transfer (ECT)

5.2.2.1.9.1 Explicit Communication Transfer (ECT) : Blind Transfer

The following figure shows the Diameter transactions that are required between Application Servers implementing the ECT service for the transferor and for the transferee, and CDF: a successful Blind Transfer from User A to User C, initiated by User B

For diagram simplification, only one CDF is shown.

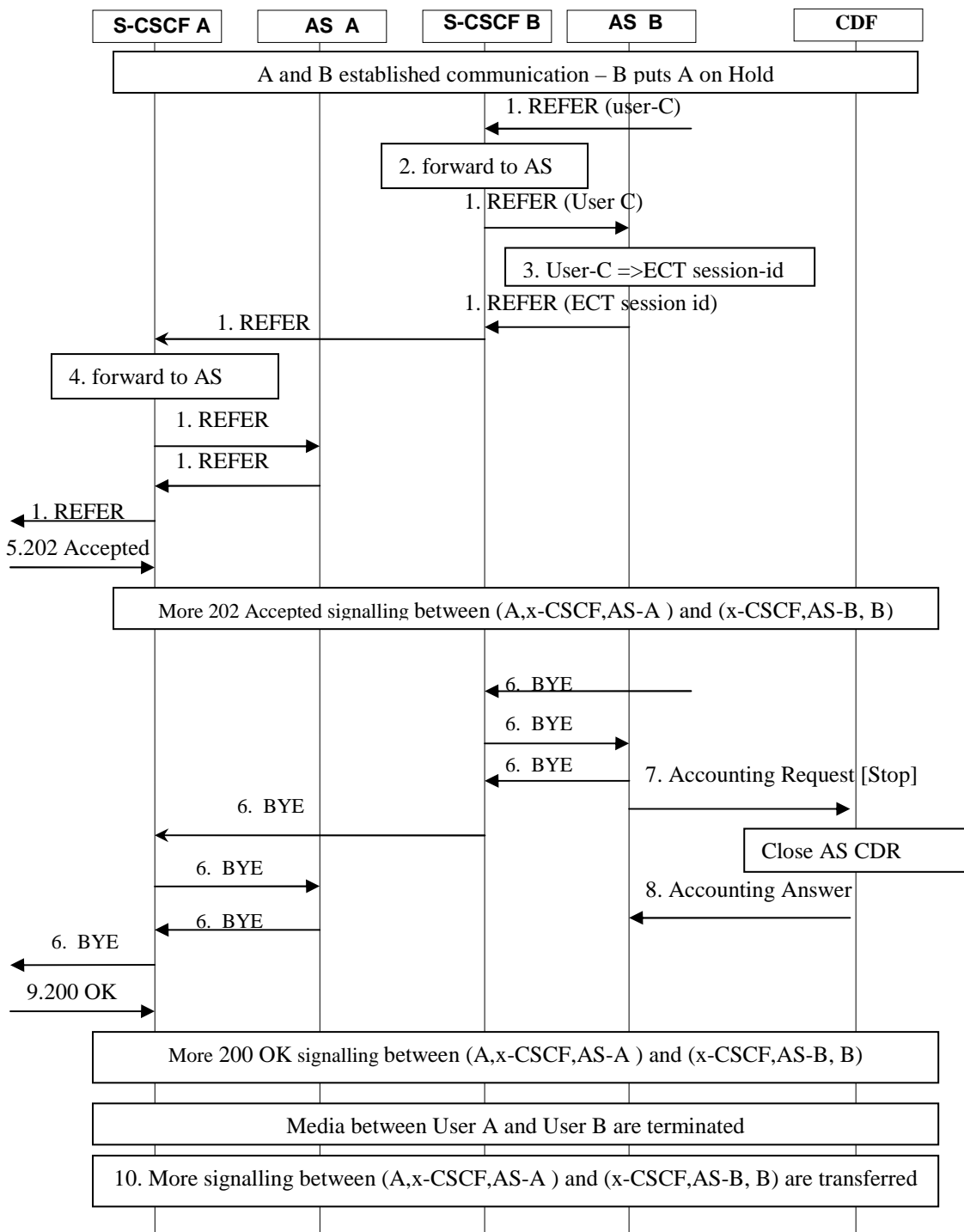


Figure 5.2.2.1.9.1-1 : Message Sequence Chart for Offline charging of ECT service – Blind Transfer (part1)

