

Source: SA5 (Telecom Management)
Title: 11 Rel-5 CRs 32.225 Charging data description for the IP Multimedia Subsystem (IMS)
Document for: Approval
Agenda Item: 7.5.3

Doc-1st-Level	Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Doc-2nd-Level	Workitem
SP-030057	32.225	008	-	Rel-5	Removal of Re-Transmission Attribute Value Pair (AVP) in order to align duplicate detection procedure with the Diameter Base protocol	F	5.1.0	S5-034175	OAM-CH
SP-030057	32.225	004	-	Rel-5	Alignment of Immediate Event Charging (IEC) description with the latest draft IEFT Credit-Control specification	F	5.1.0	S5-034040	OAM-CH
SP-030057	32.225	005	-	Rel-5	Correction of the IMS Charging Identifier (ICID) definition	F	5.1.0	S5-034124	OAM-CH
SP-030057	32.225	007	-	Rel-5	Inclusion of IETF draft 'Hakala-diameter-credit-control' specification version 05	F	5.1.0	S5-034174	OAM-CH
SP-030057	32.225	009	-	Rel-5	Correction of the accounting session supervision (Offline) - alignment with the Diameter Base protocol	F	5.1.0	S5-034177	OAM-CH
SP-030057	32.225	010	-	Rel-5	Correction of the accounting session supervision (Online) - alignment with the Diameter Base protocol	F	5.1.0	S5-034178	OAM-CH
SP-030057	32.225	011	-	Rel-5	Correction of the support of local file storage and use of FTP for transfer of Accounting Information	F	5.1.0	S5-034179	OAM-CH
SP-030057	32.225	012	-	Rel-5	Correction of abnormal session termination procedure	F	5.1.0	S5-034180	OAM-CH
SP-030057	32.225	013	-	Rel-5	Correction of network initiated session release procedure - alignment with SIP (IETF RFC 3261)	F	5.1.0	S5-034181	OAM-CH
SP-030057	32.225	014	-	Rel-5	Correction of media modification procedures - add the UPDATE SIP method	F	5.1.0	S5-034182	OAM-CH
SP-030057	32.225	006	-	Rel-5	Correction of IMS-CDR definitions	F	5.1.0	S5-034165	OAM-CH

CR-Form-v7

CHANGE REQUEST

⌘ **32.225 CR 004** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Alignment of Immediate Event Charging (IEC) description with the latest draft IEFT Credit-Control specification	
Source:	⌘	S5	
Work item code:	⌘	OAM-CH	Date: ⌘ 28/02/2003
Category:	⌘	F	Release: ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	The IEC description with the debit units operation isn't aligned with the latest draft IEFT Credit-Control specification.
Summary of change:	⌘	The message flow for IEC in figure 6.1 is updated and the corresponding descriptions are modified. Accordingly to the introduced T-flag in the Diameter Base Protocol (version 16) the Debit Units Operation Failure procedure is adapted.
Consequences if not approved:	⌘	The missing components of the message flow for IEC cause errors in the Debit Units Operation.

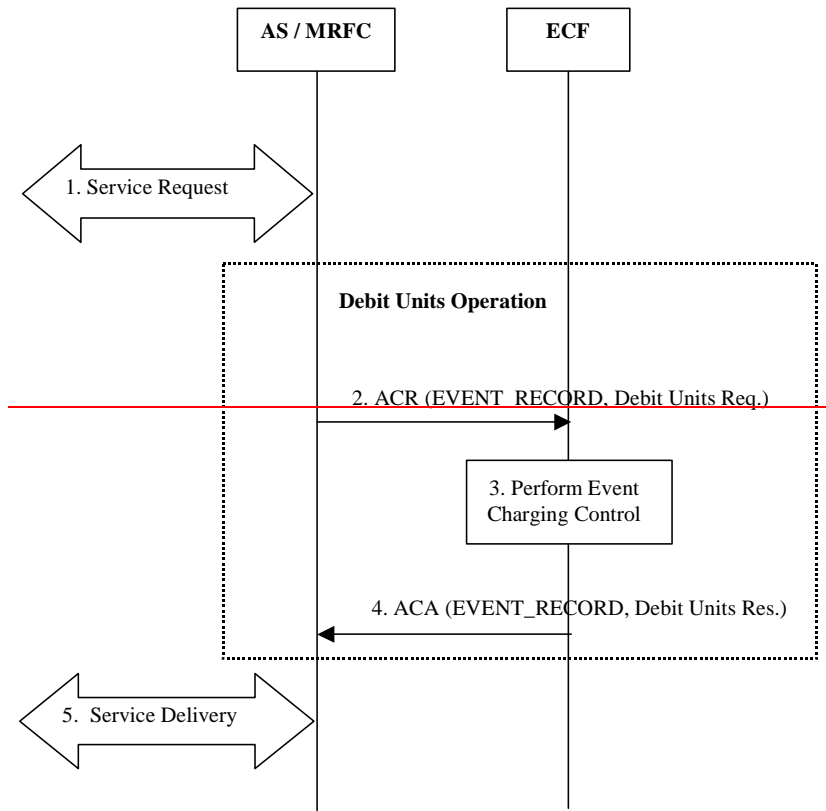
Clauses affected:	⌘	6.1.2.1.1.1, 6.1.2.1.2.2										
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table>	Y	N		X		X		X	Other core specifications	⌘
		Y	N									
			X									
			X									
	X											
		Test specifications										
		O&M Specifications										
Other comments:	⌘											

How to create CRs using this form:

Change in Clause 6.1.2.1.1

6.1.2.1.1.1 IEC - Debit Units Operation

Figure 6.1 shows the transactions that are required on the Ro interface in order to perform IEC with Debit Units operations. The Debit Units operation may alternatively be carried out prior to, concurrently with or after service/content delivery. The AS/MRFC must ensure that the requested service execution is successful, when this scenario is used.



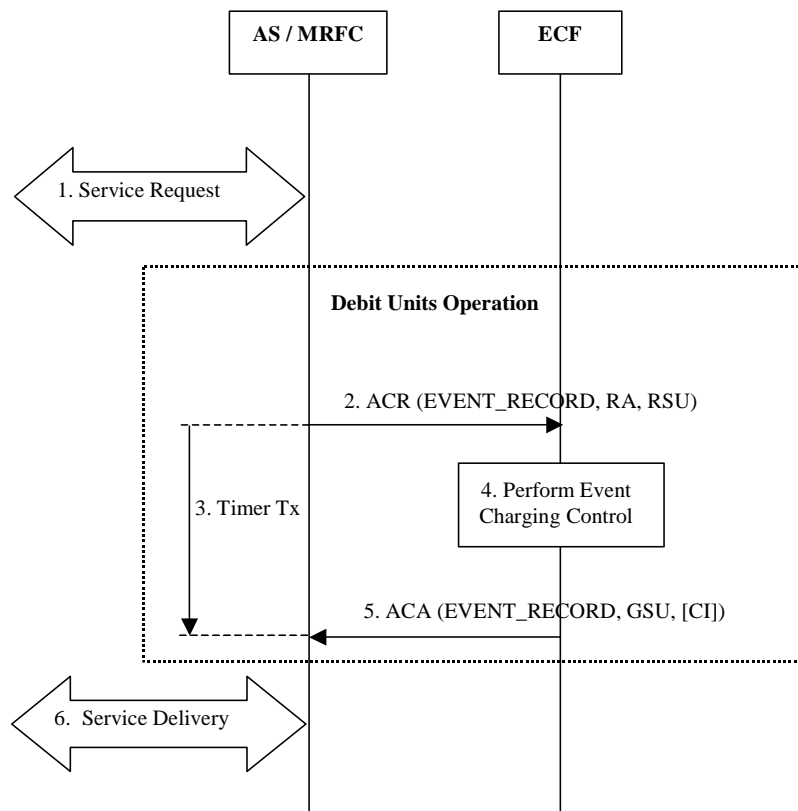


Figure 6.1: IEC - Debit Units Operation

1. The AS/MRFC receives a SIP related service request from S-CSCF.
The Debit Units Operation is performed as described in TS 32.200 [2].
2. The AS/MRFC performs IEC prior to service execution. AS/MRFC sends *Accounting-Request (ACR)* with *Accounting-Record-Type AVP* set to EVENT_RECORD to indicate service specific information to the ECF. The *Requested-Action AVP (RA)* is set to DIRECT_DEBITING. If known, the AS/MRFC may include *Requested-Service-Unit AVP (RSU)* (monetary or non monetary units) in the request message.
3. Having transmitted the *Accounting-Request* message the AS/MRFC starts the communication supervision timer Tx [13]. Upon receipt of the *Accounting Answer (ACA)* message ~~within of timer Tx~~ the AS/MRFC shall stop timer Tx.
4. ~~If the service cost information is not received by the ECF, the ECF determines the price of the service according to the service specific information received by issuing a rating request to the Rating Function.~~ The ECF determines the relevant service charging parameters in conjunction with the other internal charging functions of the OCS, then deducts the corresponding monetary amount. ~~If the cost of the service is included in the request received from the AS/MRFC, the ECF directly deducts the specified monetary amount from the user's account.~~
45. The ECF returns *Accounting-Answer* message with *Accounting-Record-Type AVP* set to EVENT_RECORD to the AS/MRFC in order to authorize the service execution (*Granted-Service-Unit AVP (GSU)* and possibly *Cost-Information AVP (CI)* indicating the cost of the service are included in the *Accounting-Answer* message). The *Accounting-Answer* message has to be checked by the AS/MRFC accordingly and the requested service is controlled concurrently with service delivery.
56. Service is being delivered.

End of Change in Clause 6.1.2.1.1

Change in Clause 6.1.2.1.2.2

6.1.2.1.2.2 Debit Units Operation Failure

This case comprises situations where either no, or an erroneous response, is received of ECF connection failure and/or receiving error responses from the ECF. The “no response” case is detected by the AS/MRFC when the connection supervision timer Tx expires [13] before a response Accounting-Answer (ACA) is received. The case of receiving an erroneous response implies that the AS/MRFC receives a Accounting-Answer (ACA), which it is unable to process, while Tx is running. The failure handling complies with the failure procedures for "Direct Debiting" scenario described in [13].

~~The AS/MRFC detects an ECF connection failure when the connection supervision timer Tx expires [13] or a transport failure is detected as defined in [3]. The ECF should indicate the cause of failure by setting the appropriate result code in the Result-Code AVP as defined in [3] and [13]. In any case, the failure handling of AS/MRFC and ECF complies with the failure procedures for "Direct Debiting" scenario described in "draft hakala-diameter-credit-control-03", [13].~~

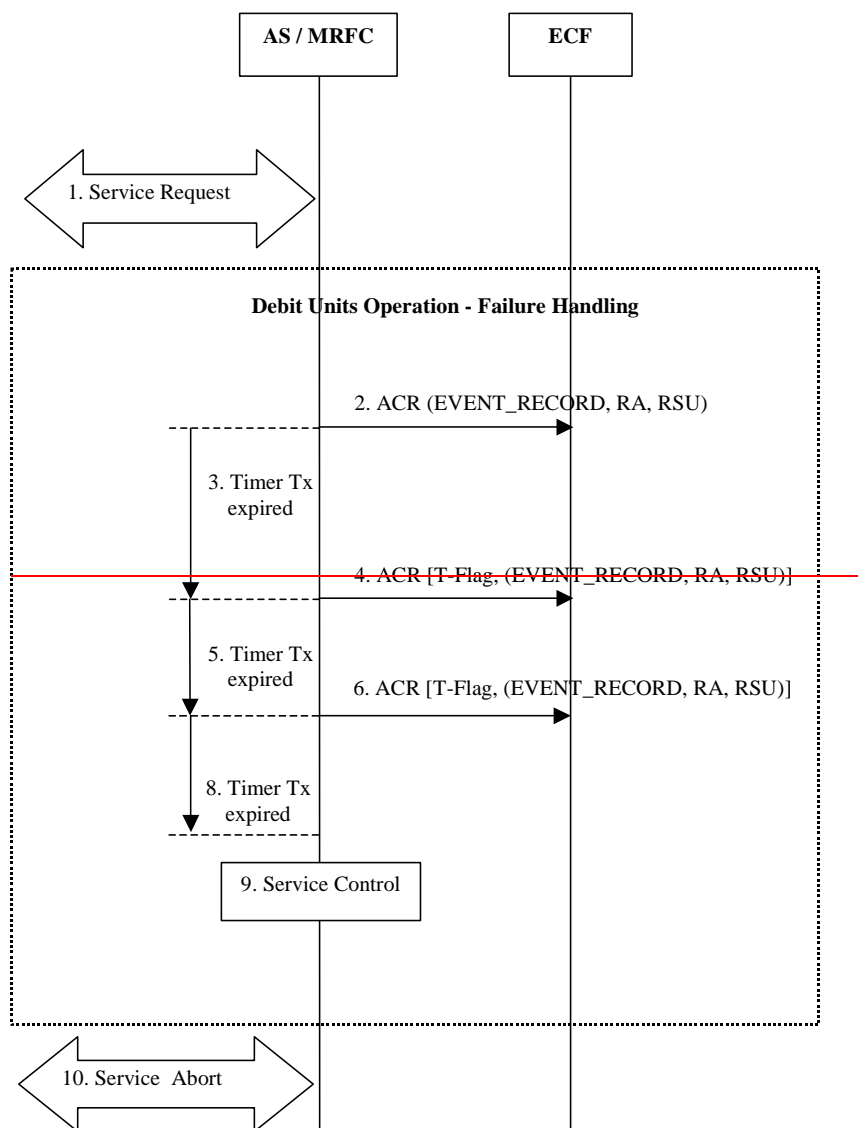


Figure 6.x: IEC – Debit Units Operation Failure

~~1. The AS/MRFC receives a SIP-related service request from S-CSCF.~~

~~The Debit Units Operation is performed as described in TS 32.200 [2].~~

~~2. The AS/MRFC performs IEC prior to service execution. AS/MRFC sends Accounting Request (ACR) with Accounting Record Type AVP set to EVENT_RECORD to indicate service specific information to the ECF. The Requested Action AVP (RA) is set to DIRECT_DEBITING. If known, the AS/MRFC may include Requested Service Unit AVP (RSU) (monetary or non monetary units) in the request message.~~

~~Due to a transport failure the communication supervision timer Tx expires. At this time the AS/MRFC must be assumed that the units have not been debited from the user's account.~~

~~It is assumed that the default value (TERMINATE_OR_BUFFER) of the Direct Debiting Fault Handling (DDFH) AVP is used. As a result of this information the AS/MRFC should grant the service. The requested service is controlled concurrently with service delivery.~~

~~Once the timer Tx is expired and the number of re-transmission attempts (e.g. 2) are not exhaustive the AS/MRFC sets the T-flag in the diameter header accordingly re-sends the stored ACR and re-starts the timer Tx.~~

~~Due to a continual transport failure the communication supervision timer Tx expires again.~~

~~If the number of re-transmission attempts are not exhaustive the AS/MRFC sets the T-flag in the diameter header and re-sends the stored ACR again.~~

~~Timer Tx expires.~~

~~Service Control is performed. As a result the transport connection is regarded failed and the number of re-transmission attempts are exhaustive.~~

~~If possible and configured by the operators, the rendered service is stopped.~~

End of Change in Clause 6.1.2.1.2.2

End of Document

CHANGE REQUEST

⌘ **32.225 CR 005** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Correction of the IMS Charging Identifier (ICID) definition		
Source:	⌘ S5		
Work item code:	⌘ OAM-CH	Date:	⌘ 28/02/2003
Category:	⌘ F	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ The current ICID structure and coding is not aligned with general IMS and SIP principles: 1. The presence of network node component (e.g. IP-address) in ICID is in conflict with the principle of network topology hiding 2. The usage of a binary coded parameter can cause converting problems
Summary of change:	⌘ 1. The IP-address is not a mandatory part of the ICID 2. The ICID coding is changed from binary to ASCII based (UTF-8)
Consequences if not approved:	⌘ Misalignment with general IMS and SIP principles for the ICID structure, resulting in potential converting problems.

Clauses affected:	⌘ 5.2.4.10										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X		
Y	N										
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Other comments:	⌘										

How to create CRs using this form:

Change in Clause 5.2.4.10

5.2.4.10 IMS Charging Identifier (ICID)

This parameter holds the IMS charging identifier (ICID) as generated by the IMS node for the SIP session. ~~There is a 1:1 relationship between the ICID and the session ID.~~ The value of the ICID parameter is identical with the 'icid-value' parameter defined in [15]. ~~The 'icid-value' is a mandatory part of the P-Charging-Vector is part of the charging correlation vector~~ and coded as ~~US-ASCII a text-based UTF-8 charset~~ (as are all SIP messages). ~~The charging correlation vector contains an IMS part (ICID—a unique number plus an IP address) and an access part (GPRS Charging ID and GGSN address).~~ For further information regarding the composition and usage of the ~~charging correlation vector P-Charging-Vector~~ refer to TS 32.200 [2], ~~and~~ TS 24.229 [14] ~~and~~ [15].

The ICID value is globally unique across all 3GPP IMS networks for a time period of at least one month, implying that neither the node that generated this ICID nor any other IMS node reuse this value before the uniqueness period expires. This can be achieved by using node specific information, e.g. high-granularity time information and / or topology / location information. The exact method how to achieve the uniqueness requirement is an implementation issue.

~~The ICID is composed of a 4 octet unique number and the IP address of the network node generating the ICID. This is inserted in the CDRs as shown in figures 5.13 and 5.14 below. Since IPv4 and IPv6 addresses are supported simultaneously, an ICID may either be composed of an IPv4 or IPv6 compliant source address.~~

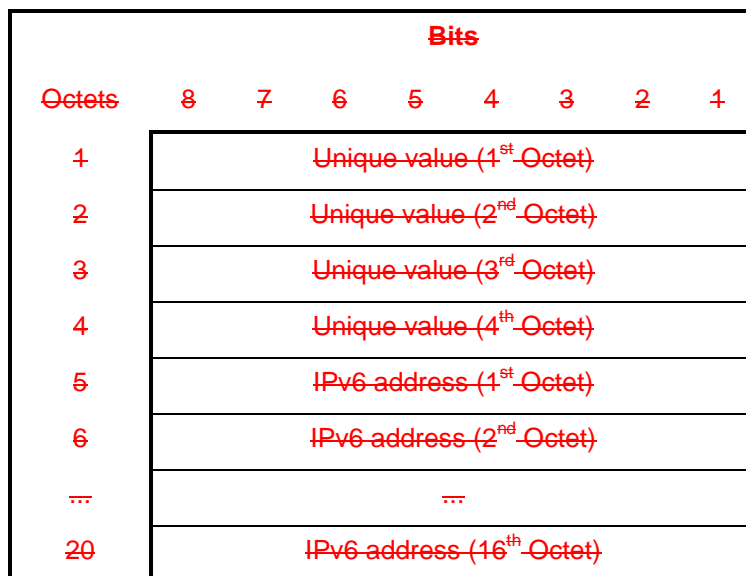


Figure 5.13: ICID layout with IPv6

		Bits							
Octets		8	7	6	5	4	3	2	1
1	Unique-value (1 st -octet)								
2	Unique-value (2 nd -octet)								
3	Unique-value (3 rd -octet)								
4	Unique-value (4 th -octet)								
5	IPv4-address (1 st -Octet)								
6	IPv4-address (2 nd -Octet)								
7	IPv4-address (3 rd -Octet)								
8	IPv4-address (4 th -octet)								

Figure 5.14: ICID layout with IPv4

The Unique Value consists of a 32-bit integer, coded as an unsigned integer. Bit 8 of the lowest numbered octet (5 for IPv4/17 for IPv6) is the most significant bit and bit 1 of the highest numbered octet (8 for IPv4/20 for IPv6) is the least significant bit.