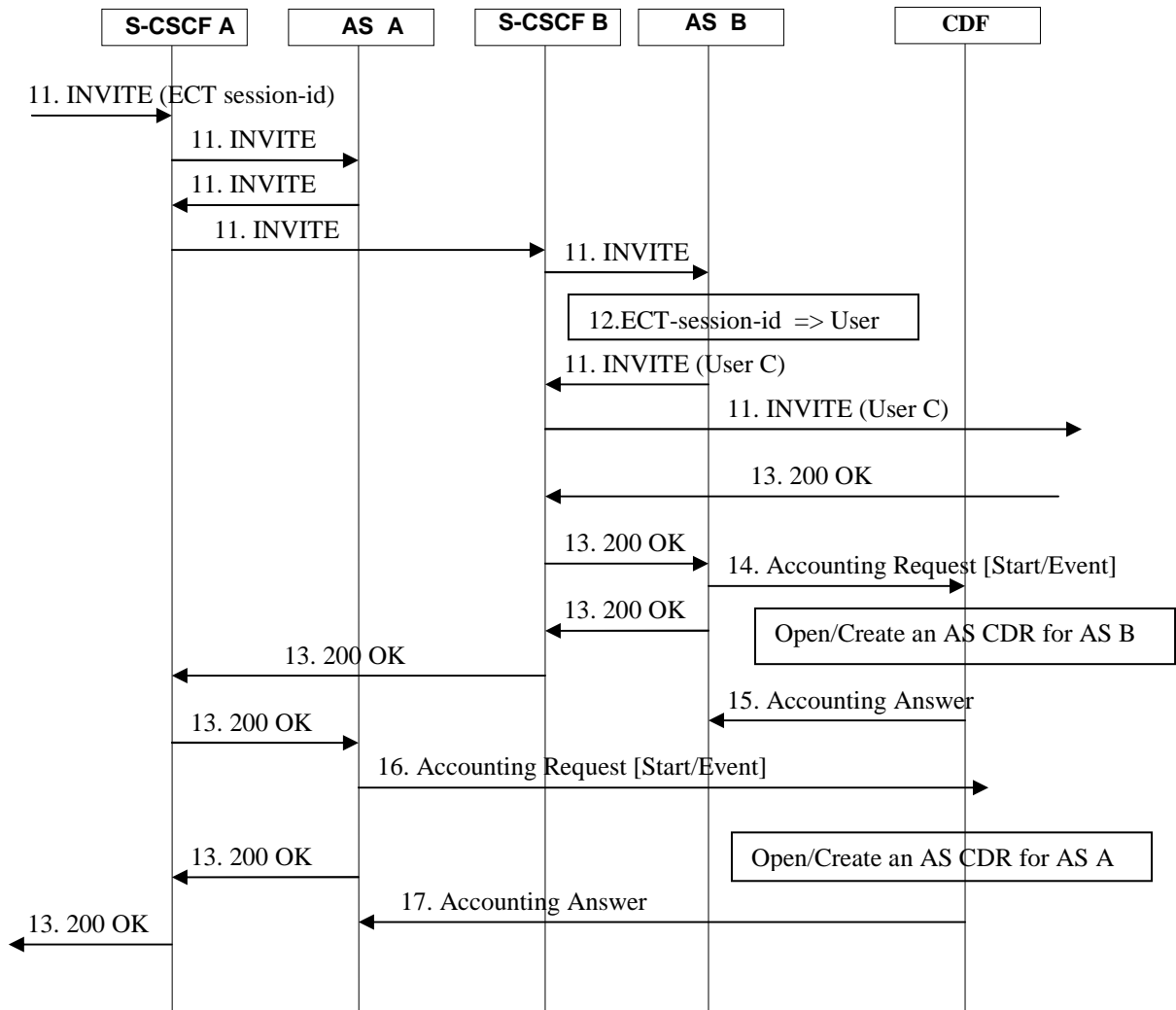


Figure 5.2.2.1.9.1-2 : Message Sequence Chart for Offline charging of ECT service – Blind Transfert (part 2)

In this scenario User A is the transferee, User B is the transferor, and User C is the transfer target.

User A and User B are in an established communication for which, based on the Initial Filter Criteria (IFC) Rules indicating that User B is subscribed to the ECT supplementary service, the INVITE was forwarded to an AS implementing ECT (for User A and User B).

User B puts User A on Hold

- 1) User B sends REFER request in the existing A-B dialog, to initiate transfer User A to User C.
- 2) this subsequent request is forwarded to the AS implementing ECT.
- 3) AS generates an 'ECT Session Identifier' replacing User C as the new destination information, for remaining in the loop, for transferor's role.
- 4) On REFER receipt, this request is forwarded the AS implementing ECT.
- 5) The REFER is accepted by User A, and 202 Accepted is transferred from User A to User B.

6-9) User B sends BYE for terminating original INVITE with User A, acknowledged by 200 OK from User A. AS B releases the media between User A and User B which are on hold, then sends an *Accounting-Request* with *Accounting-Record-Type* indicating STOP_RECORD to record termination of the dialogue between User A and User B.

10) More signalling between (User A,x-CSCF,AS-A) and (x-CSCF,AS-B,User B) :

User A sends NOTIFY(100 Trying) associated to the received REFER, and User B acknowledges by 200 OK

11) User A initiates a new session by sending an INVITE request with 'ECT Session Identifier' .

12) AS implementing the ECT service correlates this INVITE to the initial session to be transferred and replaces 'ECT Session Identifier' with User C for creating an INVITE towards UE-C.

13) The destination User C party answers and a final response is received.

14) Upon reception of the final response, the AS implementing the ECT service for the transferor, sends an Accounting-Request with Accounting-Record-Type indicating START_RECORD/EVENT_RECORD to record Transfer execution.

15)The CDF acknowledges the reception of the data and opens/creates an AS CDR.

16) Upon reception of the final response, the AS implementing the ECT service for the transferee, sends an Accounting-Request with Accounting-Record-Type indicating START_RECORD/EVENT_RECORD to record User A is transferred, with specific indicator on the transferee's 'subscriber role' (whether the transferee was engaged in an originating call or in a terminating call) before the transfer execution.

17)The CDF acknowledges the reception of the data and opens/creates an AS CDR.

NOTE : The "Consultative Transfer" scenario mainly differs from the "Blind transfer" on the transfer establishment phase : when User B has put User A on Hold, User B establishes a communication towards User C and puts User C on Hold, then User B initiates the REFER for the transfer triggering. The Accounting-Record-Type indicating START_RECORD for recording Transfer execution occurs at the same steps for both scenario: on the final response associated to INVITE towards User C for the transferor and for the transferee.

5.2.2.1.9.2 Explicit Communication Transfer (ECT) : Release

The following figure shows the Diameter transactions that are required between Application Servers implementing the ECT service for the transferor and for the transferee, and CDF: release from User A, after a successful Blind Transfer from User A to User C, initiated by User B.

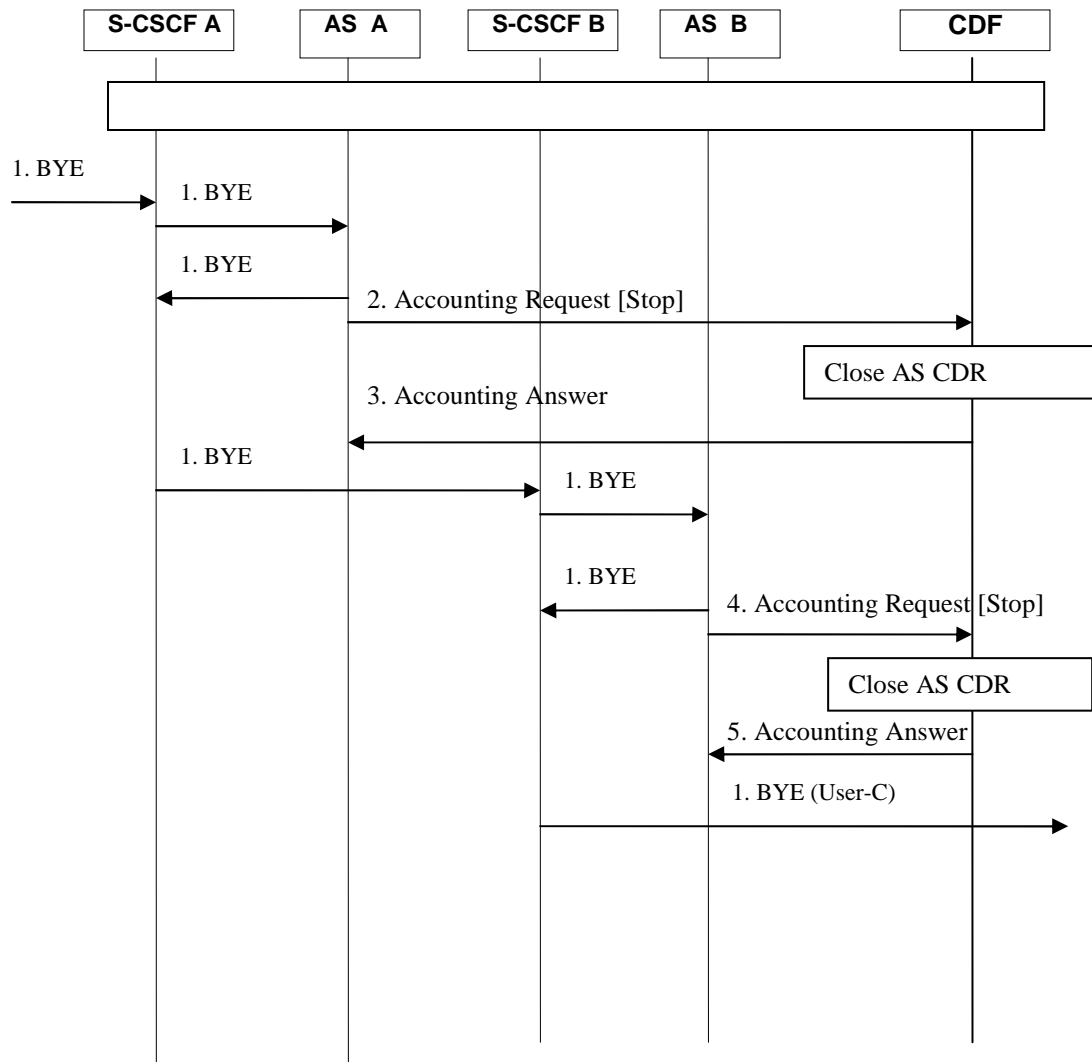


Figure 5.2.2.1.9.2-1 : Message Sequence Chart for Offline charging of ECT service – Release

- 1) User A initiates release of the communication
- 2-3) At session termination the AS implementing the ECT service for the transferee, sends an *Accounting-Request* with *Accounting-Record-Type* indicating STOP_RECORD to record stop the call for which User A has been transferred.
- 4-5) At session termination the AS implementing the ECT service for the transferor, sends an *Accounting-Request* with *Accounting-Record-Type* indicating STOP_RECORD to record stop the call transferred by User B. The AS CDR is closed.

5.2.2.1.10 Message Waiting Indication Charging (MWI)

The following figure shows the Diameter transactions that are required between Application Server (MWI), which implements the MWI service and CDF.

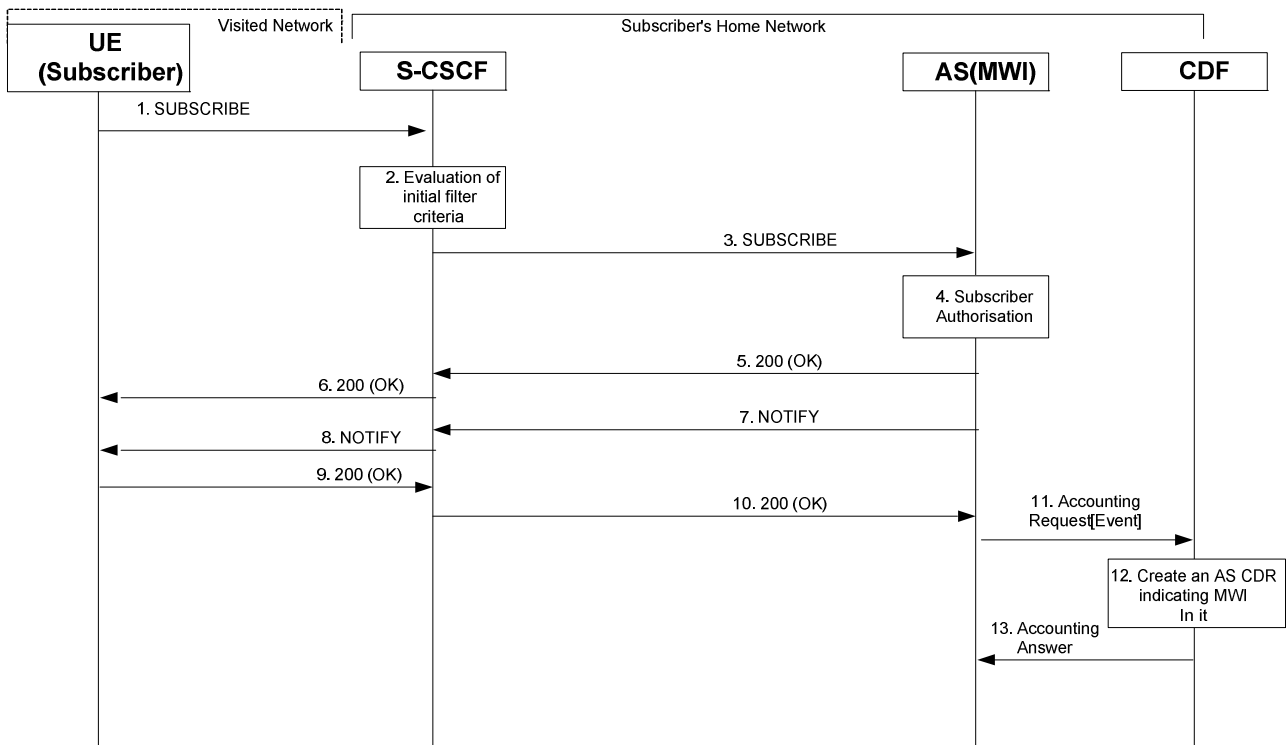


Figure 5.2.2.1.10-1 : Message Sequence Chart for Offline charging of MWI service

1-6) UE subscribes to AS (MWI) and the AS (MWI) returns 200 OK.

7-10) The AS (MWI) sends NOTIFY request to S-CSCF and the subscriber UE acknowledges the NOTIFY request.

11-13) The AS (MWI) sends Accounting Request [Event] message to CDF, CDF creates an AS CDR and returns Accounting Answer to the AS (MWI).

5.2.2.1.11 CONF Charging

During a conference, user could create the conference, join the conference, invite another user to the conference and leave the conference, according to 3GPP TS24.605. The following subclauses respectively show the Diameter transactions that are required between Application Server, which implements the CONF service and CDF corresponding different conference scenarios.