The IP address is encoded using binary coding, where each octet in ICID represents one octet in the IP address. Bit 8 of octet 1 is the most significant bit and bit 1 of the highest numbered octet (4 for IPv4/16 for IPv6) is the least significant bit.

The following example, shown in figure 5.15, describes the content of ICID when the unique value of 15409 (H'3C31) was generated by a node with the IPv6 address of 255.5.0.0.0.0.0.0.0.0.0.0.0.179 (FF05::B3):

		Bits								
Octets		8	7	6	5	4	3	2	1	Meaning
1	0	0	1	1	1	1	0	0		H'3C
2	0	0	1	1	0	0	0	1		H'31
3	1	1	1	1	1	1	1	1		255
4	0	0	0	0	0	1	0	1		5
5-17	0	0	0	0	0	0	0	0		0
18	1	0	1	1	0	0	1	1		179
19	0	0	0	0	0	0	0	0		0
20	0	0	0	0	0	0	0	0		0

Figure 5.15: ICID layout with IPv6

**End of Change in Clause 5.2.4.10
End of Document**

CHANGE REQUEST

⌘ **32.225 CR 006** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Correction of IMS-CDR definitions		
Source:	⌘ S5		
Work item code:	⌘ OAM-CH	Date:	⌘ 28/02/2003
Category:	⌘ F	Release:	⌘ Rel-5
	<i>Use <u>one</u> of the following categories:</i> F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	<i>Use <u>one</u> of the following releases:</i> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)	

Reason for change:	⌘ Description of the CDR content and field specifications for IMS-CDRs is unclear. (The definitions of the ACR AVPs as worked out and agreed during previous SA5 meetings require substantial rework of section 5.2 in order to accommodate the information available on the R _f interface). In addition, ASN.1 definitions are missing.
Summary of change:	⌘ <ul style="list-style-type: none"> • Replace all the CDR tables and correct the definitions of the CDR fields • Update of the description of partial CDR generation for session related CDRs • It is possible to generate partial records or to keep the information for one complete session in one record. • Other CRs which had impact on the CDR definition are included. • Addition of ASN.1 code and CDR content description for all types of IMS-CDRs
Consequences if not approved:	⌘ CDR content and field specifications of IMS CDRs remain incomplete. Billing will not be possible for the operator.

Clauses affected:	⌘ 2, 5.2.1, 5.2.2.1, 5.2.3, 5.2.4, 5.2.6 and 7.2.24						
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
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Y	N						
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Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Other comments:	⌘						

Change in list of References

2 References

...

- [18] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".
- [19] 3GPP TS 29.229: "Cx and Dx Interfaces based on the Diameter protocol; Protocol Details".
- [20] [IETF RFC 2806: "URLs for Telephone Calls"](#).

End of Change to References

Change in Clause 5.2

5.2 CDR Description on the Bi Interface

5.2.1 CDR Field Types

The following Standard CDR content and format are considered:

- S-CSCF-CDR generated based on information from the S-CSCF.
- I-CSCF-CDR generated based on information from the I-CSCF.
- P-CSCF-CDR generated based on information from the P-CSCF.
- BGCF-CDR generated based on information from the BGCF.
- MGCF-CDR generated based on information from the MGCF.
- MRFC-CDR generated based on information from the MRFC.
- AS-CDR generated based on information from the AS.

The content of each CDR type is defined in ~~the tables 5.9~~ that are part of this subclause. For each CDR type the field definition includes the field name, ~~description~~ and category. The field descriptions are provided in clause 5.2.4.

Equipment vendors shall be able to provide all of the fields listed in the CDR content tables in order to claim compliance with the present document. However, since CDR processing and transport consume network resources, operators may opt to eliminate some of the fields that are not essential for their operation. This operator provisionable reduction is specified by the field category.

A field category can have one of two primary values:

- M** This field is **Mandatory** and shall always be present in the CDR.
- C** This field shall be present in the CDR only when certain **Conditions** are met. These **Conditions** are specified as part of the field definition.

Some of these fields are designated as Operator provisionable. Using TMN management functions or specific tools provided by an equipment vendor, operators may choose if they wish to include or omit the field from the CDR. Once omitted, this field is not generated in a CDR. To avoid any potential ambiguity, a CDR generating element **MUST** be able to provide all these fields. Only an operator can choose whether or not these fields should be generated in their system.

Those fields that the operator may configure to be present or absent are further qualified with the "Operator provisionable" subscript as follows:

- M_o** This is a field that, if provisioned by the operator to be present, shall always be included in the CDRs. In other words, an M_o parameter that is provisioned to be present is a mandatory parameter.
- C_o** This is a field that, if provisioned by the operator to be present, shall be included in the CDRs when the required conditions are met. In other words, a C_o parameter that is configured to be present is a conditional parameter.

The CCF provides the CDRs at the Bi interface in the format and encoding described in the present document. 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.

5.2.2 CDR Triggers

5.2.2.1 Session Related CDRs

Reflecting the usage of multimedia sessions IMS CDRs are generated by the CCF on a per session level. In the scope of the present document the term "session" refers always to a SIP session. The coherent media components are reflected inside the session CDRs with a media component container comprising of all the information necessary for the description of a media component.

Accounting information for SIP sessions is transferred from the IMS nodes involved in the session to the CCF using Diameter ACR Start, Interim and Stop messages. A session CDR is opened in the CCF upon reception of a Diameter ACR [Start] message. ~~Session CDRs are updated, or partial~~ Partial CDRs ~~may be generated;~~ upon reception of a Diameter ACR [Interim] message [which is sent by the network entity towards the CCF due to a session modification procedure \(i.e. change in media\). Session CDRs are updated, or partial CDRs are generated upon reception of a diameter ACR \[Interim\] message which is sent by the network entity due to expiration of the Accounting-Interim-Interval AVP.](#) The CCF closes the final session CDR upon reception of a Diameter ACR [Stop] message, which indicates that the SIP session is terminated. Further details on triggers for the generation of IMS CDRs are specified in [2].

Accounting information for unsuccessful session set-up attempts may be sent by the IMS node to the CCF employing the Diameter ACR [Event] message. The behaviour of the CCF upon receiving ACR [Event] messages is specified in subclause 5.2.2.2.

5.2.2.2 Session Unrelated CDRs

To reflect chargeable events not directly related to a session the CCF may generate CDRs upon the occurrence of session unrelated SIP procedures, such as registration respectively de-registration events. Accounting information for SIP session-unrelated procedures is transferred from the IMS nodes involved in the procedure to the CCF using Diameter ACR [Event] messages. Session unrelated CDRs are created in the CCF in a "one-off" action based on the information contained in the Diameter ACR [Event] message. One session unrelated CDR is created in the CCF for each Diameter ACR [Event] message received, whereas the creation of partial CDRs is not applicable for session unrelated CDRs. The cases for which the IMS nodes send ACR [Event] messages are listed per SIP procedure in tables 5.1 and 5.2.

Further details on triggers for the generation of IMS CDRs are specified in [2].

5.2.3 CDR Content

The following table specifies the content of each CDR type. For each column describing the CDR type, the field name and its category are specified. The detailed description of the field is provided in section 5.2.1. Diagonal shading of a cell indicates, that the particular CDR field is not included in the particular CDR type.

Table 5.9: Charging Data of IMS CDR Types

Field	CDR Type						
	S-CSCF-CDR	P-CSCF-CDR	I-CSCF-CDR	MRFC-CDR	MGCF-CDR	BGCF-CDR	AS-CDR
Record Type	M	M	M	M	M	M	M
Retransmission	C _o	C _o	C _o	C _o	C _o	C _o	C _o
SIP Method	C _o	C _o	C _o	C _o	C _o	C _o	C _o
Role of Node	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Node Address	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Session ID	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Service ID				M _o			
Calling Party Address	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Called Party Address	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Private User ID	M _o						
Served Party IP Address		M _o					
Service Request Time Stamp	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Service Delivery Start Time Stamp	M _o	M _o		M _o	M _o	M _o	M _o
Service Delivery End Time Stamp	C _o	C _o		C _o	C _o	C _o	C _o
Record Opening Time	C _o	C _o		C _o	C _o	C _o	C _o
Record Closure Time	M _o	M _o		M _o	M _o	M _o	M _o
Application Servers Information	C _o						
Application Servers Involved	C _o						
Application Provided Called Parties	C _o						
Inter Operator Identifiers	C _o	C _o	C _o	C _o	C _o	C _o	C _o
originating IOI	C _o	C _o	C _o	C _o	C _o	C _o	C _o
terminating IOI	C _o	C _o	C _o	C _o	C _o	C _o	C _o
Local Record Sequence Number	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Record Sequence Number	C _o	C _o		C _o	C _o	C _o	C _o
Cause For Record Closing	M _o	M _o	M _o	M _o	M _o	M _o	M _o
Incomplete CDR Indication	C _o	C _o	C _o	C _o	C _o	C _o	C _o
S-CSCF Information			C _o				
IMS Charging Identifier	M _o	M _o	M _o	M _o	M _o	M _o	M _o
SDP Session Description	C _o	C _o		C _o	C _o	C _o	C _o

Field	CDR Type						
	S-CSCF-CDR	P-CSCF-CDR	I-CSCF-CDR	MRFC-CDR	MGCF-CDR	BGCF-CDR	AS-CDR
List of SDP Media Components	<u>C_o</u>	<u>C_o</u>		<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>
SIP Request Timestamp	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
SIP Response Timestamp	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
SDP Media Components	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
SDP Media Name	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
SDP Media Description	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
GPRS Charging ID	<u>M_o</u>	<u>M_o</u>		<u>M_o</u>	<u>M_o</u>	<u>M_o</u>	<u>M_o</u>
Media Initiator Flag	<u>C_o</u>	<u>C_o</u>		<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>
Authorised QoS		<u>C_o</u>					
GGSN Address	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>
Service Delivery Failure Reason	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>
Service Specific Data							<u>C_o</u>
List of Message Bodies	<u>C_o</u>	<u>C_o</u>					<u>C_o</u>
Content-Type	<u>C_o</u>	<u>C_o</u>					<u>C_o</u>
Content-Disposition	<u>C_o</u>	<u>C_o</u>					<u>C_o</u>
Content-Length	<u>C_o</u>	<u>C_o</u>					<u>C_o</u>
Originator	<u>C_o</u>	<u>C_o</u>					<u>C_o</u>
Trunk Group ID Incoming/Outgoing					<u>M_o</u>		
Bearer Service					<u>M_o</u>		
Record Extensions	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>	<u>C_o</u>

5.2.3.1 Charging Data in S-CSCF (S-CSCF-CDR)

Table 5.9: S-CSCF Charging Data (S-CSCF-CDR)

Field	Category	Description
Record-Type	M	Identifies the type of record: S-CSCF-CDR.
Retransmission	<u>C_o</u>	This parameter, when present, indicates that information from retransmitted Diameter ACRs has been used in this CDR.
Event-Type	<u>M_o</u>	Reflects the type of chargeable telecommunication service/event for which the CDR is generated, such as: "session", "register", "subscribe".
Role of Node	<u>M_o</u>	Specifies the role of the CSCF if relevant for the chargeable telecommunication service/event, which is either: Originating role (serving A) Terminating role (serving B)
Node-Address	<u>M_o</u>	The address of the S-CSCF providing the information for the CDR.
Session-ID	<u>M_o</u>	The Session identification. For a SIP session the Session-ID contains the SIP Call ID as defined in the Session Initiation Protocol.
Calling-Party-Address (Public-User-ID)	<u>M_o</u>	The address of the party initiating a session (SIP-URL, E.164 ...)
Called-Party-Address (Public-User-ID)	<u>M_o</u>	The address of the party to whom a session is established (SIP-URL, E.164 ...)
Private-User-ID (served-party)	<u>M_o</u>	Holds the used Network Access Identifier according to RFC2486 [6]. This parameter corresponds to the User-Name AVP.
Record-Opening-Time	<u>M_o</u>	A time stamp reflecting the time the CCF opened this record.
Record-Closure-Time	<u>M_o</u>	A Time stamp reflecting the time the CCF closed the record.
List of AS Involved	<u>C_o</u>	Holds a list of ASs (if any) identified by the SIP-URLs

Field	Category	Description
List of AS-Provided Called Party Addresses	C ₀	Holds a list of the Called Party Address(es), if the address(es) are determined by an AS (SIP URL, E.164...).
Inter-Operator Identifier(s)	C ₀	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.
Local Record Sequence Number	M ₀	Contains a unique record number created by this CCF.
Partial Record Sequence Number	C ₀	The partial record number, if partial records are generated.
Cause for Record Closure	M ₀	Identifies the reason for CDR closure, such as: time limit, service change (e.g. change in media components), network internal reasons, end of session, tariff time change.
IMS Charging Identifier (ICID)	M ₀	Holds the ICID as received from the S-CSCF.
SDP Session Description	C ₀	Holds the Session Description if exchanged between the User Agents.
List of Session Modifications	M ₀	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.
SIP Request Timestamp	C ₀	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the S-CSCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
SIP Response Timestamp	C ₀	This parameter contains the time of the response to the initial SIP Request (usually a 200 OK), as provided by the S-CSCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
SDP Media Component	C ₀	Holds the media components if specified in the SDP data.
Media Initiator Flag	C ₀	This is a flag that is present only if the called party requested the session modification.
GPRS Charging ID	C ₀	If IMS is accessed via GPRS, the GPRS charging ID generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN Address	C ₀	Holds the IP-address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.
Cause	M ₀	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".
User-to-User Data	C ₀	This parameter describes the user-to-user data, if carried in the SIP signaling.
Record Extensions	C ₀	A set of operator/manufacturer-specific extensions to the record, conditioned upon existence of an extension.

5.2.3.2 Charging Data in P-CSCF (P-CSCF-CDR)

Table 5.10: P-CSCF Charging Data (P-CSCF-CDR)

Field	Category	Description	
Record Type	M _O	Identifies the type of record: P-CSCF-CDR.	
Event Type	M _O	Reflects the type of chargeable telecommunication service/event for which the CDR is generated, such as: "session", "register", "subscribe".	
Role of Node	M _O	Specifies the role of the CSCF if relevant for the chargeable telecommunication service/event, which is either: Originating role (serving A) Terminating role (serving B)	
Node Address	M _O	The address of the node providing the information for the CDR.	
Session ID	M _O	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.	
Calling Party Address (Public User ID)	M _O	The address of the party initiating a session (SIP URL, E.164 ...)	
Called Party Address (Public User ID)	M _O	The address of the party to whom a session is established (SIP URL, E.164 ...)	
Served party IP Address	M _O	Holds the IP address of either the calling or called party, depending on whether the proxy is in touch with the calling or the called party	
Record Opening Time	M _O	A time stamp reflecting the time the CCF opened this record.	
Record Closure Time	M _O	A Time stamp reflecting the time the CCF closed the record.	
Inter Operator Identifier(s)	C _O	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.	
Local Record Sequence Number	M _O	Contains a unique record number created by this CCF.	
Partial Record Sequence Number	C _O	The partial record number, if partial records are generated.	
Cause for Record Closure	M _O	Identifies the reason for CDR closure, such as: time limit, service change (e.g. change in media components), network internal reasons, end of session, tariff time change.	
IMS Charging Identifier (ICID)	M _O	Holds the ICID as received from the P-CSCF.	
List of Session Modifications	M _O	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.	
	SIP Request Timestamp	C _O	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the P-CSCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SIP Response Timestamp	C _O	This parameter contains the time of the response to the initial SIP Request (usually a 200 OK), as provided by the P-CSCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SDP Media Component	C _O	Holds the media components if specified in the SDP data.
	Media Initiator Flag	C _O	This is a flag that is present only if the called party requested the session modification.
	Authorised QoS	C _O	Authorised QoS as defined in TS 23.207 [7] / TS 29.207 [8] and applied via the Go interface
	GPRS Charging ID	C _O	If IMS is accessed via GPRS, the GPRS charging ID generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN Address	C _O	Holds the IP address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.	
Cause	M _O	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".	
User-to-User Data	C _O	This parameter will describe the user-to-user data, if carried in the SIP signaling.	
Record Extensions	C _O	A set of operator/manufacture specific extensions to the record, conditioned upon existence of an extension.	

5.2.3.3 Charging Data in I-CSCF (I-CSCF-CDR)

Table 5.11: I-CSCF Charging Data (I-CSCF-CDR)

Field	Category	Description
Record Type	M _O	Identifies the type of record: I-CSCF-CDR.
Event Type	M _O	Reflects the type of chargeable telecommunication service/event for which the CDR is generated, such as: "session", "register", "subscribe".
Node Address	M _O	The address of the node providing the information for the CDR.
Session ID	M _O	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.
Calling Party Address (Public User ID)	M _O	The address of the party initiating a session (SIP URL, E.164 ...)
Called Party Address (Public User ID)	M _O	The address of the party to whom a session is established (SIP URL, E.164 ...)
Transaction time stamp	M _O	Time stamp reflecting the time for transaction termination (Upon receiving/generating the final response for the SIP request)
Inter-Operator Identifier(s)	G _O	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.
Local Record Sequence Number	M _O	Contains a unique record number created by this node.
S-CSCF information	G _O	Information related to the serving CSCF, e.g. the S-CSCF capabilities upon registration event or the S-CSCF address upon the session establishment event.
I-MSC Charging Identifier (ICID)	M _O	Holds the ICID as received from the MRFC.
Record Extensions	G _O	A set of operator/manufacture specific extensions to the record, conditioned upon existence of an extension.

5.2.3.4 Charging Data in MRFC (MRFC-CDR)

Table 5.12: MRFC Charging Data (MRFC-CDR)

Field	Category	Description	
Record Type	M _O	Identifies the type of record: MRFC-CDR.	
Node Address	M _O	The address of the node providing the information for the CDR.	
Session ID	M _O	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.	
Service ID	M _O	Identifies the service the MRFC is hosting. For conferences the conference ID is used here.	
Calling Party Address (Public User ID)	M _O	The address of the party initiating a session (SIP URL, E.164 ...)	
Called Party Address (Public User ID)	M _O	The address of the party to whom a session is established (SIP URL, E.164 ...)	
Record Opening Time	M _O	A time stamp reflecting the time the CCF opened this record.	
Record Closure Time	M _O	A Time stamp reflecting the time the CCF closed the record.	
Inter Operator Identifier(s)	C _O	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.	
Local Record Sequence Number	M _O	Contains a unique record number created by this CCF.	
Partial Record Sequence Number	C _O	The partial record number, if partial records are generated.	
Cause for Record Closure	M _O	Identifies the reason for CDR closure, such as: time limit, service change (e.g. change in media components), network internal reasons, end of session, tariff time change.	
IMS Charging Identifier (ICID)	M _O	Holds the ICID as received from the MRFC.	
List of session Modifications	M _O	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.	
	SIP Request Timestamp	C _O	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the MRFC. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SIP Response Timestamp	C _O	This parameter contains the time of the response to the initial SIP Request (usually a 200 OK), as provided by the MRFC. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	Media Initiator Flag	C _O	This is a flag that is present only if the called party requested the session modification.
	GPRS Charging ID	C _O	If IMS is accessed via GPRS, the GPRS charging id generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN Address	C _O	Holds the IP address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.	
Cause	M _O	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".	
Record Extensions	C _O	A set of operator/manufacture specific extensions to the record, conditioned upon existence of an extension.	