5.2.2.1.11.1 CONF Charging – user creating a conference

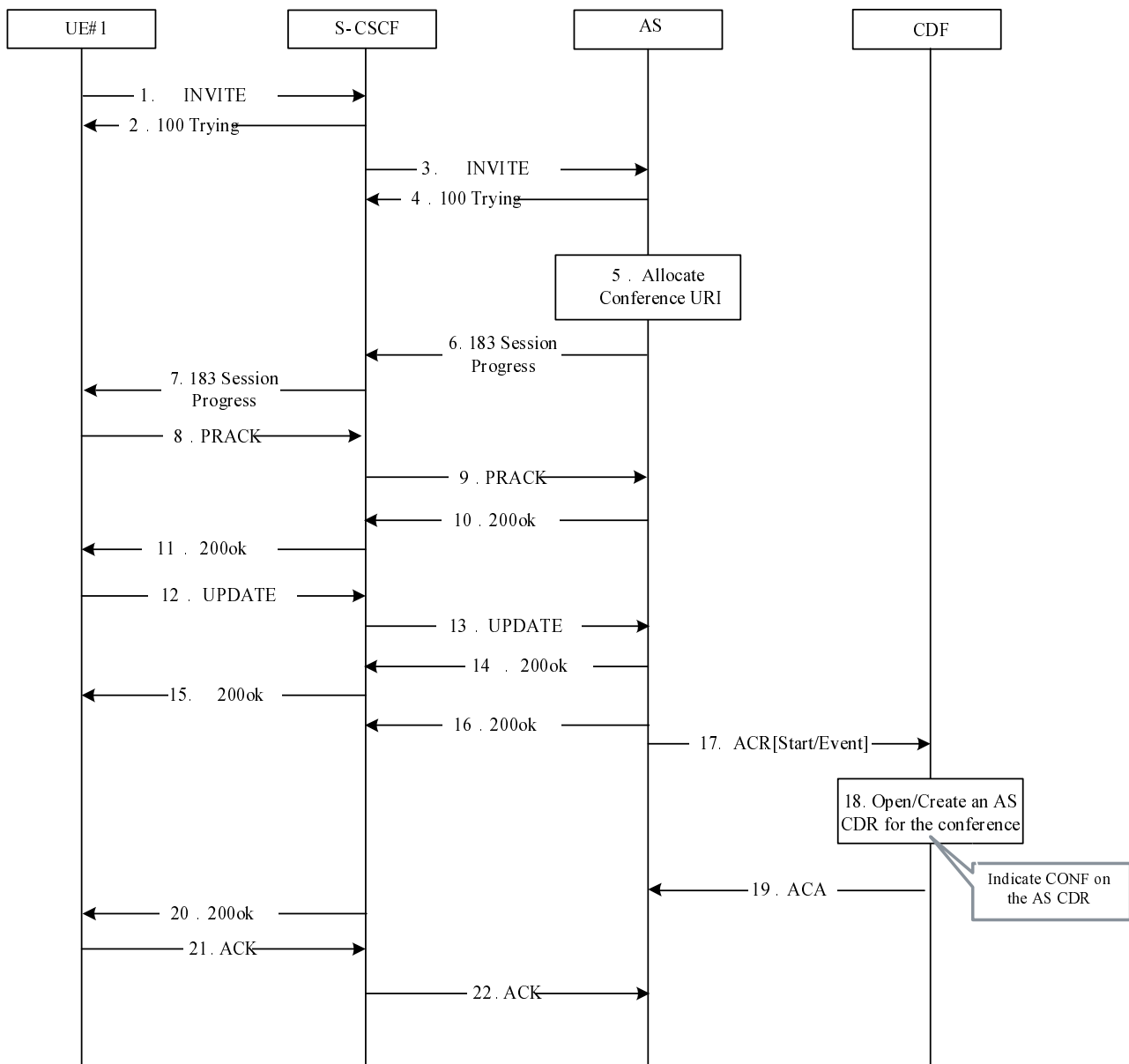


Figure 5.2.2.1.11.1-1 : Message Sequence Chart for Offline charging of CONF service- User creating a conference

1-2). The communication is initiated by UE#1 by sending an INVITE request to S-CSCF. And S-CSCF sends back 100 Trying reponse to inform UE#1 to wait for a while because the request is being treated.

3-4). S-CSCF transfers INVITE request from UE#1 to CONF AS and the CONF AS sends back 100 Trying response to inform S-CSCF to wait for a while because the request is being treated.

5). The CONF AS allocates the conference URI.

6-16). After the media resource negotiation process, the CONF AS sends back 200 ok response.

17-19). The CONF AS sends Accounting Request[Start]/Accounting Request[Event] to CDF, then the CDF opens/creates an AS CDR for the conference with CONF indication on the AS CDR and returns Accounting Answer to the CONF AS.

5.2.2.1.11.2 CONF Charging – user joining a conference

The following figure shows the Diameter transactions that are required between Application Server, which implements the CONF service and CDF corresponding to the conference scenario: user joining a conference.