5.2.3.5 Charging Data in MGCF (MGCF-CDR)

Table 5.13: MGCF Charging Data (MGCF-CDR)

Field	Category	Description
Record Type	M _O	Identifies the type of record: MGCF-CDR.
Role of node	M _O	Specifies the role of the CSCF if relevant for the chargeable telecommunication service/event, which is either: Originating role (serving A) Terminating role (serving B)
Node Address	M _O	The address of the node providing the information for the CDR.
Session ID	M _O	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.
Calling Party Address (Public User ID)	M _O	The address of the party initiating a session (SIP URL, E.164 ...)
Called Party Address (Public User ID)	M _O	The address of the party to whom a session is established (SIP URL, E.164 ...)
Record Opening Time	M _O	A time stamp reflecting the time the CCF opened this record.
Record Closure Time	M _O	A Time stamp reflecting the time the CCF closed the record.
Inter Operator Identifier(s)	C _O	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.
Local Record Sequence Number	M _O	Contains a unique record number created by this CCF.
Partial Record Sequence Number	C _O	The partial record number, if partial records are generated.
Cause for Record Closure	M _O	Identifies the reason for CDR closure, such as: time limit, service change (e.g. change in media components), network internal reasons, end of session, tariff time change.
IMS Charging Identifier (ICID)	M _O	Holds the ICID as received from the MGCF.
List of Session Modifications	M _O	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.
SIP Request Timestamp	M _O	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the MGCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
SIP Response Timestamp	M _O	This parameter contains the time of the response to the initial SIP Request (usually a 200-OK), as provided by the MGCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
List of Session Modifications	M _O	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.
Media Initiator Flag	C _O	This is a flag that is present only if the called party requested the session modification.
GPRS Charging ID	C _O	If IMS is accessed via GPRS, the GPRS charging id generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN address	C _O	Holds the IP address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.
Cause	M _O	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".
Trunk Group ID Incoming/Outgoing	M _O	PSTN leg: Contains the outgoing trunk group ID for an outgoing session/call Contains the incoming trunk group ID for an incoming session/call
Bearer Service	M _O	Holds the used bearer service for the PSTN leg
Record Extensions	C _O	A set of operator/manufacture-specific extensions to the record, conditioned upon existence of an extension.

5.2.3.6 Charging Data in BGCF (BGCF-CDR)

Table 5.14: BGCF Charging Data (BGCF-CDR)

Field	Category	Description	
Record Type	M ₀	Identifies the type of record: BGCF-CDR.	
Node Address	M ₀	The address of the node providing the information for the CDR.	
Session ID	M ₀	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.	
Calling Party Address (Public User ID)	M ₀	The address of the party initiating a session (SIP URL, E.164 ...)	
Called Party Address (Public User ID)	M ₀	The address of the party to whom a session is established (SIP URL, E.164 ...)	
Record Opening Time	M ₀	A time stamp reflecting the time the CCF opened this record.	
Record Closure Time	M ₀	A Time stamp reflecting the time the CCF closed the record.	
Inter Operator Identifier(s)	C ₀	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.	
Local Record Sequence Number	M ₀	Contains a unique record number created by this CCF.	
Partial Record Sequence Number	C ₀	The partial record number, if partial records are generated.	
Cause for Record Closure	M ₀	Identifies the reason for CDR output, such as: time limit, service change (e.g. change in media components), network internal reasons, last CDR, tariff time change.	
IMS Charging Identifier (ICID)	M ₀	Holds the ICID as received from the BGCF.	
List of Session Modifications	M ₀	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.	
	SIP Request Timestamp	C ₀	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the BGCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SIP Response Timestamp	C ₀	This parameter contains the time of the response to the initial SIP Request (usually a 200-OK), as provided by the BGCF. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SDP Media Component	C ₀	Holds the media components if specified in the SDP data.
	Media Initiator Flag	C ₀	This is a flag that is present only if the called party requested the session modification.
	GPRS Charging ID	C ₀	If IMS is accessed via GPRS, the GPRS charging id generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN address	C ₀	Holds the IP address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.	
Cause	M ₀	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".	
Record Extensions	C ₀	A set of operator/manufacture specific extensions to the record, conditioned upon existence of an extension.	

5.2.3.7 Charging Data in AS (AS-CDR)

Table 5.15: AS Charging Data (AS-CDR)

Field	Category	Description	
Record Type	M _O	Identifies the type of record: AS-CDR.	
Node Address	M _O	The address of the node providing the information for the CDR.	
Session ID	M _O	The Session identification. For a SIP session the Session ID contains the SIP Call ID as defined in the Session Initiating Protocol.	
Calling Party Address (Public User ID)	M _O	The address of the party initiating a session (SIP URL, E.164 ...)	
Called Party Address (Public User ID)	M _O	The address of the party to whom a session is established (SIP URL, E.164 ...)	
Record opening time	M _O	A time stamp reflecting the time the CCF opened this record.	
Record closure time	M _O	A Time stamp reflecting the time the CCF closed the record.	
Inter Operator Identifier(s)	C _O	Holds the identification of the network neighbours (originating and terminating) if exchanged via SIP signalling.	
Local Record Sequence Number	M _O	Contains a unique record number created by this CCF.	
Partial Record Sequence Number	C _O	The partial record number, if partial records are generated.	
Cause for Record Closure	M _O	Identifies the reason for CDR closure, such as: time limit, service change (e.g. change in media components), network internal reasons, end of session, tariff time change.	
IMS Charging Identifier (ICID)	M _O	Holds the ICID as received from the MGCF.	
List of Session Modifications	M _O	List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps.	
	SIP Request Timestamp	M _O	This parameter contains the time of the initial SIP Request (usually a (Re)Invite), as provided by the AS. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SIP Response Timestamp	M _O	This parameter contains the time of the response to the initial SIP Request (usually a 200-OK), as provided by the AS. Only present if the CDR is opened by the reception of an ACR containing the time stamp.
	SDP Media Component	C _O	Holds the media components if specified in the SDP data.
	Media Initiator Flag	C _O	This is a flag that is present only if the called party requested the session modification.
	GPRS Charging ID	C _O	If IMS is accessed via GPRS, the GPRS charging id generated by the GGSN whose address is contained in the parameter "GGSN Address".
GGSN Address	C _O	Holds the IP address of the GGSN that was used for the SIP session, if IMS is accessed via GPRS.	
Cause	M _O	A more specific reason for the closure of the CDR. The possible values of this parameter depend on the "Cause for Record Closure".	
Service Specific Data	C _O	Contains service specific data if present.	
User to User Data	C _O	This parameter will describe the user to user data if carried in the SIP signaling.	
Record Extensions	C _O	A set of operator/manufacturer specific extensions to the record, conditioned upon existence of an extension.	

5.2.4 CDR Parameter Description

~~Void~~ This clause contains a brief description of each field of the CDRs described in Table 5.9. The fields are listed in alphabetical order according to the field name as specified in the table above.

5.2.4.131 List of Application S-Provided Called Parties Address

~~Void~~ Holds a list of the Called Party Address(es), if the address(es) are determined by an AS (SIP URL, E.164...).

5.2.4.2 Application Servers Information

This is a grouped CDR field containing the fields: “Application Server Involved” and “Application Provided Called Parties”.

5.2.4.123 ~~List of~~ Application Servers Involved

~~Void~~ Holds the ASs (if any) identified by the SIP URLs.

5.2.4.14 Authorised QoS

~~Void~~ Authorised QoS as defined in TS 23.207 [7] / TS 29.207 [8] and applied via the Go interface.

5.2.4.25 Bearer Service

~~Void~~ Holds the used bearer service for the PSTN leg.

5.2.4.36 Called Party Address ~~(Public User ID)~~

~~Void~~ In the context of an end-to-end SIP transaction this field holds the address of the party (Public User ID) to whom the SIP transaction is posted.

For a subscription/registration procedure this field holds the party to be registered/subscribed.

This field contains either a SIP URL (according to IETF RFC3261 [16]) or a TEL URL (according to RFC2806 [20]).

5.2.4.47 Calling Party Address ~~(Public User ID)~~

~~Void~~ The address (Public User ID) of the party requesting a service or initiating a session. This field holds either the SIP URL (according to IETF RFC 3261 [16]) or the TEL URL (according to RFC 2806 [20]) of the calling party.

5.2.4.68 Cause for Record Closure

~~Void~~ This field contains a reason for the release of the CDR including the following:

- normal release: end of session;
- partial record generation: time (duration) limit, maximum number of changes in charging conditions (e.g. maximum number in 'List of Message Bodies' exceeded) or service change (e.g. change in media components);
- abnormal termination;
- management intervention (request due to O&M reasons).
- CCF initiated record closure;

A more detailed reason may be found in the Service Delivery Failure Reason field.

5.2.4.9 Content Disposition

This sub-field of Message Bodies holds the content disposition of the message body inside the SIP signalling. Content-disposition header field equal to “render”, indicates that “the body part should be displayed or otherwise rendered to the user”. Content disposition values are: session, render, inline, icon, alert, attachment, etc.

5.2.4.10 Content Length

This sub-field of Message Bodies holds the size of the data of a message body in bytes.

5.2.4.11 Content Type

This sub-field of Message Bodies holds the MIME type of the message body. Examples are: application/zip, image/gif, audio/mpeg, etc.

5.2.4.812 GGSN Address

This parameter holds the control plane IP address of the GGSN that handles one or more media component(s) of a IMS session. If GPRS is used to access the IMS, the GGSN address is used together with the GPRS charging ID as the access part of the charging correlation vector. The charging correlation vector is comprised of an access part and an IMS part, which is the IMS Charging Identifier. For further information regarding the composition of the charging correlation vector refer to the appropriate clause in TS 32.200 [2].

5.2.4.913 GPRS Charging ID

This parameter holds the The element GPRS charging ID (GCID) as is which is generated by the GGSN for a GPRS PDP context. There is a 1:1 relationship between the GCID and the PDP context. If GPRS is used to access the IMS, the GCID is used together with the GGSN address as the access part of the charging correlation vector that is comprised of an access part and an IMS part, which is the IMS Charging Identifier.

For further information regarding the composition of the charging correlation vector refer to the appropriate clause in TS 32.200 [2].

5.2.4.4014 ~~IMS Charging Identifier (ICID)~~

This parameter holds the IMS charging identifier (ICID) as generated by the IMS node for the SIP session. There is a 1:1 relationship between the ICID and the session ID. The ICID is part of the charging correlation vector and coded as US-ASCII (as are all SIP messages). The charging correlation vector contains an IMS part (ICID - a unique number plus an IP address) and an access part (GPRS Charging ID and GGSN address). For further information regarding the composition and usage of the charging correlation vector refer to TS 32.200 [2] and TS 24.229 [14].

The ICID is composed of a 4 octet unique number and the IP address of the network node generating the ICID. This is inserted in the CDRs as shown in figures 5.13 and 5.14 below. Since IPv4 and IPv6 addresses are supported simultaneously, an ICID may either be composed of an IPv4 or IPv6 compliant source address.

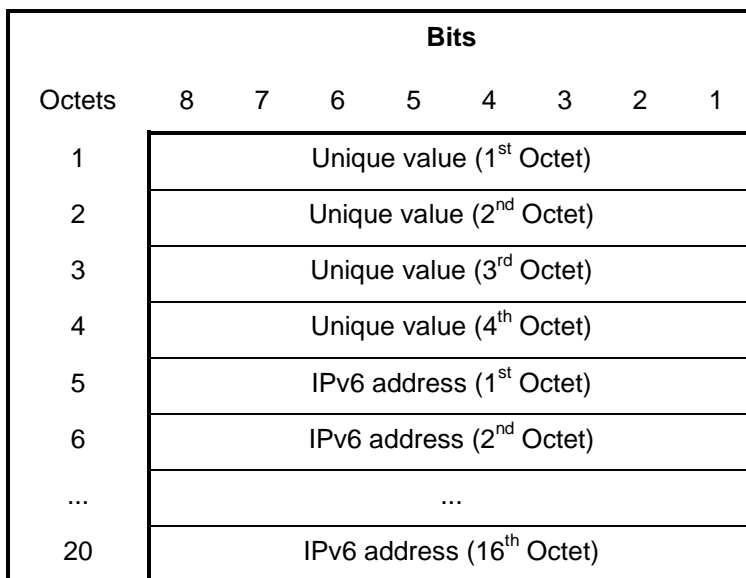


Figure 5.13: ICID layout with IPv6

		Bits							
Octets		8	7	6	5	4	3	2	1
1	Unique value (1 st octet)								
2	Unique value (2 nd octet)								
3	Unique value (3 rd octet)								
4	Unique value (4 th octet)								
5	IPv4 address (1 st Octet)								
6	IPv4 address (2 nd Octet)								
7	IPv4 address (3 rd Octet)								
8	IPv4 address (4 th octet)								

Figure 5.14: ICID layout with IPv4

The Unique Value consists of a 32-bit integer, coded as an unsigned integer. Bit 8 of the lowest numbered octet (5 for IPv4/17 for IPv6) is the most significant bit and bit 1 of the highest numbered octet (8 for IPv4/20 for IPv6) is the least significant bit.

The IP-address is encoded using binary coding, where each octet in ICID represents one octet in the IP-address. Bit 8 of octet 1 is the most significant bit and bit 1 of the highest numbered octet (4 for IPv4/16 for IPv6) is the least significant bit.

The following example, shown in figure 5.15, describes the content of ICID when the unique value of 15409 (H'3C31) was generated by a node with the IPv6-address of 255.5.0.0.0.0.0.0.0.0.0.0.179 (FF05::B3):

		Bits								
Octets		8	7	6	5	4	3	2	1	Meaning
1	0 0 1 1 1 1 0 0								H'3C	
2	0 0 1 1 0 0 0 1								H'31	
3	1 1 1 1 1 1 1 1								255	
4	0 0 0 0 0 1 0 1								5	
5-17	0 0 0 0 0 0 0 0								0	
18	1 0 1 1 0 0 1 1								179	
19	0 0 0 0 0 0 0 0								0	
20	0 0 0 0 0 0 0 0								0	

Figure 5.15: ICID layout with IPv6

5.2.4.15 Incomplete CDR Indication

This field provides additional diagnostics when the CCF detects missing ACRs.

5.2.4.16 Inter Operator Identifier(s)

Void. Holds the identification of the home network (originating and terminating) if exchanged via SIP signalling, as recorded in the Inter-Operator-Identifier AVP. For further information on the IOI please refer to TS 24.229 [14].

5.2.4.3617 List of Message Bodies~~User-to-User Data~~

~~Void~~This grouped field comprising several sub-fields describing the data that may be conveyed end-to-end in the body of a SIP message. Since several message bodies may be exchanged via SIP-signalling, this grouped field may occur several times.

The List of Message Bodies contains the following elements:

- Content Type
- Content Disposition
- Content Length
- Originator

They are described in the appropriate subclause. Message bodies with the "Content-Type" field set to *application/sdp* and the "Content-Disposition" field set to *session* are not included in the "Message Bodies" field.

5.2.4.18 List of SDP Media Components

This is a grouped field comprising several sub-fields associated with one media component. It may occur several times in one CDR. The field is present only in a SIP session related case.

The List of SDP Media Components contains following elements:

- SIP Request Timestamp
- SIP Response Timestamp
- SDP Media Components
- Media Initiator flag

These field elements are described in the appropriate subclause.

5.2.4.4519 Local Record Sequence Number

~~Void~~This field includes a unique record number created by this node. The number is allocated sequentially for each partial CDR (or whole CDR) including all CDR types. The number is unique within the CCF.

The field can be used e.g. to identify missing records in post processing system.

5.2.4.4620 Media Initiator Flag

This field indicates if the called party has requested the session modification and it is present only if the initiator was the called party.

5.2.4.4721 Node Address

~~Void~~This item holds the address of the node providing the information for the CDR. This may either be the IP address or the FQDN of the IMS node generating the accounting data. This parameter corresponds to the *Origin-Host* AVP.

5.2.4.22 Originator

This sub-field of the "List of Message Bodies" indicates the originating party of the message body.

5.2.4.4923 Private User ID~~(served party)~~

Holds the used Network Access Identifier of the served party according to RFC2486 [6]. This parameter corresponds to the *User-Name* AVP.~~This field identifies the served party's private User ID that is received in the *User-Name* AVP in the *Accounting Request* message. The served party could be either the calling or called party.~~

5.2.4.2024 Record Closure Time

~~Void:~~ A Time stamp reflecting the time the CCF closed the record.

5.2.4.2125 Record Extensions

~~Void:~~ A set of operator/manufacture specific extensions to the record, conditioned upon existence of an extension.

5.2.4.2226 Record Opening Time

~~Void:~~ A time stamp reflecting the time the CCF opened this record. Present only in SIP session related case.

5.2.4.1827 ~~Partial~~ Record Sequence Number

~~Void:~~ This field contains a running sequence number employed to link the partial records generated by the CCF for a particular session (characterised with the same Charging ID and GGSN address pair). The Record Sequence Number is not present if the record is the only one produced in the CCF for a session. The Record Sequence Number starts from one (1).

5.2.4.2328 Record Type

~~Void:~~ Identifies the type of record. The parameter is derived from the *Origin-Host* AVP.

5.2.4.2429 Retransmission

~~Void:~~ This parameter, when present, indicates that information from retransmitted Diameter ACRs has been used in this CDR.

5.2.4.2530 Role of Node

~~Void:~~ This fields indicates the role of the AS/CSCF. As specified in TS 23.218 [5] the role can be:

- originating (CSCF serving the calling subscriber or AS initiated session)
- terminating (CSCF serving the called subscriber or AS terminated session)
- proxy (only applicable for an AS, when a request is proxied)
- B2BUA (only applicable for an AS, when the AS performs third party control/acts in B2BUA mode)

5.2.4.26 ~~SDP Media Component~~

~~Void:~~

5.2.4.1431 ~~SDP Media Components~~ ~~List of Session Modifications~~

This is a grouped field comprising several sub-fields associated with one media component. Since several media components may exist for a session in parallel these sub-fields may occur several times (as much times as media are involved in the session). The sub-fields are present if medium (media) is (are) available in the SDP data which is provided in the ACR received from the IMS node.

The SDP media component contains the following elements:

- SDP media name
- SDP media description
- GPRS Charging ID

These field elements are described in the appropriate subclause.

5.2.4.32 SDP Media Description:

This field holds the attributes of the media as available in the SDP data tagged with “i=”, “c=”, “b=”, “k=”, “a=”. Only the attribute lines relevant for charging are recorded. To be recorded “SDP lines” shall be recorded in separate “SDP Media Description” fields, thus multiple occurrence of this field is possible. Always complete “SDP lines” are recorded per field.

This field corresponds to the *SDP-Media-Description* AVP as defined in Table 5.8.