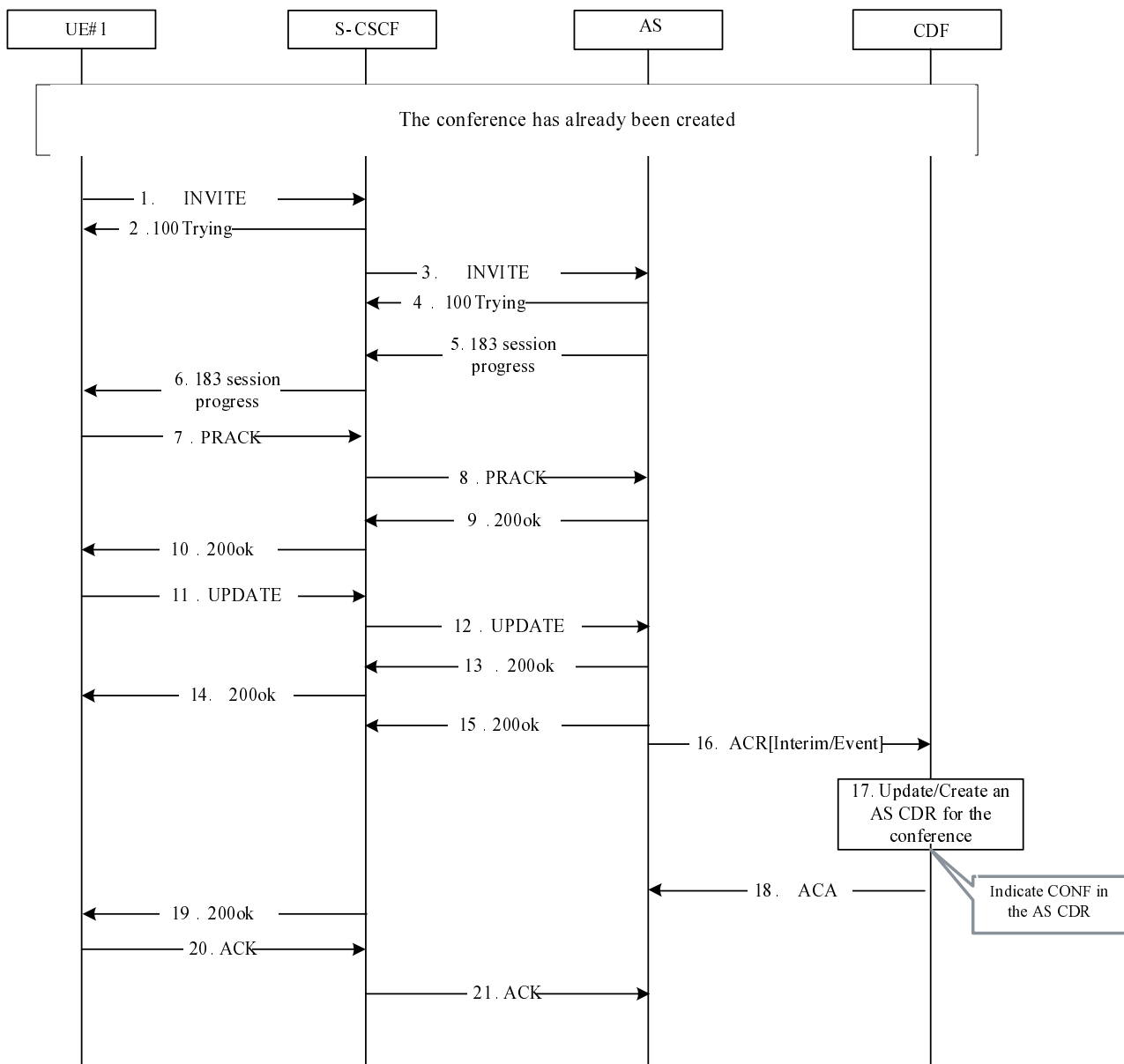


Figure: 5.2.2.1.11.2-1 CONF Charging – user joining a conference

1-2). The conference has already been created. UE#1 sends an INVITE request to S-CSCF in order to join in the conference. And S-CSCF sends back SIP 100 Trying response to inform UE#1 to wait for a while because the request is being treated.

3-4). S-CSCF transfers INVITE request from UE#1 to CONF AS and the CONF AS sends back SIP 100 Trying response to inform S-CSCF to wait for a while because the request is being treated.

5-15). After the media resource negotiation process, the CONF AS sends back SIP 200 ok response.

16-18). The CONF AS sends Accounting Request[Interim/Event] to CDF, CDF updates or creates an AS CDR for the conference and returns Accounting Answer to the CONF AS.

5.2.2.1.11.3 CONF Charging – user inviting another user to a conference

The following figure shows the Diameter transactions that are required between Application Server, which implements the CONF service and CDF corresponding to the conference scenario: user being invited into a conference.

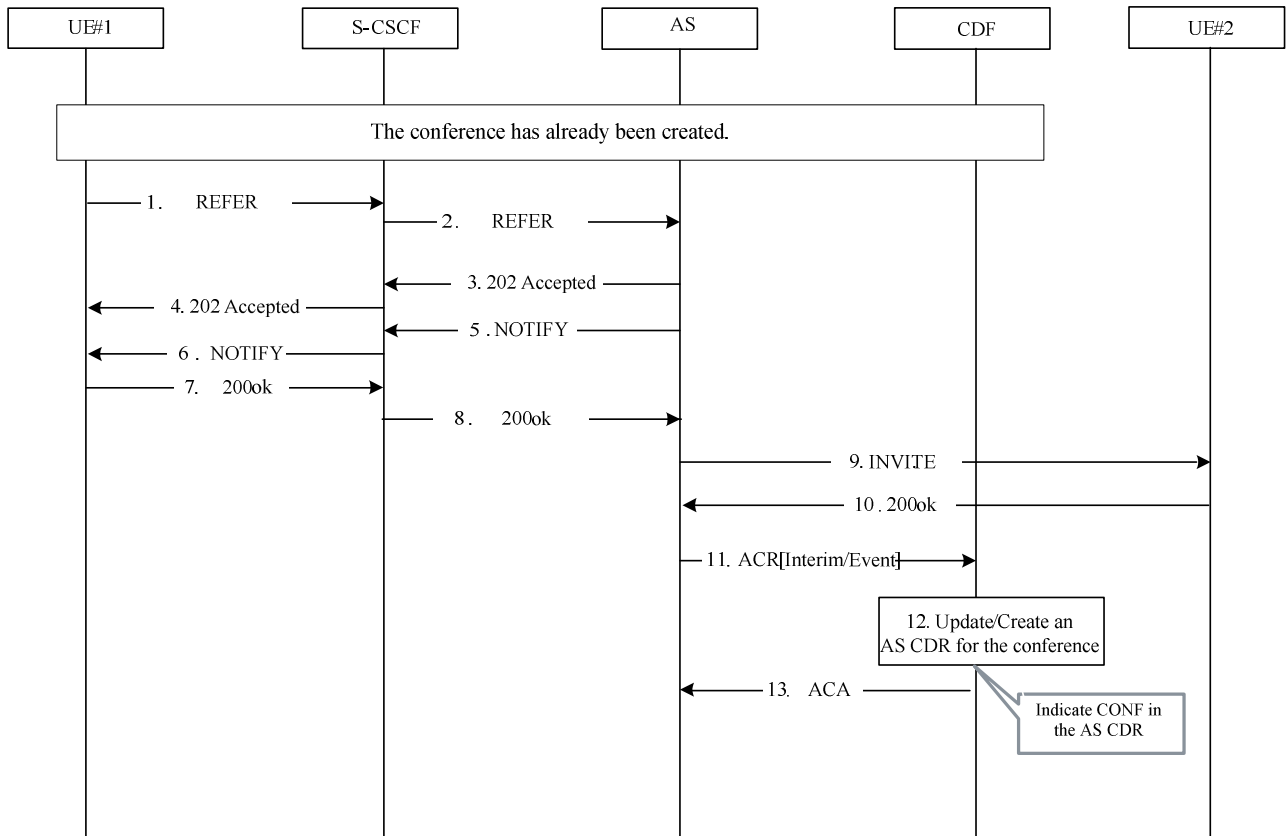


Figure: 5.2.2.1.11.3-1 CONF Charging – user inviting another user to a conference

1-2). The conference has already been created. UE#1 sends a REFER request to S-CSCF in order to invite UE#2 into the conference.

3-4). The CONF AS sends back 202 Accepted response to UE#1 via some related NEs like S-CSCF to indicate that he has received the REFER request successfully.

5-6). The CONF AS sends a NOTIFY request corresponding to the REFER request to UE#1.

7-8). UE#1 sends back SIP 200 ok reponse to the CONF AS.

9-10). The CONF AS sends an INVITE request to UE#2 in order to invite him into the conference. And UE#2 sends back SIP 200 ok response to the CONF AS.

11-13) The CONF AS sends Accounting Request [Interim/Event] to CDF, CDF updates or creates an AS CDR for the conference and returns Accounting Answer to the CONF AS.

5.2.2.1.11.4 CONF Charging – user leaving a conference

The following figure shows the Diameter transactions that are required between Application Server, which implements the CONF service and CDF corresponding to the conference scenario: user leaving a conference.