Example: “c=IN IP4 134.134.157.81”

For further information on SDP please refer to IETF draft ‘SDP: Session Description Protocol’ [17].

Note: session unrelated procedures typically do not contain SDP data.

5.2.4.33 SDP Media Name

This field holds the name of the media as available in the SDP data tagged with “m=”. Always the complete “SDP line” is recorded.

This field corresponds to the *SDP-Media-Name* AVP as defined in Table 5.8.

Example: “m=video 51372 RTP/AVP 31”

For further information on SDP please refer to IETF draft ‘SDP: Session Description Protocol’ [17].

List of session information exchanged via SIP signalling by the user agent(s) and the related timestamps. Each entry in the list is comprised of the SIP request and response timestamps and media component information as provided in the ACR received from the IMS node. New entries are added to the list each time an ACR that includes the SIP request and response timestamps is received.

This implies that the list is not updated when receiving ACRs that are generated by the IMS node due to expiration of the *Acct-Interim-Interval* timer.

Charging data for media components associated with a session are handled inside the Session CDRs as follows:

A new media component container is added into a session CDR each time a media component is added to a session. A media component container is closed once the related media component is removed from a session. Figure 5.16 illustrates this principle.

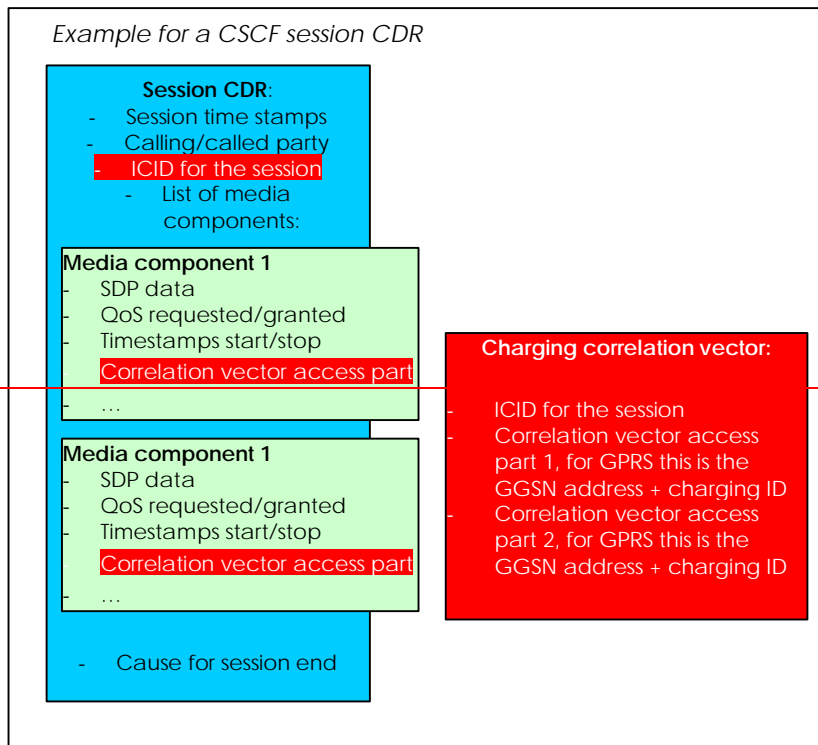


Figure 5.16: Charging Data Record Structure

A media component container is added into the session CDR when the associated SIP 200 OK message (the one corresponding to the appropriate SIP INVITE message) is received in the node generating the CDR. An appropriate media component start time stamp reflects the start of this media component. A media component is supposed to be removed from a session once either the SIP BYE message or a SIP 200 OK message (corresponding to the SIP INVITE message removing a media) is received in the node generating the ACR. The removal of a media component (either due to session release or due to a SIP INVITE/200 OK message pair during a session) is reflected with an appropriate time stamp inside the media components. If a media component is removed from an ongoing session, the related media component container is not carried forward to subsequent partial CDRs (if any).

5.2.4.2734 SDP Session Description

Void Holds the Session portion of the SDP data exchanged between the User Agents if available in the SIP transaction.

This field holds the attributes of the media as available in the session related part of the SDP data tagged with "c=" and "a=" (multiple occurrence possible). Only attribute lines relevant for charging are recorded.

The content of this field corresponds to the SDP-Session-Description AVP of the ACR message.

Note: session unrelated procedures typically do not contain SDP data.

5.2.4.35 Service Delivery End Time Stamp

This field records the time at which the service delivery was terminated. It is Present only in SIP session related case.

The content of this field corresponds to the SIP-Request-Timestamp AVP of a received ACR[Stop] message indicating a session termination.

5.2.4.536 Service Delivery Failure ReasonCause

Void Holds the reason for why a requested service could not be successfully provided (i.e. SIP error codes taken from SIP-Method AVP). This field is not present in case of a successful service delivery.

5.2.4.37 Service Delivery Start Time Stamp

This field holds the time stamp reflecting either:

- a successful session set-up: this field holds the start time of a service delivery (session related service)
- a delivery of a session unrelated service: the service delivery time stamp
- an unsuccessful session set-up and an unsuccessful session unrelated request: this field holds the time the network entity forwards the unsuccessful indication (SIP “RESPONSE” with error codes 3xx, 4xx, 5xx) towards the requesting User direction.

The content of this field corresponds to the *SIP-Response-Timestamp* AVP as defined in Table 5.8.

For partial CDRs this field remains unchanged.

5.2.4.2838 Service ID

This field identifies the service the MRFC is hosting. For conferences the conference ID is used here.

5.2.4.39 Service Request Timestamp

This field contains the time stamp which indicates the time at which the service was requested (“SIP request” message) and is present for session related and session unrelated procedures. The content of this item is derived from the *SIP-Request-Timestamp* AVP as defined in Table 5.8. If the *SIP-Request-Timestamp* AVP is not supplied by the network entity this field is not present.

For partial CDRs this field remains unchanged.

This field is present for unsuccessful service requests if the ACR message includes the *SIP-Request-Timestamp* AVP.

5.2.4.2940 Service Specific Data

~~Void.~~ This field contains service specific data.

5.2.4.3041 Session ID

~~Void.~~ The Session identification. For a SIP session the Session-ID contains the SIP Call ID as defined in the Session Initiation Protocol RFC [16].

5.2.4.3142 Served pParty IP Address

~~Void.~~ This field contains the IP address of either the calling or called party, depending on whether the P-CSCF is in touch with the calling or called network.

5.2.4.743 ~~SIP Method~~ Event Type

~~Void.~~ Specifies the SIP-method for which the CDR is generated. Only available in session unrelated cases.

5.2.4.3244 SIP Request Timestamp

~~Void.~~ This parameter contains the time of the SIP Request (usually a (Re)Invite).

5.2.4.3345 SIP Response Timestamp

~~Void.~~ This parameter contains the time of the response to the SIP Request (usually a 200 OK).

5.2.4.3446 S-CSCF Information

This field contains Information related to the serving CSCF, e.g. the S-CSCF capabilities upon registration event or the S-CSCF address upon the session establishment event. This field is derived from the *Server-Capabilities* AVP if present in the ACR received from the I-CSCF.

5.2.4.3547 Trunk Group ID Incoming/Outgoing

Void. [Contains the outgoing trunk group ID for an outgoing session/call or the incoming trunk group ID for an incoming session/call.](#)

5.2.5 Bi interface Conventions

The present document gives several recommendations for the main protocol layers for the Bi interface protocol stack. These recommendations are not strictly specified features, since there are a lot of variations among the existing Billing Systems.

As a minimum, all implementations shall support a file based bulk interface for the transfer of CDRs from the CCF to the BS. The recommendation is FTP over TCP/IP.

5.2.6 Abstract Syntax Description

Void. [TS32225-DataTypes {42} -- to be allocated, value "42" is used to allow compilation of the code](#)

```

DEFINITIONS IMPLICIT TAGS ::=
BEGIN

-- Exports everything

IMPORTS

TimeStamp
FROM TS32205-DataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
umts-Operation-Maintenance (3) ts-32-205 (205) informationModel (0) asnlModule (2) version1 (1)}

IMSRecord ::= SET
{
-- Fields used by several multimedia Record types ("Common fields"):
-- (which field is used in which record type is defined in section 5.2.3)
recordType [0] CallEventRecordType,
retransmission [1] NULL OPTIONAL,
sIP-Method [2] SIP-Method OPTIONAL,
role-of-Node [3] Role-of-Node OPTIONAL,
nodeAddress [4] NodeAddress OPTIONAL,
session-Id [5] Session-Id OPTIONAL,
calling-Party-Address [6] InvolvedParty OPTIONAL,
called-Party-Address [7] InvolvedParty OPTIONAL,
privateUserID [8] GraphicString OPTIONAL,
serviceRequestTimeStamp [9] TimeStamp OPTIONAL,
serviceDeliveryStartTimeStamp [10] TimeStamp OPTIONAL,
serviceDeliveryEndTimeStamp [11] TimeStamp OPTIONAL,
recordOpeningTime [12] TimeStamp OPTIONAL,
recordClosureTime [13] TimeStamp OPTIONAL,
interOperatorIdentifiers [14] InterOperatorIdentifiers OPTIONAL,
localRecordSequenceNumber [15] LocalRecordSequenceNumber OPTIONAL,
recordSequenceNumber [16] INTEGER OPTIONAL,
causeForRecordClosing [17] CauseForRecordClosing OPTIONAL,
incomplete-CDR-Indication [18] Incomplete-CDR-Indication OPTIONAL,
ims-Charging-Identifier [19] IMS-Charging-Identifier OPTIONAL,
sDP-Session-Description [20] SEQUENCE OF Graphic STRING OPTIONAL,
list-Of-SDP-Media-Components [21] SEQUENCE OF Media-Components-List OPTIONAL,
gGSNAddress [22] NodeAddress OPTIONAL,
serviceDeliveryFailureReason [23] ServiceDeliveryFailureReason OPTIONAL,
list-Of-Message-Bodies [24] SEQUENCE OF MessageBody OPTIONAL,
recordExtensions [25] RecordExtensions OPTIONAL,
-- Space left for further "common fields"

-- Fields particular used in the S-CSCF-recordType:
applicationServersInformation [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,

-- Fields particular used in the P-CSCF-recordType:
servedPartyIParess [50] ServedPartyIPAddress OPTIONAL,
-- < ServedPartyIPAddress to be defined >

-- Fields particular used in the I-CSCF-recordType:
transactionTimestamp [60] TimeStamp OPTIONAL
s-CSCF-Information [61] S-CSCF-Information OPTIONAL

```

```

-- < S-CSCF-Information to be defined >
-- Fields particular used in the MRFC-recordType:
service-Id [70] Service-Id OPTIONAL,
-- <Service-Id to be defined>

-- Fields particular used in the MGCF-recordType:
trunkGroupID [80] TrunkGroupID OPTIONAL,
bearerService [81] TransmissionMedium OPTIONAL

-- Fields particular used in the BGCF-RecordType (start with tag 90):
-- <empty so far>

-- Fields particular used in the AS-RecordType:
serviceSpecificData [100] OCTET STRING OPTIONAL,
}

ACRInterimLost ::= ENUMERATED
{
    no (0),
    yes (1),
    unknown (2)
}

ApplicationServersInformation ::= SEQUENCE
{
    applicationServersInvolved [0] NodeAddress OPTIONAL,
    applicationProvidedCalledParties [1] SEQUENCE OF InvolvedParty OPTIONAL
}

CauseForRecordClosing ::= ENUMERATED
{
    serviceDeliveryEndSuccessfully (0),
    unsuccessfulServiceDelivery (1),
    timeLimit (3),
    serviceChange (4), -- e.g. change in media due to Re-Invite
    managementIntervention (5), -- partial record generation reasons to be added
-- Additional codes are for further study
}

IMS-Charging-Identifier ::= OCTET STRING

Incomplete-CDR-Indication ::= SET
{
    aCRStartLost [0] BOOLEAN, -- TRUE if ACR[Start] was lost, FALSE otherwise
    aCRInterimLost [1] ACRInterimLost,
    aCRStopLost [2] BOOLEAN -- TRUE if ACR[Stop] was lost, FALSE otherwise
}

InterOperatorIdentifiers ::= SEQUENCE
{
    originatingIOI [0] GraphicString OPTIONAL,
    terminatingIOI [1] GraphicString OPTIONAL
}

InvolvedParty ::= CHOICE
{
    sIP-URL [0] GraphicString, -- refer to rfc3261
    tEL-URL [1] GraphicString -- refer to rfc3261
}

IPAddress ::= CHOICE
{
    ipV4Addr [0] GraphicString, -- "dot" notation is used
    ipV6Addr [1] GraphicString -- "dot" notation is used
}

LocalRecordSequenceNumber ::= INTEGER (0..+2147483647)
-- A unique number assigned by the CCF and supplied to all CDRs. The value range
-- limits the field to a maximum 4 octet INTEGER.

```

```

Media-Components-List ::= SEQUENCE
{
    sIP-Request-Timestamp [0] TimeStamp OPTIONAL,
    sIP-Response-Timestamp [1] TimeStamp OPTIONAL,
    sDP-Media-Components [2] SDP-Media-Components OPTIONAL,
    mediaInitiatorFlag [3] NULL OPTIONAL,
    authorized-QoS [3] GraphicString OPTIONAL
}

MessageBody ::= SEQUENCE
{
    Content-Type [0] GraphicString OPTIONAL,
    Content-Disposition [1] GraphicString OPTIONAL,
    Content-Length [2] INTEGER OPTIONAL,
    Originator [3] InvolvedParty OPTIONAL
}

NodeAddress ::= CHOICE
{
    ipAddress [0] IPAddress,
    domainName [1] GraphicString
}

RecordExtensions ::= SEQUENCE
{
    -- ...
    -- operator specific record extensions
    -- ...
}

Role-of-Node ::= ENUMERATED
{
    originating (0),
    terminating (1),
    proxy (2),
    b2bua (3)
}

SDP-Media-Components ::= SEQUENCE
{
    sDP-Media-Name [0] SEQUENCE OF GraphicString OPTIONAL,
    sDP-Media-Descriptions [1] SEQUENCE OF SDP-Media-Description OPTIONAL,
    gPRS-Charging-Id [2] INTEGER OPTIONAL,
}

SDP-Media-Description ::= SEQUENCE OF GraphicString OPTIONAL,

ServiceDeliveryFailureReason ::= GraphicString
-- holds the SIP error code as received via a SIP Final response (4xx, 5xx or 6xx)

Session-Id ::= GraphicString
-- rfc3261: example for SIP Call-ID: f81d4fae-7dec-11d0-a765-00a0c91e6bf6@foo.bar.com

Sip-Method ::= GraphicString

TransmissionMedium ::= SEQUENCE {
    -- Transmission Medium Required, refer to ITU-T Q.763:
    tMR [0] OCTET STRING (SIZE (1)) OPTIONAL,
    -- Transmission Medium USED, refer to ITU-T Q.763:
    tMU [1] OCTET STRING (SIZE (1)) OPTIONAL
}

TrunkGroupID ::= CHOICE {
    incoming [0] GraphicString,
    outgoing [1] GraphicString
}

END

```

5.2.7 Data Encoding Rules

Data encoding rules are described in [9] for BER, in [10] for PER, or in [11] for XER.

End of Change in Clause 5.2**Change in Clause 7.2.24****7.2.24 Role-of-Node AVP**

The *Role-Of-Node* AVP (AVP code TBD) is of type Enumerated and specifies the role of the [AS/CSCF](#), ~~as relevant for the chargeable telecommunication service/event.~~

The identifier can be one of the following:

ORIGINATING_ROLE 0

The [AS/CSCF](#) is applying a originating role, serving the calling subscriber.

TERMINATING_ROLE 1

The [AS/CSCF](#) is applying a terminating role, serving the called subscriber.

[PROXY_ROLE](#) 2

The AS is applying a proxy role.

[B2BUA_ROLE](#) 3

The AS is applying a B2BUA role.

End of Change in Clause 7.2.24**End of Document**

CHANGE REQUEST

⌘ **32.225 CR 007** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Inclusion of IETF draft 'Hakala-diameter-credit-control' specification version 05		
Source:	⌘ S5		
Work item code:	⌘ OAM-CH	Date:	⌘ 28/02/2003
Category:	⌘ F	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)	2 (GSM Phase 2)	
	A (corresponds to a correction in an earlier release)	R96 (Release 1996)	
	B (addition of feature),	R97 (Release 1997)	
	C (functional modification of feature)	R98 (Release 1998)	
	D (editorial modification)	R99 (Release 1999)	
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘ The "draft-hakala-diameter-credit-control-05.txt" is a critical reference to TS 32.225. As it currently has only a draft status in IETF, it is necessary to include it into the 3GPP TS 32.225 in order to preserve its content until it receives a permanent status (RFC).
Summary of change:	⌘ Include of the IETF "draft-hakala-diameter-credit-control-05.txt" as Annex A.
Consequences if not approved:	⌘ There is no credit control application for IMS online charging.

Clauses affected:	⌘ Annex A										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> </table>	Y	N	⌘	X	⌘	X	⌘	X	Other core specifications	⌘
Y	N										
⌘	X										
⌘	X										
⌘	X										
		Test specifications									
		O&M Specifications									
Other comments:	⌘										

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/specs/CR.htm>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Change in Clause Annex A

Annex A (informativeNormative): Diameter Credit Control Application

The document included in this Annex is the latest available Internet-Draft at the time of writing. When the IETF issues the RFC to this Internet-Draft then a change request will be provided to replace the text in Annex A with a reference in clause 2.

<hr/>	<u>Harri Hakala,</u>
<hr/>	<u>Leena Mattila</u>
<u>INTERNET-DRAFT</u>	<u>Ericsson,</u>
<u>Draft:<draft-hakala-diameter-credit-control-05.txt></u>	<u>Juha-Pekka</u>
<u>Expires: May 2003</u>	<u>Koskinen,</u>
<hr/>	<u>Marco Stura</u>
<hr/>	<u>Nokia</u>
<hr/>	<u>November 2002</u>

Diameter Credit Control Application

Status of this memo

This document is an Internet-Draft and is subject to all provisions of Section 10 of RFC2026.

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Abstract

This document specifies a Diameter application that is used for real-time cost and credit control between a service element and a credit control server in service environment.

Diameter accounting messages with additional AVPs are used to transfer service and credit control information between the service element and the credit control server.

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1 Introduction

This Diameter application, combined with the Diameter base protocol [DIAMBASE], describes the accounting protocol that can be used for real time cost and credit control in the service environment.

The next generation wireless networks specify (e.g. 3G Charging and Billing requirements [3GPPCHARG]) more critical requirements for the accounting applications. The accounting application must be able to rate accounting information in real-time. For example, for the service environment it is vital to be able to rate service event information instantly.

There also exists a demand for the end user credit control. The accounting application must be able to check the end user's account for coverage for the requested service event charge prior to execution of that service event. All the chargeable events related to a specific account must be prevented from the end user when the credit of that account is exhausted or expired.

Also a mechanism should be provided to indicate to the end user of the charges to be levied for a chargeable event.

There are as well services such as gaming or advertising that in some situations rather refund than deduct the end user's account.

To fulfill all these needs a new type of accounting application is needed, the credit control application. This application is used for real-time delivery of service event information in the service environment from the service element to the credit control server to minimize the financial risk.

1.1. Requirements language

In this document, the key words "MAY", "MUST", "MUST NOT", "optional", "recommended", "SHOULD", and "SHOULD NOT", are to be interpreted as described in [KEYWORDS].

1.2 Terminology

AAA

Authentication, Authorization and Accounting

Accounting

The act of collection of information on resource usage for the purposes of trend analysis, auditing, billing or cost allocation.

Accounting Server

The accounting server receives accounting data from the service elements and other devices and translates it into session records. It acts as an interface to back-end rating, billing, and operations support systems.

Charging

In the telecom world charging is synonym to accounting. A function whereby information related to a chargeable event is transferred in order to make it possible to determine usage for which the charged party may be billed.

Credit Control

Credit control is a mechanism, which directly interacts in real-time with an account and controls or monitors the charges, related to the service usage. Credit control is a process of checking if credit is available, credit-reservation, reduction of credit from the end user account when service is completed and refunding of reserved credit not used.

Credit Control Server

It is located in the home environment and is accessed by service elements in real-time for purpose of price determination and credit control before the service event is delivered to the end-user. It may also interact with business support systems.

Diameter Credit Control Client

A Diameter credit control client is an entity that interacts with a credit control server.

Diameter Credit Control Server

A Diameter credit control server is an entity that handles credit control request.

Rating

The act of determining the cost of the service event.

Service

A type of task that is performed by a service element for an end user.

Service Element

A network element that provides a service to end user. A service element itself can include the application service providers or application service providers can be located in an other domain.

Service Event

Any event which creates value for the end-user.

1.3 Advertising application support

Diameter nodes conforming to this specification MAY advertise support by including the value of TBD (X) in the Acct-Application-Id AVP of the Capabilities-Exchange-Request and Capabilities-Exchange-Answer command [DIAMBASE].

2 Architecture Model

A service element provides services to end-users. When accounting is used a service element collects service event information and reports it while and/or after services are provided to an accounting server by using an accounting protocol. Alternatively the accounting server may query the service element for service event information.

The accounting protocol can for example be RADIUS accounting protocol or the Diameter base protocol with a Diameter application.

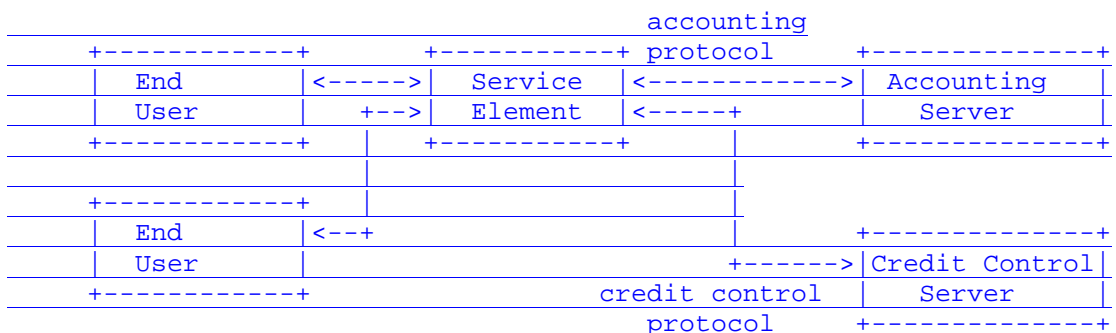
If real-time credit control is required, the service element (credit control client) contacts the credit control server with service event information included before the service is provided. The credit control server, depending on the service event information, MAY perform the rating of the service event, pricing of the service event, credit check and credit-reservation from the account. The service element monitors the service execution according to the instructions returned by the credit control server. After the service completion the credit control server deducts the money from the account.

If direct debiting/refunding is requested, the credit control server deducts/increases the end user's account, respectively. The service element can also enquire the price of the service or the account balance status from the credit control server.

In a multi-service environment it might happen that an end user with already ongoing service (e.g. voice call) issues a new service request (e.g. data service) towards same account or during an active multimedia session an additional media type is added to the session causing a new simultaneous request towards same account. Consequently this SHOULD be considered when units are granted to the services.

There MAY be multiple credit control servers in the system for reasons of redundancy and load balancing. The system MAY also contain separate rating server(s) and accounts MAY locate in a centralized database. System internal interfaces can exist to relay messages between servers and an account manager. However the detailed architecture of credit control system and its interfaces are implementation specific and are out of scope of this specification.

The credit control protocol is the Diameter base protocol with the Diameter credit control application.



The credit control server and accounting server in this architecture model are logical entities. The real configuration MAY combine them into a single host.

There MAY exist protocol transparent Diameter relays and redirect agents between credit control client and credit control server. These

agents transparently support the Diameter credit control application.

If Diameter credit control proxies exist between the credit control client and the credit control server, they MUST advertise the Diameter credit control application support.

3 Service Control

When an end user requests a service the request is forwarded to a service element in the home domain, that is the same administrative domain, in which the end user's credit control server is located. In some cases it might be possible that the service element in the visited domain can offer service event to the end user, but in that case a commercial agreement must exist between the service element in the visited domain and in the home domain.

The service element SHOULD authenticate and authorize the end user before any request is sent to the credit control server. The way how the authentication and/or authorization are performed in the service element and the authentication and/or authorization messages that are used are not defined in this application. The methods defined in other Diameter applications or other legacy authentication and authorization methods can be used.

Each credit control session MUST have globally unique Session-Id as defined in [DIAMBASE] and it MUST NOT be changed during the life time of a credit control session.

The Diameter credit control client in the service element MAY get information from the authorization server regarding the way accounting data shall be forwarded (accounting protocol, credit control protocol or both) based on its knowledge of the end user. This means that the accounting information is forwarded to the accounting server as defined in [DIAMBASE], the credit control server SHOULD be contacted before the service event is offered to the end user or both the accounting protocol and the credit control protocol MAY be used in parallel.

The authorization server MAY include the Accounting-Realtime-Required AVP to determine what to do if the sending of accounting records to the accounting server has been temporarily prevented as defined in [DIAMBASE]. The Accounting-Realtime-Required AVP is not used by this application. Instead of or in addition to the Accounting-Realtime-Required AVP the authorization server MAY include the Credit-Control-Failure-Handling AVP and Direct-Debiting-Failure-Handling AVP to determine what to do if the sending of credit control messages to the credit control server has been temporarily prevented. The usage of Credit-Control-Failure-Handling AVP and the Direct-Debiting-Failure-Handling AVP gives flexibility to have different failure handling for credit control session and one time event direct debiting. The credit control server MAY override the failure handling for credit control session by including the Credit-Control-Failure-Handling AVP in the Accounting-Answer.

The usage of separate AVPs makes it possible to have different failure handling towards accounting servers and credit control servers, in case both should be used parallel. It is recommended that the client complements the credit control failure procedures with backup accounting flow towards an accounting server. With different combinations of above AVPs different safety levels can be built. For example by choosing the Credit-Control-Failure-Handling AVP equal to CONTINUE and Accounting-Realtime-Required AVP equal to DELIVER_AND_GRANT the service can be granted to the end user even if

the connection to the credit control server is down but the accounting server is able to collect the accounting information, provided that there is information exchange taking place between the accounting server and credit control server.

If authentication and authorization is done based on Diameter application the authorization server MAY include the Acct-Interim-Interval AVP to control the operation of the device in the service element operating as a client as defined in [DIAMBASE]. If the Acct-Interim-Interval AVP is included then the interim interval MAY be present in the request message sent to the credit control server.

The Diameter credit control server MAY override the interim interval. It is up to the credit control server to determine, even independently from the requested value, the allowed interim interval to be used for consumption of the granted service units. The credit control server MAY return the interim interval in the Answer message to the credit control client. It can be included in the Answer message even in case it is not present in the Request message. Alternatively the accounting interim interval can be omitted from the Answer message. However, since interim records are also produced at the expiry of granted service units and/or for mid-session service events the omission of Acct-Interim-Interval does not mean that interim records are not produced.

During authorization, the authorization server MAY return the Accounting-Multi-Session-Id, which the Diameter credit control client MAY include in all subsequent accounting messages. The Accounting-Multi-Session-Id AVP MAY include the value of the original Session-Id. It's contents are implementation specific, but MUST be globally unique across other Accounting-Multi-Session-Id, and MUST NOT be changed during the life time of a credit control session. There are certain applications that require multiple accounting sub-sessions. Such applications would send messages with a constant Session-Id AVP, but a different Accounting Sub-Session-Id AVP. If several credit sub-sessions will be used, all sub-sessions MUST be closed separately before the closing the main session. The absence of this AVP implies no sub-sessions are in use.

If the credit control client wants to perform credit-reservation before granting service to the end user it MUST use several interrogations towards the credit control server. In this case the credit control server MUST maintain the accounting session state.

A one time event MAY be used when there is no need to maintain any state in the Diameter credit control server, for example enquiring the price of the service.

3.1 Session Based Credit Control

For a session based credit control several interrogations are needed: the first, intermediate (optional) and the final interrogation.

3.1.1 First Interrogation

The first interrogation MUST be sent before the Diameter credit control client in a service element allows any service event to the end user. The Accounting-Record-Type is set to the value START_RECORD in the first request message. The Subscription-Id-Data AVP SHOULD be included to identify the end-user in the credit control server.

If the Diameter credit control client knows the cost of the service event the monetary amount to be charged is included in the Requested-

Service-Unit AVP. If the Diameter credit control client does not know the cost of the service event, the Requested-Service-Unit AVP MAY contain the number of requested service events and the Service-Parameter-Info AVP SHOULD contain the service event information to be rated by the credit control server. The Service-Parameter-Info AVP always refers to the requested service units.

The Event-Timestamp AVP contains the time when the service event is requested in the service element.

The credit control server SHOULD rate the service event and make a credit-reservation from the end user's account that covers the cost of the service event. If the type of the Requested-Service-Unit AVP is money, no rating is needed but the corresponding monetary amount is reserved from end user's account.

The credit control server returns the Granted-Service-Unit AVP in the Answer message to the Diameter credit control client. The Granted-Service-Unit AVP contains the amount of service units that the Diameter credit control client can provide to the end user until a new Accounting-Request MUST be sent to the credit control server. If several unit types are sent in the Answer message the credit control client MUST handle each unit type separately. However there MUST be maximum one instance of the same unit type in one Answer message. When the granted service units for one unit type have been spent a new Accounting-Request MUST be sent to the credit control server even though there would be service units left for other units types. The type of the Granted-Service-Unit AVP can be time, volume, service specific or money depending on the type of service event. It is not allowed to change the unit type(s) within the session.

If the credit control server determines that no further control is needed for the service it MAY include the result code indicating that the credit control is not applicable (e.g. service is free of charge) and terminate the credit control session.

The Accounting-Answer message MAY also include the Final-Unit-Indication AVP to indicate that the Answer message contains the final units for the service session. After the end user has used these units, the Diameter credit control client is responsible for terminating the service session and the credit control session by sending the final interrogation to the credit control server.

3.1.2 Intermediate Interrogation

When all the granted service units for one unit type are spent by the end user or the interim interval is expired the Diameter credit control client MUST send a new Accounting-Request to the credit control server. In case the Acct-Interim-Interval is used it is always up to the Diameter credit control client to send a new request well in advance before the expiration of the previous request in order to avoiding interruption in the service element. Even if the granted service units reserved by the credit control server have not been spent upon expiration of the accounting interim interval, the Diameter credit control client MUST send a new Accounting-Request to the credit control server.

There can be also mid-session service events, which might affect the rating of the current service events. In this case a spontaneous updating (a new Accounting-Request) SHOULD be sent including information related to the service event even if all the granted service units have not been spent or the accounting interim interval has not expired.

When the used units are reported to the credit control server the credit control client will not have any units in its possession before new granted units are received from the credit control server. When the new granted units are received from the credit control server these units apply from the point where the measurement of the reported used units stopped.

The Accounting-Record-Type AVP is set to the value INTERIM_RECORD in the intermediate request message. The Subscription-Id-Data AVP SHOULD also be included in the intermediate message to identify the end user in the credit control server.

The Requested-Service-Unit AVP contains the new amount of requested service units. The Used-Service-Unit AVP contains the amount of used service units measured from the point when the service became active or, in case of interim interrogations are used during the session, from the point when the previous measurement ended. The same unit types that are used in the previous message MUST be used. If several unit types were included in the previous Answer message the used service units for each unit type MUST be reported.

The Event-Timestamp AVP contains the time of the event that triggered the sending of the new Accounting-Request.

The credit control server MUST deduct the used monetary amount from the end user's account. It MAY rate the new request and make a new credit-reservation from the end user's account that covers the cost of the requested service event.

The Accounting-Answer message with the Accounting-Record-Type AVP set to the value INTERIM_RECORD MAY include the Cost-Information AVP containing the accumulated cost estimation for the session without taking any credit-reservation into account.

There MAY be several intermediate interrogations within a session.

3.1.3 Final Interrogation

When the end user terminates the service session or when all the granted units are used after a Final-Unit-Indication AVP has been received from the credit control server, the Diameter credit control client MUST send a final Accounting-Request message to the credit control server. The Accounting-Record-Type AVP is set to the value STOP_RECORD.

The Event-Timestamp AVP MAY contain the time of the session was terminated.

The Used-Service-Unit AVP contains the amount of used service units measured from the point when the service became active or, in case of interim interrogations are used during the session, from the point when the previous measurement ended. If several unit types were included in the previous answer message the used service units for each unit type MUST be reported.

After final interrogation the credit control server MUST refund the reserved credit amount not used to the end user's account and deduct the used monetary amount from the end user's account.

The Accounting-Answer message with the Accounting-Record-Type set to the value STOP_RECORD SHOULD include the Cost-Information AVP containing the estimated total cost for the session in question.

3.1.4 Failure Procedures

Since the credit control application is based on real-time bi-directional communication between the credit control client and the credit control server alternative destinations and buffering of messages are not sufficient in the event of communication failures. Since the credit control server has to maintain a session state the credit control message stream MUST not be moved to a backup credit control server during an ongoing credit control session. However, Diameter agents MAY perform failover to an alternative agent when they detect a transport failure. As a consequence the credit control server MAY receive duplicate messages. These duplicates or out of sequence messages can be detected in the credit control server based on the credit control server session state machine (section 3.3), Session-Id AVP and Accounting-Record-Number AVP.

If a communication failure occurs during an ongoing credit control session the credit control client will terminate or continue the service depending on the value set in the Credit-Control-Failure-Handling AVP. The Credit-Control-Failure-Handling AVP MAY be sent from the authorization server and in the Accounting-Answer from the credit control server. For new credit control sessions failover to alternative credit control server SHOULD be performed, if possible.

The timer Tx (as defined in section 8) is used in the credit control client to supervise the communication with the credit control server.

If the credit control server detects a failure during an ongoing credit control session it will terminate the credit control session and return the reserved units back to the end user's account.

The supervision session timer Ts as defined in [DIAMBASE] is used in the credit control server.

3.2 One Time Event

The one time event is used when there is no need to maintain accounting session state in the credit control server.

The one time event can be used when the service element wants to know the cost of the service event without any credit-reservation or to check the account balance without any credit-reservation. It can be used also for refunding service units on the user's account or direct debiting without any credit-reservation.

3.2.1 Service Price Enquiry

Sometimes the service element needs to know the price of the service event. There might exist services offered by application service providers, whose prices are not known in the service element. End user might also want to get an estimation of the price of a service event before requesting it.

A Diameter credit control client requesting the cost information MUST set the Accounting-Record-Type AVP equal to EVENT_RECORD, include the Requested-Action AVP set to PRICE_ENQUIRY and set the requested service event information into the Service-Parameter-Info AVP in the Accounting-Request message.

The credit control server calculates the cost of the requested service event, but it does not perform any account balance check or credit-reservation from the account.

The estimated price of the requested service event is returned to the credit control client in the Cost-Information AVP in the Accounting-Answer message.

3.2.2 Balance Check

Sometimes Diameter credit control client needs only to verify that the end user's account balance covers the cost for a certain service without reserving any units from the account at the time of the enquiry. This method does not guarantee that there would be credit left when the Diameter credit control client requests the debiting of the account with a separate request.

A Diameter credit control client requesting the balance check MUST set the Accounting-Record-Type AVP equal to EVENT_RECORD, include Requested-Action AVP set to CHECK_BALANCE and include the Subscription-Id-Data to identify the End-User in the credit control server.

The credit control server makes the balance check, but it does not do any credit-reservation from the account.

The result of balance check (Credit/No Credit) is returned to the credit control client in the Check-Balance-Result AVP in the Accounting-Answer message.

3.2.3 Direct Debiting

There are certain one time events for which service execution is always successful in the service environment. Sometimes the delay between the service invocation and the actual service delivery to the end user can be so long that the use of the session based credit control would lead to unreasonable long credit control sessions. In these cases the Diameter credit control client can use the one time event scenario for direct debiting. The Diameter credit control client SHOULD be sure that the requested service event execution will be successful, when this scenario is used.

The Accounting-Record-Type is set to the value EVENT_RECORD and the Requested-Action AVP set to DIRECT_DEBITING in the Accounting-Request message. The Subscription-Id-Data AVP SHOULD be included to identify the End-User in the credit control server. The Event-Timestamp AVP contains the time when the service event is requested in the service element.

The Diameter credit control client MAY include the monetary amount to be charged in the Request-Service-Unit AVP, if it knows the cost of the service event. If the Diameter credit control client does not know the cost of the service event, then the Service-Parameter-Info AVP SHOULD contain the service event information to be rated by the credit control server. The Service-Parameter-Info AVP always refers to the requested service unit.

The credit control server SHOULD rate the service event and deduct the corresponding monetary amount from end user's account. If the type of the Requested-Service-Unit AVP is money, no rating is needed but the corresponding monetary amount is deducted from the End User's account.

The credit control server returns the Granted-Service-Unit AVP in the Answer message to the Diameter credit control client. The Granted-Service-Unit AVP contains the amount of service units that the

Diameter credit control client can provide to the end user. The type of the Granted-Service-Unit can be time, volume, service specific or money depending on the type of service event.

If the credit control server determines that no credit control is needed for the service it MAY include the result code indicating that the credit control is not applicable (e.g. service is free of charge).

For informative purposes, the Accounting-Answer message SHOULD also include the Cost-Information AVP containing the estimated total cost of the requested service.

3.2.4 Refund

There MAY be a need to refund service units on the end user's account, for example gaming services.

The credit control client MUST set Accounting-Record-Type AVP to the value EVENT_RECORD and the Requested-Action AVP to REFUND in the Accounting-Request message. The Subscription-Id-Data AVP SHOULD be included to identify the End-User in the credit control server.

The Diameter credit control client MAY include the monetary amount to be refunded in the Request-Service-Unit AVP, if it knows the cost of the service event. If the Diameter credit control client does not know the cost of the service event, then the Service-Parameter-Info AVP SHOULD contain the service event information to be rated by the credit control server. The Service-Parameter-Info AVP always refers to the requested service unit.

For informative purposes, the Accounting-Answer message MAY also include the Cost-Information AVP containing the estimated monetary amount of refunded unit.

3.2.5 Failure Procedure

There MAY exist protocol transparent Diameter relays and redirect agents or Diameter credit control proxies between credit control client and credit control server. These agents MAY perform failover procedures if they detect transport failure as described in [DIAMBASE].