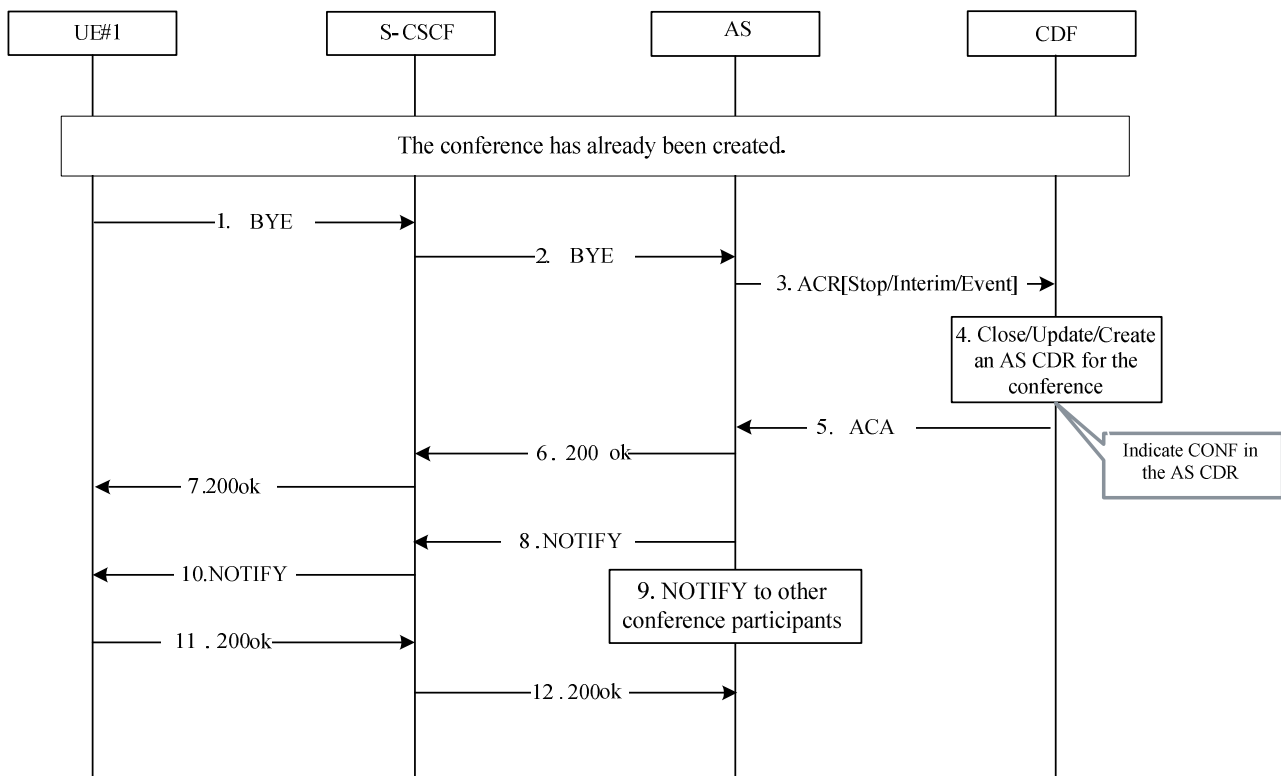


Figure: 5.2.2.1.11.4-1 CONF Charging – user leaving a conference

1-2). The conference has already been created. UE#1 sends a BYE request to the CONF AS in order to quit the conference.

3-5). The CONF AS sends Accounting Request[Interim/Event] to CDF, CDF updates or creates an AS CDR for the conference and returns Accounting Answer to the CONF AS. Conference termination should refer to the description of subclause 5.3.2.7 in TS 24.147, e.g. If there isn't any conference policy and the last online conference user quits the conference could be considered as the conference termination, when the last online conference user quits the conference (sends a BYE request to the CONF AS), the CONF AS sends Accounting Request [Stop/Event] to CDF, CDF stops or creates an AS CDR for the conference and returns Accounting Answer to the CONF AS.

6-7). The CONF AS sends back SIP 200 ok response to UE#1.

8-10). The CONF AS sends a NOTIFY request to other conference participants that UE#1 has quitted the conference.

11-12). Other conference participants sends back SIP 200 ok response to the CONF AS.

5.2.3 GTP" record transfer flows

As in IMS offline charging, GTP" is not used between CDF and CGF for MMTel offline charging, because CDF and CGF are combined into CCF.

5.2.4 B₁ CDR file transfer

For further details on the B₁ protocol application refer to 3GPP TS 32.297 [52].

5.3 MMTel online charging scenarios

Editor's Note : MMTel online charging is ffs

5.3.1 Basic principles

Online charging of MMTel services is done according to the general principles of Diameter Credit-Control Applications (DCCA) as specified in TS 32.299 [50].

Editor's note: The generated online charging messages contain distinguishable service usage data for any of the sub-services.

5.3.2 Diameter message flows

Following message flows are defined in TS 32.260 [20], and can be re-used for charging the basic multimedia telephony capabilities:

- Successful Session Establishment
- Successful Session Establishment with Early Media Negotiation
- Mid-Session Procedures
- Session Release

6 Definition of charging information

6.1 Data description for MMTel offline charging

6.1.1 Rf Diameter message contents

For offline charging, the different service CTFs supporting MMTel specific service charging generate accounting information transferred to the CDF using the Diameter accounting application, as described in the TS 32.299 [50].

The *Charging Data Request* and *Charging Data Response* are used for this MMTel service offline charging, as described in TS 32.260 [20].

6.1.1.1 Charging Data-Request Message Description

The generic *Charging Data-Request* message described in TS 32.260[20] used for MMTel offline charging is enhanced with specific MMTel service information.

The following table illustrates the overall *Charging Data-Request* message as used for MMTel offline charging.

Table 6.1.1.1 : Charging Data Request Message Contents

Field	Category	Description
See <i>Charging Data-Request</i> message fields described in TS 32.260 [20]		
Service Information	O _M	This field holds the MMTel specific parameter and is described in clause 6.3.

NOTE: Detailed descriptions of the fields are provided in 3GPP TS 32.299 [50].

6.1.1.2 Charging Data Response Message Description

The generic *Charging Data-Response* message described in TS 32.260[20] is used for MMTel offline charging.

6.1.2 GTP" message contents

Not applicable. Refer to subclause 5.2.3 for further information.

6.1.3 CDR Description on the Bi Interface

6.1.3.1 CDR Field Type

The MMTel CDR content and format description is based on TS 32.260[20] AS-CDR description, enhanced with specific MMTel service information.

The content of MMTel CDR type is defined in the table in clause 6.1.3.3. The field definition includes the field name, category and description. The detailed field descriptions are provided in TS 32.298 [51].

The CDF provides the CDRs at the Bi interface in the format and encoding described in TS 32.298 [51]. Additional CDR formats and contents may be available at the interface to the billing system to meet the requirements of the billing system, these are outside of the scope of 3GPP standardisation.