When the credit control client detects a communication failure to the credit control server its behavior depends on the requested action. The timer Tx (as defined in section 8) is used in the credit control client to supervise the communication with the credit control server.

In case the requested action is Service Price Enquiry or Balance Check and communication failure is detected the credit control client MAY forward the request messages to an alternative credit control server, if possible.

If the requested action is DIRECT_DEBITING and the Direct-Debiting-Failure-Handling AVP is set to TERMINATE_OR_BUFFER the credit control client SHOULD terminate the service if it can determine from the result code or error code in the answer message that units have not been debited. Otherwise the credit control client SHOULD grant the service to the end user and store the record in the credit control application level non-volatile storage. The credit control client MUST mark these request messages as possible duplicate by setting the T-flag in the command header as described in [DIAMBASE] section 3. If the Direct-Debiting-Failure-Handling AVP is set to CONTINUE the

service SHOULD be granted even if credit control messages can't be delivered. If the timer Tx expires the credit control client MUST continue the service and eventually buffer the request according to the value of the Direct-Debiting-Failure-Handling AVP.

The Accounting-Request with requested action REFUND should always be stored in the credit control application level non-volatile storage in case of temporary failure. The credit control client MUST mark the re-transmitted request message as possible duplicate by setting the T-flag in the command header as described in [DIAMBASE] section 3.

The implementation MAY choose to limit the number of re-transmission attempts and define a re-transmission interval.

Because there can appear duplicate request for various reason the credit control server is therefore responsible for the real time duplicate detection. Implementation issues for duplicate detection are discussed in [DIAMBASE] Appendix C. When the credit control client re-sends messages from its application level non-volatile storage it MUST mark these request messages as possible duplicate by setting the T-flag in the command headers as described in [DIAMBASE] section 3.

Only one place in the credit control system SHOULD be responsible for duplicate detection. If there is only one credit control server within the given realm the credit control server MAY perform duplicate detection. In case when more than one credit control server are supporting the credit control application the accounting manager controlling the account database MAY be responsible for duplicate detection.

3.3 Credit Control Session State Machine

The following state machines MUST be supported for credit control applications.

The first two state machines are to be observed by credit control clients. The first one describes the session based credit control and the second one event based credit control. The third state machine describes the credit control session from a credit control server perspective.

Any event not listed in the state machines MUST be considered as an error condition, and a corresponding answer, if applicable, MUST be returned to the originator of the message.

In the state table, the event 'Failure to send' means that the Diameter credit control client is unable to communicate with the desired destination (i.e. the answer message is not received within the validity time of the request). This could be due to the peer being down, or due to a physical link failure in the path to/from the credit control server.

The event 'Temporary error' means that the Diameter credit control client received a transient failure notification in the Accounting Answer command (i.e. the peer sending back a transient failure or temporary protocol error notification DIAMETER_TOO_BUSY, or DIAMETER_LOOP_DETECTED in the Result-Code AVP).

The event 'Failed answer' means that the Diameter credit control client received non-transient failure (permanent failure) notification in the Accounting Answer command.

The action 'store record' means that a record is stored in the credit control application level non-volatile storage.

The event 'Not successfully processed' means that the credit control server could not process the message, e.g. due to unknown end user, account being empty or due to errors defined in [DIAMBASE].

The states PendingS, PendingI, PendingL PendingE and PendingB stand for pending states to wait for an answer to an accounting request related to a Start, Interim, Stop, Event or Buffered record respectively.

CLIENT, SESSION BASED

State	Event	Action	New State
Idle	Client or device requests access	Send accounting start req., start Tx.	PendingS
PendingS	Successful accounting start answer received	Stop Tx	Open
PendingS	Failure to send, or temporary error and credit control fault handling equal to CONTINUE	Grant service to end user	Idle
PendingS	Failure to send, or temporary error and credit control fault handling equal to TERMINATE	Disconnect user/dev	Idle
PendingS	Tx expired and credit Control fault handling equal to TERMINATE	Disconnect user/dev	Idle
PendingS	Tx expired and credit control fault handling equal to CONTINUE	Grant service to end user	Idle
PendingS	Accounting start answer received with result code SERVICE_DENIED or USER_NOT_FOUND	Disconnect user/dev	Idle
PendingS	Accounting start answer received with result code equal to credit control N/A	Grant service to end user	Idle
PendingS	Failed accounting start answer received and credit control fault handling equal to CONTINUE	Grant Service to end user	Idle
PendingS	Failed accounting start answer received and credit control failure handling equal to TERMINATE	Disconnect user/dev	Idle
PendingS	User service terminated	Queue termination event	PendingS

PendingS	Change in rating condition	Queue changed rating condition event	PendingS
Open	Granted unit elapses and no final unit indication received	Send accounting interim req., start Tx.	PendingI
Open	Granted unit elapses and final unit indication received	Disconnect send accounting stop req., start Tx.	PendingL
Open	Change in rating condition in queue	Send accounting interim req., Start Tx.	PendingI
Open	Service terminated in queue	Send accounting stop req., start Tx	PendingL
Open	Change in rating condition or interim interval elapses	Send accounting interim req., Start Tx.	PendingI
Open	User service terminated	Send accounting stop req., start Tx	PendingL
PendingI	Successful accounting interim answer received	Stop Tx	Open
PendingI	Failure to send, or temporary error and credit control fault handling equal to CONTINUE	Grant service to end user	Idle
PendingI	Failure to send, or temporary error and credit control fault handling equal to TERMINATE	Disconnect user/dev	Idle
PendingI	Tx expired and credit control fault handling equal to TERMINATE	Disconnect user/dev	Idle
PendingI	Tx expired and credit control fault handling equal to CONTINUE	Grant service to end user.	Idle
PendingI	Accounting interim answer received with result code SERVICE_DENIED	Disconnect user/dev	Idle

PendingI	Accounting interim answer received with result code equal to credit control N/A	Grant service to end user	Idle
PendingI	Failed accounting interim answer received and credit control fault handling equal to CONTINUE	Grant service to end user.	Idle
PendingI	Failed accounting interim answer received and credit control fault handling equal to TERMINATE	Disconnect user/dev	Idle
PendingI	User service terminated	Queue termination event	PendingI
PendingI	Change in rating condition	Queue changed rating condition event	PendingI
PendingL	Successful accounting stop answer received		Idle
PendingL	Tx expired		Idle
PendingL	Failure to send, or temporary error or failed answer		Idle
PendingL	Change in rating condition		PendingL
CLIENT, EVENT BASED			
State	Event	Action	New State
Idle	Client or device requests a one-time service	Send accounting event req., Start Tx.	PendingE
Idle	Records in storage	Send stored records	PendingB
PendingE	Successful accounting event answer received		Idle
PendingE	Failure to send, temporary error or failed accounting event answer received, or Tx expired, requested action GET_BALANCE or PRICE_ENQUIRY	Indicate service error	Idle
PendingE	Accounting event answer received with result code SERVICE_DENIED or USER_NOT_FOUND	Disconnect user/dev	Idle

PendingE	Accounting event answer received with result code credit control N/A, requested action DIRECT_DEBITING	Grant service to end user	Idle
PendingE	Failure to send, temporary error or failed accounting event answer received, or Tx expired, requested action DIRECT_DEBITING and fault handling equal to CONTINUE	Grant service to end user	Idle
PendingE	Failed accounting event answer received, requested action DIRECT_DEBITING and fault handling equal to TERMINATE_OR_BUFFER	Disconnect user/dev	Idle
PendingE	Failure to send or Tx expired, requested action DIRECT_DEBITING and fault handling equal to TERMINATE_OR_BUFFER	Grant service to end user and store record with T-flag	Idle
PendingE	Temporary error, requested action DIRECT_DEBITING and fault handling equal to TERMINATE_OR_BUFFER	Disconnect user/dev	Idle
PendingE	Failed accounting event answer received, requested action REFUND	Indicate service error and delete record	Idle
PendingE	Failure to send or Tx expired, requested action REFUND	Store record with T-flag	Idle
PendingE	Temporary error and requested action REFUND	Store record	Idle
PendingB	Successful accounting answer received	Delete record	Idle
PendingB	Failed accounting answer received	Delete record	Idle
PendingB	Failure to send or temporary error		Idle
SERVER, SESSION AND EVENT BASED			
State	Event	Action	New State

Idle	Accounting start request received and successfully processed.	Send accounting start answer,	Open

		reserve units, start Ts	
Idle	Accounting start request received, but not successfully processed.	Send accounting start Answer with Result-Code != SUCCESS	Idle
Idle	Accounting event request received and successfully processed.	Send accounting event answer, debit units	Idle
Idle	Accounting event request received, but not successfully processed.	Send accounting event Answer with Result-Code != SUCCESS	Idle
Open	Accounting Interim request received and successfully processed	Send accounting answer, debit used units and reserve new units, Restart Ts	Open
Open	Accounting interim request received, but not successfully processed.	Send accounting interim Answer with Result-Code != SUCCESS, debit used units	Idle
Open	Accounting stop request received, and successfully processed	Send accounting stop answer, Stop Ts, debit used units	Idle
Open	Accounting stop request received, but not successfully processed.	Send accounting stop Answer with Result-Code != SUCCESS, debit used units	Idle
Open	Session supervision timer Ts expired	Stop Ts, release reserved units	Idle

4 Accounting AVPs

This section defines the accounting AVPs that are specific to Diameter Credit Control Application and MAY be included in the Diameter accounting messages [DIAMBASE].

Accounting-Request command MAY include the following additional AVPS:

- [Subscription-Id]
- [Requested-Action]
- *[Requested-Service Unit]
- *[Used-Service-Unit]
- *[Service-Parameter-Info]
- [Abnormal-Termination-Reason]
- *[Accounting-Correlation-Id]
- [Credit-Control-Failure-Handling]

Accounting-Answer command MAY include a following additional AVPS:

- [Subscription-Id]
- *[Granted-Service-Unit]
- [Cost-Information]
- [Final-Unit-Indication]
- [Check-Balance-Result]
- [Credit-Control-Failure-Handling]

The following table describes the Diameter AVPs defined in Credit Control application, their AVP Code values, types, possible flag values and whether the AVP MAY be encrypted.

				+-----+				
				AVP Flag rules				
				-----+				
Attribute Name	AVP Code	Section Defined	Data Type	MUST	MAY	SHLD NOT	MUST NOT	MAY Encr
				-----+				
Abnormal-Termination-Reason	XXX	4.1	Enumerated	M	P		V	Y
Accounting-Correlation-Id	XXX	4.2	OctetString	M	P		V	Y
Check-Balance-Result	XXX	4.3	Enumerated	M	P		V	Y
Cost-Information	XXX	4.5	Grouped	M	P		V	Y
Credit-Control-Failure-Handling	XXX	4.6	Enumerated	M	P		V	Y
Direct-Debiting Failure-Handling	XXX	4.8	Enumerated	M	P		V	Y
Final-Unit-Indicator	XXX	4.9	Unsigned32	M	P		V	Y
Granted-Service-Unit	XXX	4.10	Grouped	M	P		V	Y
Requested-Action	XXX	4.11	Enumerated	M	P		V	Y
Requested-Service-Unit	XXX	4.12	Grouped	M	P		V	Y
Service-Parameter-Info	XXX	4.14	Grouped	M	P		V	Y
Subscription-Id	XXX	4.17	Grouped	M	P		V	Y
Used-Service-Unit	XXX	4.22	Grouped	M	P		V	Y
				+-----+				

4.1 Abnormal-Termination-Reason AVP

The Abnormal-Termination-Reason AVP (AVP Code TBD) is of type Enumerated and contains information about the reason for an abnormal service termination in a service element.

The following reasons are defined:

SERVICE_ELEMENT_TERMINATION	0
An error occurred in the service element.	

CONNECTION_TO_END-USER_BROKEN	1
The connection to the end-user is broken.	

4.2 Accounting-Correlation-Id AVP

The Accounting-Correlation-Id AVP (AVP Code TBD) is type of OctetString and contains information to correlate accounting data generated for different components of the service, e.g. transport and service level.

4.3 Check-Balance-Result AVP

The Check Balance Result AVP (AVP code TBD) is of type Enumerated and contains the result of the balance check. This AVP is applicable only when the Requested-Action AVP indicates CHECK_BALANCE in the Accounting-Request command.

The following values are defined for the Check-Balance-Result AVP.

ENOUGH_CREDIT	0
There is enough credit in the account to cover the requested service.	

NO_CREDIT	1
There isn't enough credit in the account to cover the requested service.	

4.4 Cost-Information AVP

The Cost-Information AVP (AVP Code TBD) is of type Grouped and is used to return the cost information of a service in the Accounting-Answer command. The included Unit-Value AVP contains the cost estimate (always type of money) of the service in case of price enquiry or the accumulated cost estimation in the case of credit control session. The Currency-Code specifies in which currency the cost was given.

When the Requested-Action AVP with value PRICE_ENQUIRY is included in the Accounting-Request command the Cost-Information AVP sent in the succeeding Accounting-Answer command contains the cost estimation of the requested service, without any reservation being made.

The Cost-Information AVP included in the Accounting-Answer command with the Accounting-Record-Type set to INTERIM_RECORD contains the accumulated cost estimation for the session without taking any credit-reservation into account.

The Cost-Information AVP included in the Accounting-Answer command with the Accounting-Record-Type set to EVENT_RECORD or STOP_RECORD contains the estimated total cost for the requested service.

It has the following ABNF grammar:

```
<Cost-Information> ::= < AVP Header: TBD >
                        { Unit-Value }
                        { Currency-Code }
```

4.5 Credit-Control-Failure-Handling AVP

The Credit-Control-Failure-Handling AVP (AVP Code TBD) is of type Enumerated. The credit control client uses information in this AVP to decide what to do if the sending of credit control messages to the credit control server has been for instance temporarily prevented due to a network problem.

TERMINATE 0

When the Credit-Control-Failure-Handling AVP is set to TERMINATE the service MUST only be granted as long as there is a connection to the credit control server. If the credit control client does not receive any Accounting-Answer message within the Tx timer (as defined in section 8) the credit control request is regarded failed. The moving of already started credit control session to alternative server is not allowed.

This is the default behaviour if the AVP isn't included in the reply from the authorization or credit control server.

CONTINUE 1

When the Credit-Control-Failure-Handling AVP is set to CONTINUE the service SHOULD be granted even if credit control messages can't be delivered.

4.6 Currency-Code AVP

The Currency-Code AVP (AVP Code TBD) is of type Unsigned32 and contains a currency code that specifies in which currency the values of AVPs containing monetary units were given. It is specified using the numeric values defined in the ISO 4217 standard.

4.7 Direct-Debiting-Failure-Handling AVP

The Direct-Debiting-Failure-Handling AVP (AVP Code TBD) is of type Enumerated. The credit control client uses information in this AVP to decide what to do if the sending of credit control messages (Requested-Action AVP set to Direct Debiting) to the credit control server has been for instance temporarily prevented due to a network problem.

TERMINATE_OR_BUFFER 0

When the Direct-Debiting-Failure-Handling AVP is set to TERMINATE_OR_BUFFER the service MUST be granted as long as there is a connection to the credit control server. If the credit control client does not receive any Accounting-Answer message within the Tx timer (as defined in section 8) the credit control request is regarded failed. The client SHOULD terminate the service if it can determine from the failed answer that units have not been debited. Otherwise the credit control client SHOULD grant the service, store the request to application level non-volatile storage and try to re-send the request. These requests MUST be marked as possible duplicate by setting the T-flag in the command header as described in [DIAMBASE] section 3.

This is the default behaviour if the AVP isn't included in the reply from the authorization server.

CONTINUE 1

When the Direct-Debiting-Failure-Handling AVP is set to CONTINUE the service SHOULD be granted even if credit control messages can't be delivered.

4.8 Exponent AVP

Exponent AVP is of type Integer32 (AVP code TBD) and contains the exponent value to be applied for the Value-Digit AVP within the Unit-Value AVP.

4.9 Final-Unit-Indication AVP

The Final-Unit-Indication AVP (AVP Code TBD) is of type Unsigned32 and indicates that the Granted-Service-Unit AVP in the accounting command contains the final units for the service. After these units have expired, the Diameter credit control client in a service element is responsible for terminating the service and sending the STOP_RECORD to the credit control server.

If more than one unit types are received in the Accounting-Answer, the Unit type which first expired SHOULD cause the termination.

If included in a command, the value of this AVP is always 1.

4.10 Granted-Service-Unit AVP

Granted-Service-Unit AVP (AVP Code TBD) is of type Grouped and contains the amount of units that the Diameter credit control client can provide to the end user until the service must be released or the new Accounting-Request must be sent. The Unit-Value AVP contains the granted units and the Unit-Type AVP defines the type of the unit.

If the Unit-Type AVP is set to time in the Accounting-Answer command, the Unit Value AVP specifies the granted time in seconds.

If the Unit-Type AVP is set to volume in the Accounting-Answer command, the Unit-Value AVP specifies the granted volume in bytes.

If the Unit-Type AVP is set to service specific in the Accounting-Answer command, the Unit-Value AVP specifies the granted number of service specific units (e.g. number of events, points) given in a selected service.

If the Unit-Type AVP is set to money in the Accounting-Answer command, the Unit-Value AVP specifies the granted monetary amount in the given currency. If the unit type is money, a Currency-Code AVP SHOULD be included.

It has the following ABNF grammar:

```
<Granted-Service-Unit> ::= < AVP Header: TBD >
                                { Unit-Type }
                                { Unit-Value }
                                [ Currency-Code ]
```

4.11 Requested-Action AVP

The Requested-Action AVP (AVP Code TBD) is type of Enumerated and contains the requested action being sent by Accounting-Request command where the Accounting-Record-Type is set to EVENT_RECORD.

The following values are defined for the Requested-Action AVP:

DIRECT DEBITING 0

Direct debiting indicates that the request is to decrease the end user's account according to information specified in the Requested-Service-Unit AVP and/or Service-Parameter-Info AVP. The Granted-Service Unit AVP in the Accounting-Answer command contains the debited units.

REFUND ACCOUNT 1

Refund account indicates that the request is to increase the end

user's account according to information specified in the Requested-Service-Unit AVP and/or Service-Parameter-Info AVP. The Granted-Service Unit AVP in the Accounting-Answer command contains the refunded units.

CHECK_BALANCE 2

Check balance indicates that the request is a balance check request. In this case the checking of the account balance is done without any credit reservation from the account. The Check-Balance-Result AVP in the Accounting-Answer command contains the result of the Balance Check.

PRICE_ENQUIRY 3

Price Enquiry indicates that the request is a price enquiry request. In this case neither checking of the account balance nor reservation from the account will be done, only the price of the service will be returned in the Cost-Information AVP in the Accounting-Answer Command.

4.12 Requested-Service-Unit AVP

The Requested-Service-Unit AVP (AVP Code TBD) is of type Grouped and contains the amount of requested units specified by the Diameter credit control client. The included Unit-Value AVP contains the requested Unit-Value and the Unit-Type AVP defines the type of the unit.

If the Unit Type AVP is set to time in the Accounting-Request command, the Unit-Value AVP specifies the requested time in seconds.

If the Unit-type AVP is set to volume in the Accounting-Request command, the Unit-Value AVP specifies the requested volume in bytes.