6.1.3.2 CDR Triggers

Accounting information for MMTel services charging is transferred from the CTFs supporting MMTel service charging to the CDF, using Charging Data Request Start, Interim Stop or Event messages, depending on MMTel service behaviour (detailed in clause 5.2.2). Within the CDF, the CDRs triggering follows the same principle as described for SIP sessions in TS 32.260[20] : MMTel CDR is opened upon reception of a Charging Data Request [Start] message, closed upon reception of a Charging Data Request [Stop] message, updated upon reception of a Charging Data Request [Interim], and created upon reception of a Charging Data Request [Event].

6.1.3.3 MMTel-AS CDR Content

The MMTel CDR content and format description is based on TS 32.260[20] AS-CDR description, enhanced with specific MMTel service informations.

The following table illustrating the overall MMTel CDR content, is extracted from TS 32.260[20] AS-CDR Charging data table, and adapted for MMTel service, with specific descriptions and new MMTel information field.

The detailed description of the field is provided in TS 32.298 [51].

Table 6.1.3.3: Charging Data of MMTel CDR

Field	Category	Description
Record Type	M	Identifies the MMTel service record.
Retransmission	O _C	Used as defined in 3GPP TS 32.260 [20].
SIP Method	O _C	Used as defined in 3GPP TS 32.260 [20].
Event	O _C	Used as defined in 3GPP TS 32.260 [20].
Expires Information	O _C	Used as defined in 3GPP TS 32.260 [20].
Role of Node	O _M	This fields indicates the role of the AS implementing MMTel service and supplementary services
Node Address	O _M	Used as defined in 3GPP TS 32.260 [20].
Session ID	O _M	Used as defined in 3GPP TS 32.260 [20].
List Of Calling Party Address	O _M	Used as defined in 3GPP TS 32.260 [20].
Called Party Address	O _M	Used as defined in 3GPP TS 32.260 [20].
Number Portability routing information	O _C	Used as defined in 3GPP TS 32.260 [20].
Carrier Select routing information	O _C	Used as defined in 3GPP TS 32.260 [20].
Requested Party Address	O _C	Used as defined in 3GPP TS 32.260 [20].
List of Subscription Id	O _M	Used as defined in 3GPP TS 32.260 [20].
List of Called Asserted Identity	O _C	Used as defined in 3GPP TS 32.260 [20].
Service Request Time Stamp	O _M	Used as defined in 3GPP TS 32.260 [20].
Service Delivery Start Time Stamp	O _M	Used as defined in 3GPP TS 32.260 [20].
Service Delivery End Time Stamp	O _C	Used as defined in 3GPP TS 32.260 [20].
Record Opening Time	O _C	Used as defined in 3GPP TS 32.260 [20].
Record Closure Time	O _M	Used as defined in 3GPP TS 32.260 [20].
Inter Operator Identifiers	O _C	Used as defined in 3GPP TS 32.260 [20].
Local Record Sequence Number	O _M	Used as defined in 3GPP TS 32.260 [20].
Record Sequence Number	O _C	Used as defined in 3GPP TS 32.260 [20].
Cause For Record Closing	O _M	Used as defined in 3GPP TS 32.260 [20].
Incomplete CDR Indication	O _C	Used as defined in 3GPP TS 32.260 [20].
IMS Charging Identifier	O _M	Used as defined in 3GPP TS 32.260 [20].
List of SDP Media Components	O _C	Used as defined in 3GPP TS 32.260 [20].
GGSN Address	O _C	Used as defined in 3GPP TS 32.260 [20].
Service Reason Return Code	O _M	Used as defined in 3GPP TS 32.260 [20].
List of Message Bodies	O _C	Used as defined in 3GPP TS 32.260 [20].
Access Network Information	O _C	Used as defined in 3GPP TS 32.260 [20].
Service Context Id	O _M	Used as defined in 3GPP TS 32.260 [20].
IMS Communication Service ID	O _C	Used as defined in 3GPP TS 32.260 [20].
MMTel information	O _C	This field includes a list of MMTel supplementary services which may occur within the same AS. The MMTel supplementary services related informations are described in Clause 6.3.1.2.
Record Extensions	O _C	Used as defined in 3GPP TS 32.260 [20].

6.2 Data description for MMTel online charging

Editor's Note : MMTel online charging is ffs.

6.2.1 Diameter message contents

6.3 MMTel Charging Specific Parameters

6.3.1 Definition of MMTel charging information

The MMTel Information parameter used for MMTel charging is provided in the Service Information parameter.

6.3.1.1 MMTel charging information assignment for Service Information

The components in the Service Information that are use for MMTel charging can be found in Table 6.3.1.1.

Table 6.3.1.1: Service Information used for MMTel Charging

Field	Category	Description
Service Information	O _M	A set of fields hold the 3GPP specific parameter as defined in 3GPP TS 32.299 [50].
Subscription Id	O _M	Used as defined in 3GPP TS 32.260 [20].
IMS Information	O _C	A set of fields hold the IMS specific parameters. The details are defined in 3GPP TS 32.260 [20].
Event Type	O _C	Used as defined in 3GPP TS 32.260 [20].
Role of Node	O _C	Used as defined in 3GPP TS 32.260 [20].
Node Functionality	O _M	Used as defined in 3GPP TS 32.260 [20].
User Session ID	O _C	Used as defined in 3GPP TS 32.260 [20].
Calling Party Address	O _C	Used as defined in 3GPP TS 32.260 [20].
Called Party Address	O _C	Used as defined in 3GPP TS 32.260 [20].
Number Portability routing information	O _C	Used as defined in 3GPP TS 32.260 [20].
Carrier Select routing information	O _C	Used as defined in 3GPP TS 32.260 [20].
Requested Party Address	O _C	Used as defined in 3GPP TS 32.260 [20].
Called Asserted Identity	O _C	Used as defined in 3GPP TS 32.260 [20].
Time stamp	O _C	Used as defined in 3GPP TS 32.260 [20].
Inter Operator Identifier	O _C	Used as defined in 3GPP TS 32.260 [20].
IMS Charging Identifier	O _C	Used as defined in 3GPP TS 32.260 [20].
Early Media Description	O _C	Used as defined in 3GPP TS 32.260 [20].
SDP Session Description	O _C	Used as defined in 3GPP TS 32.260 [20].
SDP Media Components	O _C	Used as defined in 3GPP TS 32.260 [20].
Message Bodies	O _C	Used as defined in 3GPP TS 32.260 [20].
Access Network Information	O _C	Used as defined in 3GPP TS 32.260 [20].
IMS Communication Service Id	O _C	Used as defined in 3GPP TS 32.260 [20].
Cause Code	O _C	Used as defined in 3GPP TS 32.260 [20].
MMTel Information	O _M	This field holds a set of MMTel services with theirs specific parameters. The details are defined in clause 6.3.1.2.

Editor's Note : content described in this table is to be further finalized

6.3.1.2 Definition of the MMTel Information

MMTel specific charging information is provided within the MMTel Information, and the detailed structure of the MMTel Information can be found in table 6.3.1.2.