If the Unit-type AVP is set to service specific in the Accounting-Request command, the Unit-Value AVP specifies the used number of service specific units (e.g. number of events) given in a selected service.

If the Unit-Type AVP is set to money in the Accounting-Request command, the Unit-Value AVP specifies the monetary amount in the given currency. If the unit type is money, a Currency-Code AVP SHOULD be included.

It has the following ABNF grammar:

```
<Requested-Service-Unit> ::= < AVP Header: TBD >
                                { Unit-Type }
                                { Unit-Value }
                                [ Currency-Code ]
```

4.13 Service-Parameter-Info AVP

The Service-Parameter-Info AVP (AVP Code TBD) is of type Grouped and contains a service specific information used for price calculation or rating. The Service-Parameter-Type AVP defines the service parameter type and the Service-Parameter-Value AVP contains the parameter value. Alternatively it MAY also contain IANA registered standard AVPs or vendor specific AVPs. The actual contents of these AVPs are not within the scope of this document and SHOULD be defined in another Diameter application, standards written by other standardization bodies, or service specific documentation.

In case of unknown service request (e.g. unknown AVP or Service-Parameter-Type), the corresponding answer message MUST contain error code DIAMETER_AVP_UNSUPPORTED or DIAMETER_INVALID_AVP_VALUE. An Accounting Answer message with these errors MUST contain one or more FAILED-AVP AVPs containing the AVPs that caused the failure.

It has the following ABNF grammar:

```

<Service-Parameter-Info> ::= < AVP Header: TBD >
                               [ Service-Parameter-Type ]
                               [ Service-Parameter-Value ]
                               [ AVP ]

```

4.14 Service-Parameter-Type AVP

The Service-Parameter-Type AVP is of type Unsigned32 (AVP Code TBD) and defines the type of the service event specific parameter (e.g. it can be end-user location, service name). The different parameters and their types are service specific and the meanings of these parameters are not defined in this document. The Service-Parameter-Value AVP contains the service parameter type.

4.15 Service-Parameter-Value AVP

The Service-Parameter-Value AVP is of type UTF8String (AVP Code TBD) and contains the value of the service parameter type.

4.16 Subscription-Id AVP

The Subscription-Id AVP (AVP Code TBD) is used to identify the end user's subscription and is of type Grouped. The Subscription-Id AVP includes a Subscription-Id-Data AVP that hold the identifier and a Subscription-Id-Type AVP that defines the identifier type.

It has the following ABNF grammar:

```

<Subscription-Id> ::= < AVP Header: TBD >
                     { Subscription-Id-Data }
                     { Subscription-Id-Type }

```

4.17 Subscription-Id-Data AVP

The Subscription-Id-Data AVP (AVP Code TBD) is used to identify the end-user and is of type UTF8String. The Subscription-Id-Type AVP defines which type of identifier is used.

4.18 Subscription-Id-Type AVP

The Subscription-Id-Type AVP (AVP Code TBD) is of type Enumerated and it is used to determine which type of identifier that is carried by the Subscription-Id AVP.

The identifier can be one of the following:

END_USER_MSISDN 0

The identifier is in international MSISDN format, according to the ITU-T E.164 numbering plan as defined in [E164] and [CE164].

END_USER_IMSI 1

The identifier is in international IMSI format, according to the ITU-T E.212 numbering plan as defined in [E121] and [CE121].

END_USER_SIP_URL	2
The identifier is in the form of a SIP URL as defined in [SIP].	
END_USER_NAI	3
The identifier is in the form of a Network Access Identifier as defined in [NAI].	
END_USER_PRIVATE	4
The Identifier is a credit control server private identifier.	

4.19 Unit-Type AVP

The Unit-Type AVP is of type Enumerated (AVP Code TBD) and contains the type of the unit.

The unit type can be one of the following:

CREDIT_TYPE_TIME	0
The unit is of type time, given in seconds.	
CREDIT_TYPE_VOLUME	1
The unit is of type volume, given in bytes.	
CREDIT_TYPE_SERVICE_SPECIFIC	2
The unit is service specific (e.g. number of events, points, chips, services etc), given in a selected service.	
CREDIT_TYPE_MONEY	3
The unit is of type money, given as a monetary value, whose currency SHOULD be specified by the Currency-Code AVP.	

4.20 Unit-Value AVP

Unit-Value AVP is of type Grouped (AVP Code TBD). The value can be time in seconds, volume in bytes, number of service specific units or monetary amount depending on the given unit type. The Unit-Value is a value together with an exponent, i.e. Unit-Value = Value-Digits AVP * 10^{Exponent}. This representation avoids unwanted rounding off. For example the value of 2,3 is represented as Value-Digits = 23 and Exponent = -1. The absence of exponent part MUST be interpreted as exponent being equal to zero.

It has the following ABNF grammar:

```
<Unit-Value> ::= < AVP Header: TBD >
                { Value-Digits }
                [ Exponent ]
```

4.21 Used-Service-Unit AVP

The Used-Service-Unit AVP is of type Grouped AVP (AVP Code TBD) and contains the amount of used units measured from the point when the service became active or, in case of interim interrogations are used during the session, from the point when the previous measurement ended. The included Unit-Type AVP defines the type of the unit and the Unit-Value AVP contains the used amount.

If the Unit Type AVP is set to time in the Accounting-Request command, the Unit-Value AVP specifies the used time in seconds.

If the Unit-Type AVP is set to volume in the Accounting-Request command, the Unit-Value AVP specifies the used volume in bytes.

If the Unit-type AVP is set to service specific in the Accounting-Request command, the Unit-Value AVP specifies the used number of service specific units (e.g. number of events) given in a selected service.

If the Unit-Type AVP is set to money in the Accounting-Request command, the Unit-Value AVP specifies the used monetary amount in the given currency. If the unit type is money, a Currency-Code AVP SHOULD be included.

It has the following ABNF grammar:

```
<Used-Service-Unit>::=< AVP Header: TBD >
                        { Unit-Type }
                        { Unit-Value }
                        [ Currency-Code ]
```

4.22 Value-Digits AVP

The Value-Digits AVP is of type Unsigned64 (AVP code TBD) and contains the number of seconds, volume in bytes, number of service specific units or monetary amount depending on the given Unit-Type AVP. If decimal values are needed to present the units, the scaling MUST be indicated with the related Exponent AVP. For example for the monetary amount \$ 0,05 the value of Value-Digits AVP MUST be set to 5 and the scaling MUST be indicated with the Exponent AVP set to 2.

5 Result Code AVP values

This section defines new Result-Code AVP [DIAMBASE] values that must be supported by all Diameter implementations that conform to this specification.

The Accounting-Answer message includes the Result-Code AVP, which MAY indicate that an error was present in the Accounting-Request message. A rejected Accounting-Request message SHOULD cause the user's session to be terminated.

5.1 Transient Failure

Errors that fall within the transient failures category are used to inform a peer that the request could not be satisfied at the time it was received, but MAY be able to satisfy the request in the future.

DIAMETER_END_USER_SERVICE_DENIED 40XX

The credit control server denies the service request due to service restrictions or limitations related to the end-user, for example the end-user's account could not cover the requested service.

DIAMETER_CREDIT_CONTROL_NOT_APPLICABLE 40XX

The credit control server determines that the service can be granted to the end user but no further credit control is needed for the service (e.g. service is free of charge).

5.2 Permanent Failures

Errors that fall within permanent failure category are used to inform the peer that the request failed, and should not be attempted again.

DIAMETER_USER_UNKNOWN 50XX

The specified end user is unknown in the credit control server.

6 AVP Occurrence Table

The following table presents the AVPs defined in this document, and specifies in which Diameter messages they MAY, or MAY NOT be present. Note that AVPs that can only be present within a Grouped AVP are not represented in this table.

The table uses the following symbols:

0	The AVP MUST NOT be present in the message.
0+	Zero or more instances of the AVP MAY be present in the message.
0-1	Zero or one instance of the AVP MAY be present in the message. It is considered an error if there are more than once instance of the AVP.
1	One instance of the AVP MUST be present in the message.
1+	At least one instance of the AVP MUST be present in the message.

6.1 Accounting AVP Table

The table in this section is used to represent which Credit Control applications specific AVPs defined in this document are to be present in the accounting messages.

+-----+		
	Command	
	Code	
-----+		
Attribute Name	ACR	ACA
-----+		
Abnormal-Termination-Reason	0-1	0
Accounting-Correlation-Id	0-1	0
Credit-Control-Failure-Handling	0-1	0-1
Check-Balance-Result	0	0-1
Cost-Information	0	0-1
Direct-Debiting-Failure-Handling AVP	0	0
Final-Unit-Indication	0	0-1
Granted-Service-Unit	0	0+
Requested-Action	0-1	0
Requested-Service-Unit	0-1	0
Service-Parameter-Info	0+	0
Subscription-Id	0-1	0-1
Used-Service-Unit	0+	0
-----+		

7 IANA Considerations

This section contains the namespaces that have either been created in this specification, or the values assigned to existing namespaces managed by IANA.

7.1 Application Identifier

This specification assigns the value TBD to the Application Identifier namespace defined in [DIAMBASE]. See section 1.3 for more information.

7.2 Command Codes

This specification uses the value 271 from the Command code namespace

defined in [DIAMBASE].

7.3 AVP Codes

This specification assigns the values TBD - TBD from the AVP code namespace defined in [DIAMBASE] See section 4.0 for the assignment of the namespace in this specification.

7.4 Result-Code AVP Values

This specification assigns the values 40XX and 50XX from the Result-Code AVP (AVP Code 268) value namespace defined in [DIAMBASE]. See section 5.0 for the assignment of the namespace in this specification.

7.5 Abnormal-Termination-Reason AVP

As defined in Section 4.1, the Abnormal-Termination-Reason AVP (AVP Code TBD) defines the values 0-1. All remaining values are available for assignment via Designated Expert [IANA].

7.6 Check-Balance-Result AVP

As defined in Section 4.3, the Check-Balance-Result AVP (AVP Code TBD) defines the values 0-1. All remaining values are available for assignment via Designated Expert [IANA].

7.7 Credit-Control-Failure-Handling AVP

As defined in Section 4.6, the Credit-Control-Failure-Handling AVP (AVP Code TBD) defines the values 0-1. All remaining values are available for assignment via Designated Expert [IANA].

7.8 Direct-Debiting-Failure-Handling AVP

As defined in Section 4.8, the Direct-Debiting-Failure-Handling AVP (AVP Code TBD) defines the values 0-1. All remaining values are available for assignment via Designated Expert [IANA].

7.9 Requested-Action AVP

As defined in Section 4.11, the Requested-Action AVP (AVP Code TBD) defines the values 0-3. All remaining values are available for assignment via Designated Expert [IANA].

7.10 Subscription-Id-Type AVP

As defined in Section 4.17, the Subscription-Id-Type AVP (AVP Code TBD) defines the values 0-4. All remaining values are available for assignment via Designated Expert [IANA].

7.11 Unit-Type AVP

As defined in Section 4.20, the Unit-Type AVP (AVP Code TBD) defines the values 0-3. All remaining values are available for assignment via Designated Expert [IANA].

8 Credit Control Application related parameter

Tx timer

When real-time credit control is required, the credit control client contacts the credit control server before and during the service is provided to an end user. Due to real-time nature of

application the communication delays SHOULD be minimized, e.g. to avoid too long service set up time experienced by the end user. The Tx timer is introduced to control the waiting time in the client in the PENDING state.

The recommended value is 10 seconds.

9 Security Considerations

The security models as defined in the Diameter base protocol [DIAMBASE] applies to this application too.

10 References

10.1 Normative

- [DIAMBASE] P. Calhoun, J. Arkko, E. Guttman, G. Zorn, J. Loughney "Diameter Base Protocol", draft-ietf-aaa-diameter-15.txt, IETF work in progress, June 2002.
- [3GPPCHARG] 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects, Service aspects; Charging and Billing, (release 5), 3GPP TS 22.115 v. 5.2.1, 2002-03
- [SIP] M. Handley, H. Schulzrinne, E. Schooler, J. Rosenberg, G. Camarillo, A. Johnston, J. Peterson, R. Sparks "SIP: Session Initiation Protocol", RFC 3261. June 2002.
- [NAI] Aboba, Beadles "The Network Access Identifier." RFC 2486. January 1999.
- [E164] Recommendation E.164/I.331 (05/97): The International Public Telecommunication Numbering Plan. 1997.
- [CE164] Complement to ITU-T Recommendation E.164 (05/1997): "List of ITU-T Recommendation E.164 assigned country codes", June 2000.
- [E212] Recommendation E.212 (11/98): The international identification plan for mobile terminals and mobile users. 1998.
- [CE212] Complement to ITU-T Recommendation E.212 (11/1997): " List of mobile country or geographical area codes ", February 1999.
- [IANA] Narten, Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 2434, October 1998
- 10.2 Non-Normative
- [KEYWORDS] S.Bradner, "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [ACCMGMT] B.Aboba, J.Arkko, D.Harrington. "Introduction to Accounting Management", RFC 2975, October 2000.

11 Acknowledgement

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End of Change in Annex A

End of Document

CHANGE REQUEST

⌘ **32.225 CR 008** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Removal of Re-Transmission Attribute Value Pair (AVP) in order to align duplicate detection procedure with the Diameter Base protocol
Source:	⌘	S5
Work item code:	⌘	OAM-CH
		Date: ⌘ 28/02/2003
Category:	⌘	F
		Use <u>one</u> of the following categories:
		F (correction)
		A (corresponds to a correction in an earlier release)
		B (addition of feature),
		C (functional modification of feature)
		D (editorial modification)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .
		Release: ⌘ Rel-5
		Use <u>one</u> of the following releases:
		2 (GSM Phase 2)
		R96 (Release 1996)
		R97 (Release 1997)
		R98 (Release 1998)
		R99 (Release 1999)
		Rel-4 (Release 4)
		Rel-5 (Release 5)
		Rel-6 (Release 6)

Reason for change:	⌘	The duplicate detection mechanism in Diameter Base Protocol specification has been updated. Due of that update, also Diameter Credit Control Application specification has been updated so that Re-Transmission AVP is removed.
Summary of change:	⌘	Replaced the Re-Transmission AVP description with reference to Diameter Base Protocol where T-flag usage is described in detail.
Consequences if not approved:	⌘	TS 32.225 will not be aligned with Diameter Base Protocol and Diameter Credit Control Application specifications. Retransmission for IMS charging would not work.

Clauses affected:	⌘	5.1.2.2.3.2, 5.1.2.2.3.3, 5.1.3.2.1, 5.1.3.3, 6.1.2.1.2.3, 6.1.3.2.1, 6.1.3.3, 7.2								
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
Other comments:	⌘									

How to create CRs using this form:

Change in Clause 5.1.2.2.3.2

5.1.2.2.3.2 No Reply from CCF

In case an IMS node does not receive an ACA in reply to an ACR, it may repeat the ACR message. The waiting time until a repetition is sent, and the maximum number of repetitions are both configurable by the operator. When the maximum number of repetitions is reached and still no ACA reply has been received, the IMS node executes the CCF connection failure procedure as specified above.

If retransmitted ACRs are sent, they are marked with the [T-flag as described in \[3\]](#)~~Re-Transmission AVP~~, in order to allow duplicate detection in the CCF, as specified in the next subclause.

End of Change in Clause 5.1.2.2.3.2**Change in Clause 5.1.2.2.3.3**

5.1.2.2.3.3 Duplicate Detection

A Diameter client marks possible duplicate request messages (e.g. retransmission due to the link failover process) with the [T-flag as described in \[3\]](#)~~Re-Transmission AVP~~.

If the CCF receives a message that is marked as retransmitted and this message was already received, then it discards the duplicate message. If the re-transmitted message was not yet received, its information is taken into account when generating the CDR. The CDRs are marked with a retransmission flag if information from duplicated messages is used.

End of Change in Clause 5.1.2.2.3.3**Change in Clause 5.1.3.2.1**

5.1.3.2.1 Accounting-Request Message

Table 5.4 illustrates the basic structure of a Diameter *Accounting-Request* message as used for offline charging. The use of the AVPs is specified in subclause 5.1.3.3 per IMS node and ACR type.

Table 5.4: Accounting-Request (ACR) Message Contents for Offline Charging

Diameter base protocol AVPs	
AVP	Used in offline ACR
<Diameter-Header:271,REQ,PXY>	Yes
<Session-Id> -- Diameter Session Id	Yes
{Origin-Host}	Yes
{Origin-Realm}	Yes
{Destination-Realm}	Yes
{Accounting-Record-Type}	Yes
{Accounting-Record-Number}	Yes
[Acct-Application-Id]	No
[Vendor-Specific-Application-Id]	Yes
[User-Name]	Yes
[Accounting-Sub-Session-Id]	No
[Accounting-RADIUS-Session-Id]	No
[Acct-Multi-Session-Id]	No
[Acct-Interim-Interval]	Yes
[Accounting-Realtime-Required]	No
[Origin-State-Id]	Yes
[Event-Timestamp]	Yes
*[Proxy-Info]	No
*[Route-Record]	No
*[AVP]	No
Diameter Credit Control AVP	
[Subscription-Id]	No
[Requested-Action]	No
*[Requested-Service-Unit]	No
*[Used-Service-Unit]	No
*[Service-Parameter-Info]	No
[Abnormal-Termination-Reason]	No
*[Accounting-Correlation-Id]	No
[Credit-Control-Failure-Handling]	No
[Direct-Debiting-Failure-Handling]	No
[Re-Transmission]	Yes
3GPP Diameter accounting AVPs	
[Event-Type]	Yes
[Role-of-node]	Yes
[User-Session-ID]	Yes
[Calling-Party-Address]	Yes
[Called-Party-Address]	Yes
[Time-stamps]	Yes
*[Application-Server]	Only for S-CSCF
*[Application-provided-Called-Party-Address]	Only for S-CSCF
*[Inter-Operator-Identifier]	Yes
[IMS-Charging-Identifier]	Yes
*[SDP-Session-Description]	Yes
*[SDP-Media-Component]	Yes
[GGSN-Address]	Yes
[Served-Party-IP-Address]	Only for S-CSCF
[Authorised-QoS]	Only for P-CSCF
[Server-Capabilities]	Only for I-CSCF
[Trunk-Group-ID]	Only for MGCF
[Bearer-Service]	Only for MGCF
[Service-ID]	Only for MRFC
[UUS-Data]	Yes

NOTE: For AVP of type "Grouped" only the group AVP is listed in table 5.4. Detailed descriptions of the AVPs is provided in clause 7.

End of Change in Clause 5.1.3.2.1

Change in Clause 5.1.3.3

5.1.3.3 Detailed Message Formats

Following the base protocol specification, the following "types" of accounting data may be sent:

- Start session accounting data.
- Interim session accounting data.
- Stop session accounting data.
- Event accounting data.

ACR types Start, Interim and Stop are used for accounting data related to successful SIP sessions. In contrast, Event accounting data is unrelated accounting data, such as a simple registration or interrogation and successful service event triggered by an AS. In addition, Event accounting data are also used for unsuccessful SIP session establishment attempts.

The following table specifies per ACR type the accounting data that are sent by each of the IMS network elements:

- S-CSCF.
- P-CSCF.
- I-CSCF.
- MRFC.
- MGCF.
- BGCF.
- AS.