Table 6.3.1.2: Structure of the MMTel Information

Field	Category	Description
Supplementary Service	O _M	This is a grouped field comprising several sub-fields associated with one supplementary service. It can be present multiple times as necessary to present the parallel activity of the different supplementary services.
Service Type	O _M	This field holds the type of the Supplementary Service, i.e. OIP, OIR, TIP, TIR, CW, HOLD, CB, MWI, CONF, CDIV, ECT.
Service Mode	O _C	This field holds the mode of specific Service Type, i.e. for CB: ACR, ICB, OCB and for CDIV: CFU, CFB, CFNR, CFNRc, CFNL, CFUDB.
Number of diversions	O _C	This field holds the number of diversions for CDIV.
Associated party address	O _C	This field holds additional party identification needed for the service charging, i.e. for CDIV the 'forwarding party', for ECT the 'transferor',
Service id	O _C	This field holds the conference ID for CONF supplementary service
Change Time	O _C	This field holds the time of the requested action indicated in the 'Participant Action Type' during the CONF supplementary service. It provides the time stamps for the CONF supplementary service parameters reporting. When the action is set to 'CREATE', this field indicates the start time of the CONF supplementary service. When the action is set to 'QUIT' and Number Of Participants holds the value '0', this field indicates the end time of the CONF supplementary service.
Number Of Participants	O _C	This field holds the number of parties who are currently attached to the Conference at the time stamped indicated in the 'Change Time', for the CONF supplementary service.
Participant Action Type	O _C	This field holds the participant action type for CONF supplementary service (CREATE_CONF, JOIN_CONF, INVITE_CONF, QUIT_CONF) at the time stamped indicated in the 'Change Time'.
Subscriber role	O _M	This field indicates subscriber role (originating party or terminating party) for UE when AS acts as B2BUA role and used for AS only

Editor's Note : content and structure (Service Type and Service Mode) described in this table is to be further finalized

Support of MMTel Information in MMTel Offline Charging

In table 6.3.1.3 the basic structure of the supported fields within the MMTel Information on the Rf interface are presented. The Charging Data Request messages by different nodes are: S (start)/I (interim)/S (stop)/E (event). When all Operation Types are possible it is marked as SISE. If only some Operation Types are allowed for a node, only the appropriate letters are used (i.e. SIS or E). The omission of an Operation Type for a particular field is marked with "-" (i.e. SI-E).

Table 6.3.1.3: Supported values in Charging Data Request Message MMTel Information.

Field	
Node Type	AS
Supported Operation Types	S/I/S/E
Service Type	
OIP (see note 1)	S--E
OIR	S--E
TIR	S--E
TIR (see note 2)	S--E
CW	SI-E
HOLD (see note 3)	SI-E
CB (see note 2)	---E
MWI	---E
CONF	SISE
CDIV	S-SE
CDIVN	---E
ECT	S-SE
NOTE 1: Only present at terminating side. NOTE 2: Terminating side service. NOTE 3: AS may be involved for announcement purposes.	

Editor's note: The correct use indication at AS is ffs.

6.3.1.4 Support of MMTel Information in MMTel Online Charging

In table 6.3.1.4 the basic structure of the supported fields within the MMTel Information in the Debit and Reserve Units Request for IMS online charging on the Ro interface are presented. The Operation types are listed in the following order: I (initial)/U (update)/T (terminate)/E (event). Therefore, when all Operation types are possible it is marked as IUTE. If only some Operation types are allowed for a node, only the appropriate letters are used (i.e. IUT or E) as indicated in the table heading. The omission of an Operation type for a particular field is marked with "-" (i.e. IU-E). Also, when an entire field is not allowed in a node the entire cell is marked as "-".

Table 6.3.1.4: Supported values in Debit and Reserve Units Request Message MMTel Information

Field	
Node Type	AS
Supported Operation Types	I/U/T/E
Service Type	
OIP (see note 1)	-
OIR (see note 1)	-
TIP (see note 1)	-
TIR (see note 1)	-
CW (see note 1)	-
HOLD (see note 1)	-
CB (see note 1)	-
MWI (see note 1)	-
CONF	IUTE
CDIV	I--T-
CDIVN	---E
ECT	I--T-
NOTE 1: Only reported in offline charging.	

Editor's note: The correct use indication at AS is ffs.

Annex A (informative): Bibliography

a) **The 3GPP charging specifications**

- 3GPP TS 32.250: "Telecommunication management; Charging management; Circuit Switched (CS) domain charging".
- 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".
- 3GPP TS 32.252: "Telecommunication management; Charging management; Wireless Local Area Network (WLAN) charging".
- 3GPP TS 32.271: "Telecommunication management; Charging management; Location Services (LCS) charging".
- 3GPP TS 32.272: "Telecommunication management; Charging management; Push-to-talk over Cellular (PoC) charging".
- 3GPP TS 32.273: "Telecommunication management; Charging management; Multimedia Broadcast and Multicast Service (MBMS) charging".
- 3GPP TS 32.274: "Telecommunication management; Charging management; Short Message Service (SMS) charging".

b) **Common 3GPP specifications**

- 3GPP TS 23.002: "Network architecture".

c) **other Domain and Service specific 3GPP / ETSI specifications**

- 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network
- 3GPP TS 22.003: "Circuit Teleservices Supported by a Public Land Mobile Network (PLMN)".
- 3GPP TS 22.004: "General on Supplementary Services".
- 3GPP TS 23.009: "Handover procedures"
- 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- 3GPP TS 23.140: "Multimedia Messaging Service (MMS); Functional description; Stage 2".
- 3GPP TS 23.271: "Location Services (LCS); Functional description; Stage 2".

d) **Relevant ITU Recommendations**

- ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- ITU-T Recommendation Q.767: "Application of the ISDN user part of CCITT signalling System No.7 for international ISDN interconnections".
- ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".
- ITU-T Recommendation X.121: "International numbering plan for public data networks".

e) **Relevant IETF RFCs**

- IETF RFC 959 (1985): "File Transfer Protocol".
- IETF RFC1350: "The TFTP Protocol (Revision 2)".

Annex B (informative): Change history

Change history								
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Cat	Old	New
Sep 2008	--	--	--	--	Presentation to SA Plenary		0.2.0	1.0.0
Mar 2009	SA-43	SP-090058	--	--	Presentation to SA for approval		2.0.0	8.0.0
Jun 2009	SA-44	SP-090432	--	005	Correction of offline charging message flow of Communications Diversion (CDIV) service	F	8.0.0	8.1.0
Jun 2009	SA-44	SP-090432	--	007	Correction of offline charging message flow of Explicit Communication Transfer (ECT) service	F	8.0.0	8.1.0
Jun 2009	SA-44	SP-090432	--	012	Clarification on MMTel charging architecture	F	8.0.0	8.1.0

History

Document history		
V8.0.0	April 2009	Publication
V8.1.0	July 2009	Publication