The ACR types in the table are listed in the following order: S (start)/I (interim)/S (stop)/E (event). Therefore, when all ACR types are possible it is marked as SISE. If only some ACR types are allowed for a node, only the appropriate letters are used (i.e. SIS or E) as indicated in the table heading. The omission of an ACR type for a particular AVP is marked with "-" (i.e. SI-E). Also, when an entire AVP is not allowed in a node the entire cell is marked as "-".

Note that not for all Grouped AVPs the individual AVP members are listed in the table. See clause 7 for a detailed list of the AVP group members and for the description of the AVPs.

For the ACA the same details listed in table 5.8 applies with the addition that *Error-Reporting-Host* AVP is supported in all ACAs in a similar manner as most other base protocol AVPs (e.g. in the same manner as *Origin-State-Id* AVP).

Table 5.8: Detailed Diameter ACR Message Contents for Offline Charging

AVP name	Node Type	S-CSCF	P-CSCF	I-CSCF	MRFC	MGCF	BGCF	AS
	Supported ACRs	S/I/S/E	S/I/S/E	E	S/I/S	S/I/S/E	S/I/S/E	S/I/S/E
AVPs from the Diameter base protocol								
<Session-Id>		SISE	SISE	E	SIS	SISE	SISE	SISE
{Origin-Host}		SISE	SISE	E	SIS	SISE	SISE	SISE
{Origin-Realm}		SISE	SISE	E	SIS	SISE	SISE	SISE
{Destination-Realm}		SISE	SISE	E	SIS	SISE	SISE	SISE
{Accounting-Record-Type}		SISE	SISE	E	SIS	SISE	SISE	SISE
{Accounting-Record-Number}		SISE	SISE	E	SIS	SISE	SISE	SISE
{Vendor-Specific-Application-Id}		SISE	SISE	E	SIS	SISE	SISE	SISE
[Acct-Application-Id]		-	-	-	-	-	-	-
[User-Name] (see note 1)		SISE	SISE	E	SIS	SISE	SISE	SISE

AVP name	Node Type	S-CSCF	P-CSCF	I-CSCF	MRFC	MGCF	BGCF	AS
	Supported ACRs	S/I/S/E	S/I/S/E	E	S/I/S	S/I/S/E	S/I/S/E	S/I/S/E
[Accounting-Sub-Session-Id]		-	-	-	-	-	-	-
[Accounting-RADIUS-Session-Id]		-	-	-	-	-	-	-
[Acct-Multi-Session-Id]		-	-	-	-	-	-	-
[Acct-Interim-Interval]		SIS-	SIS-	-	SIS-	SIS-	SIS-	SIS-
[Accounting-Realtime-Required]		-	-	-	-	-	-	-
[Origin-State-Id]		SISE	SISE	E	SIS	SISE	SISE	SISE
[Event-Timestamp]		SISE	SISE	E	SIS	SISE	SISE	SISE
*[Proxy-Info]		-	-	-	-	-	-	-
*[Route-Record]		-	-	-	-	-	-	-
*[AVP]		-	-	-	-	-	-	-
Diameter Credit Control AVP								
[Subscription-Id]		-	-	-	-	-	-	-
[Requested-Action]		-	-	-	-	-	-	-
*[Requested-Service-Unit]		-	-	-	-	-	-	-
*[Used-Service-Unit]		-	-	-	-	-	-	-
*[Service-Parameter-Info]		-	-	-	-	-	-	-
[Abnormal-Termination-Reason]		-	-	-	-	-	-	-
*[Accounting-Correlation-Id]		-	-	-	-	-	-	-
[Credit-Control-Failure-Handling]		-	-	-	-	-	-	-
[Direct-Debiting-Failure-Handling]		-	-	-	-	-	-	-
[Re-Transmission]		SISE	SISE	E	SIS	SISE	SISE	SISE
3GPP Diameter accounting AVPs								
[Event-Type]		SISE	SISE	E	SIS	SISE	SISE	SISE
[Role-of-Node]		SISE	SISE	E	SIS	SISE	SISE	SISE
[User-Session-Id]		SISE	SISE	E	SIS	SISE	SISE	SISE
[Calling-Party-Address]		SISE	SISE	E	SIS	SISE	SISE	SISE
[Called-Party-Address]		SISE	SISE	E	SIS	SISE	SISE	SISE
[Time-stamps]		SISE	SISE	E	SIS	SISE	SISE	SISE
*[Application-server] (see note 1)		SISE	-	-	-	-	-	-
*[Application-Provided-Called-Party-Address] (see note 1)		SISE	-	-	-	-	-	-
[Inter-Operator-Identifiers] (see note 1)		SISE	SISE	E	SIS	SISE	SISE	SISE
[IMS-Charging-Identifier]		SISE	SISE	E	SIS	SISE	SISE	SISE
*[SDP-Session-Description] (see note 2)		SI-E	SI-E	-	SI-	SI-E	SI-E	SI-E
*[SDP-Media-component] (see note 2)		SI-E	SI-E	-	SI-	SI-E	SI-E	SI-E
[GGSN-Address]		SI-E	SI-E	-	SI-	SI-E	SI-E	SI-E
[Served-Party-IP-Address] (see note 1)		-	SISE	-	-	-	-	-
[Authorized-QoS] (see note 1)		-	SISE	-	-	-	-	-
[Server-Capabilities]		-	-	E	-	-	-	-
[Trunk-Group-ID]		-	-	-	-	SISE	-	-
[Bearer-Service]		-	-	-	-	SISE	-	-
[Service-Id]		-	-	-	SIS	-	-	-
[UUS-Data] (see note 3)		SISE	SISE	-	-	-	-	SISE
NOTE 1: Only present if available in the IMS node.								
NOTE 2: Present in Interim and Event ACRs only if the SIP transactions that triggered the ACR contained SDP.								
NOTE 3: Present only if user-to-user data is included in the SIP message that triggered the ACR.								

End of Change in Clause 5.1.3.3

Change in Clause 6.1.2.1.2.3

6.1.2.1.2.3 Duplicate Detection

The detection of duplicate request is needed and must be enabled. To speed up and simplify as much as possible the duplicate detection, the all-against-all record checking should be avoided and just those records marked as potential duplicates need to be checked against other received requests (within a reasonable time window) by the receiver entity.

The AS/MRFC mark the request messages that are retransmitted after a link failover as possible duplicates with the [T-flag as described in \[3\]](#). ~~Re-Transmission AVP~~. For optimized performance, uniqueness checking against other received requests is only necessary for those records marked with the [T-flag](#) ~~Re-Transmission AVP~~ received within a reasonable time window. This focused check is based on the inspection of the *Session-Id* and *Accounting-Record-Number* AVP pairs.

Note that for IEC the duplicate detection is performed in the Correlation Function that is part of the OCS. The ECF that receives the possible duplicate request should mark as possible duplicate the corresponding request that is sent over the Rc interface.

End of Change in Clause 6.1.2.1.2.3

Change in Clause 6.1.3.2.1

6.1.3.2.1 Accounting-Request Message

Table 6.2 illustrates the basic structure of a Diameter *Accounting-Request* message as used for IMS online charging.

Table 6.2: Accounting-Request (ACR) Message Contents for Online Charging

Diameter Base Protocol AVPs	
AVP	Used in Online ACR
<Diameter Header: 271, REQ, PXY>	Yes
<Session-Id>	Yes
{Origin-Host}	Yes
{Origin-Realm}	Yes
{Destination-Realm }	Yes
{Accounting-Record-Type}	Yes
{Accounting-Record-Number}	Yes
[Acct-Application-Id]	No
[Vendor-Specific-Application-Id]	Yes
[User-Name]	Yes
[Accounting-Sub-Session-Id]	No
[Accounting-RADIUS-Session-Id]	No
[Acct-Multi-Session-Id]	No
[Acct-Interim-Interval]	Yes
[Accounting-Realtime-Required]	No
[Origin-State-Id]	Yes
[Event-Timestamp]	Yes
* [Proxy-Info]	No
* [Route-Record]	No
*[AVP]	No
Diameter Credit Control AVPs	
[Subscription-Id]	Yes
[Requested-Action]	Yes
*[Requested-Service-Unit]	Yes
*[Used-Service-Unit]	Yes
[Tariff-Switch-Definition]	Yes
*[Service-Parameter-Info]	Yes
[Abnormal-Termination-Reason]	Yes
*[Accounting-Correlation-Id]	No
[Credit-Control-Failure-Handling]	Yes
[Direct-Debiting-Failure-Handling]	Yes
[Re-Transmission]	Yes
3GPP Diameter accounting AVPs	
[Event-Type]	Yes
[Role-of-node]	Yes
[User-Session-ID]	Yes
[Calling-Party-Address]	Yes
[Called-Party-Address]	Yes
[Time-stamps]	Yes
*[Application-Server]	No
*[Application-Provided-Called-Party-Address]	No
*[Inter-Operator-Identifier]	Yes
[IMS-Charging-Identifier]	Yes
*[SDP-Session-Description]	Yes
*[SDP-Media-Component]	Yes
[GGSN-Address]	Yes
[Served-Party-IP-Address]	No
[Authorised QoS]	No
[Server-Capabilities]	No
[Trunk-Group-ID]	No
[Bearer-Service]	No
[UUS-Data]	Yes

The detailed use of the AVPs for MRFC/AS and for each ACR record type (start/interim/stop/event) is specified in subclause 6.1.3.3.

End of Change in Clause 6.1.3.2.1**Change in Clause 6.1.3.3****6.1.3.3 Detailed Message Formats**

Following the protocol specifications, the following "types" of accounting data may be sent:

- Start session accounting data.
- Interim session accounting data.
- Stop session accounting data.
- Event accounting data.

ACR types start, interim and stop are used for accounting data related to successful SIP sessions. In contrast, event accounting data is used for session-unrelated accounting data, such as a simple registration or interrogation, and for accounting data related to unsuccessful SIP session establishment attempts.

The following table specifies per ACR type the accounting data that are sent by MRFC and AS.

Tables 6.4 and 6.5 are the basic structure for online charging messages via Ro Interface. This is based directly on the *Accounting-Request* and *Accounting-Answer* messages defined in the Diameter protocol specifications [3] and [13].

Table 6.4: Detailed Diameter ACR Message Contents for online Charging

AVP name	Node Type	MGCF	AS
	Supported ACRs	S/I/S/E	S/I/S/E
AVPs from Diameter Base Protocol			
<Session-ID>		SISE	SISE
{Origin-Host}		SISE	SISE
{Origin-Realm}		SISE	SISE
{Destination-Realm}		SISE	SISE
{Accounting-Record-Type}		SISE	SISE
{Accounting-Record-Number}		SISE	SISE
[Acct-Application-ID]		-	-
[Vendor-Specific-Application-ID]		SISE	SISE
[User-Name]		SISE	SISE
[Accounting-Sub-Session-ID]		-	-
[Accounting-RADIUS-Session-ID]		-	-
[Acct-Multi-Session-ID]		-	-
[Acct-Interim-Interval]		SIS-	SIS-
[Accounting-Realtime-Required]		-	-
[Origin-State-ID]		SISE	SISE
[Event-Timestamp]		SISE	SISE
*[Proxy-Info]		-	-
*[Route-Record]		-	-
*[AVP]		-	-
Diameter Credit-Control AVP			
[Subscription-Id]		SISE	SISE
[Requested-Action]		SISE	SISE
*[Requested-Service-Unit]		SISE	SISE
*[Used-Service-Unit]		SISE	SISE
[Tariff-Switch-Definition]		SISE	SISE
*[Service-Parameter-Info]		SISE	SISE
[Abnormal-Termination-Reason]		SISE	SISE
*[Accounting-Correlation-Id]		SISE	SISE
[Credit-Control-Failure-Handling]		SISE	SISE
[Direct-Debiting-Failure-Handling]		SISE	SISE
*[Granted-Service-Unit]		-	-
[Cost-Information]		-	-
[Final-Unit-Indication]		-	-
[Check-Balance-Result]		-	-
[Re-Transmission]		SISE	SISE
3GPP Diameter Accounting AVPs			
[Event-Type]		SISE	SISE
[Role-of-Node]		SISE	SISE
[User-Session-ID]		SISE	SISE
[Calling-Party-Address]		SISE	SISE
[Called-Party-Address]		SISE	SISE
[Time-stamps]		SISE	SISE
[Application-server]		-	-
[Application-provided-called-party-address]		-	-
[Inter-Operator-Identifiers]		SISE	SISE
[IMS-Charging-Identifier]		SISE	SISE
*[SDP-Session-Description]		SI-E	SI-E
*[SDP-Media-component]		SI-E	SI-E
[SDP-Media-Name]		SI-E	SI-E
[GGSN-Address]		SI-E	SI-E
GPRS-Charging-Id		SI-E	SI-E
[Served-Party-IP-Address]		-	-
[Authorized-QoS]		-	-
[Server-Capabilities]		-	-
[Trunk-Group-ID]		-	-
[Bearer-Service]		-	-
[Service-Id]		-	-
[UUS-Data]		SISE	SISE

End of Change in Clause 6.1.3.3

Change in Clause 7.2

7.2 Additional AVPs

For the purpose of IMS charging additional AVPs are used in ACR and ACA for both online and offline charging. The use of these AVPs are described in subclause 5.1.3 for offline charging and in subclause 6.1.3 for online charging. The information is summarized in table 7.2 along with the AVP flag rules.

Detailed descriptions of AVPs that are used specifically for IMS charging are provided in the subclauses below the table. However, for AVPs that are just borrowed from other applications only the reference (e.g. [13]), is provided in table 7.2 and the detailed description is not repeated.

Table 7.2: Use Of Diameter Credit Control and 3GPP accounting AVPs for IMS

AVP Name	AVP Code	Clause Defined	Value Type	AVP Flag rules				
				Must	May	Should not	Must not	May Encr.
AVPs from Diameter Credit Control								
[Subscription-Id]		[13]						
[Requested-Action]		[13]						
*[Requested-Service-Unit]		[13]						
*[Used-Service-Unit]		7.2.41	Grouped					
{Unit-Type}		7.2.38						
{Unit-Value}		7.2.39						
{Unit-Value-After-Tariff-Switch}		7.3.40	Float64					
{Currency-Code}		[13]						
[Tariff-Switch-Definition]		7.2.34	OctetString					
*[Service-Parameter-Info]		[13]						
[Abnormal-Termination-Reason]		[13]						
*[Accounting-Correlation-Id]		[13]						
[Credit-Control-Failure-Handling]		[13]						
[Direct-Debiting-Failure-Handling]		[13]						
*[Granted-Service-Unit]		7.2.17	Grouped					
{Unit-Type}		7.2.38						
{Unit-Value}		7.2.39						
{Unit-Value-After-Tariff-Switch}		7.3.40	Float64					
{Currency-Code}		[13]						
[Cost-Information]		7.2.11	Grouped					

AVP Name	AVP Code	Clause Defined	Value Type	AVP Flag rules				
				Must	May	Should not	Must not	May Encr.
{Cost}		[13]						
{Currency-Code}		[13]						
[Final-Unit-Indication]		[13]						
[Check-Balance-Result]		[13]						
[Re-Transmission]		[13]						
3GPP Diameter Accounting AVPs								
[Event-Type]		7.2.14	Grouped					
[SIP-Method]		7.2.31	UTF8String					
[Event]		7.2.13	UTF8String					
[Content-Type]		7.2.10	UTF8String					
[Content-Length]		7.2.9	UTF8String					
[Content-Disposition]		7.2.8	UTF8String					
[Role-of-Node]		7.2.24	Enumerated					
[User Session Id]		7.2.42	UTF8String					
[Calling-Party-Address]		7.2.7	UTF8String					
[Called-Party-Address]		7.2.6	UTF8String					
[Time-stamps]		7.2.36	Grouped					
[SIP-Request-Timestamp]		7.2.32	UTF8String					
[SIP-Response-Timestamp]		7.2.33	UTF8String					
[Application-server]		7.2.3	UTF8String					
[Application-provided-called-party-address]		7.2.2	UTF8String					
[Inter-Operator-Identifier]		7.2.20	Grouped					
[Originating-IOI]		7.2.22	UTF8String					
[Terminating-IOI]		7.2.35	UTF8String					
[IMS-Charging-Identifier]		7.2.18	UTF8String					
*[SDP-Session-Description]		7.2.28	UTF8String					
*[SDP-Media-component]		7.2.25	Grouped					
[SDP-Media-Name]		7.2.27	UTF8String					
*[SDP-Media-Description]		7.2.26	UTF8String					
[GPRS-Charging-Id]		7.2.16	UTF8String					
[GGSN-Address]		7.2.15	IPAddress					
[Served-Party-IP-Address]		7.2.29	IPAddress					
[Authorized-QoS]		7.2.4	TBD					
[Server-Capabilities]		[19]						
[Trunk-Group-Id]		7.2.37	Grouped					
[Incoming-Trunk-Group-Id]		7.2.19	UTF8String					
[Outgoing-Trunk-Group-Id]		7.2.23	UTF8String					
[Bearer-Service]		7.2.5	OctetString					
[Service-Id]		7.2.30	UTF8String					
[UUS-Data]		7.2.43	Grouped					
[Amount-of-UUS-data]		7.2.1	UTF8String					
[Mime-type]		7.2.21	UTF8String					
[Direction]		7.2.12	Enumerated					

End of Change in Clause 7.2
End of Document

CHANGE REQUEST

⌘ **32.225 CR 009** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Correction of the accounting session supervision (Offline) - alignment with the Diameter Base protocol	
Source:	⌘	S5	
Work item code:	⌘	OAM-CH	Date: ⌘ 28/02/2003
Category:	⌘	F	Release: ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	The accounting session supervision for offline charging is not in accordance with the Diameter Base protocol.	
Summary of change:	⌘	<ul style="list-style-type: none"> ▪ Removal of reference to the Ts timer. ▪ Definition of application based supervision timer. 	
Consequences if not approved:	⌘	Incompatibility with reference [3] (Diameter Base Protocol).	

Clauses affected:	⌘	4.2.2.1									
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘	Y	N		X		X		X	
Y	N										
	X										
	X										
	X										
		Test specifications									
		O&M Specifications									
Other comments:	⌘										

How to create CRs using this form:

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under [ftp://ftp.3gpp.org/specs/](http://ftp.3gpp.org/specs/). For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Change in Clause 4.2.2.1**4.2.2.1 Offline Specific Base Protocol Requirements**

In order to support the offline charging principles described in the present document, the Diameter client and server must implement at least the following Diameter options listed in [3]:

- To send/receive Abort-Session-Request.
- To send/receive Abort-Session-Answer.

All other options of the Diameter Base Protocol are beyond the scope of the present document.

~~If Acct-Interim-Interval AVP is not used or its value field is set to 0, the timer Ts should have a configurable default value.~~

A configurable timer is supported in the CCF to supervise the reception of the ACR [Interim] and/or ACR [Stop]. An instance of the 'Timer' is started at the beginning of the accounting session, reset on the receipt of an ACR [Interim] and stopped at the reception of the ACR [Stop]. Upon expiration of the timer, the CCF stops the accounting session with the appropriate error indication.

**End of Change in Clause 4.2.2.1
End of Document**

CHANGE REQUEST

⌘ **32.225 CR 010** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Correction of the accounting session supervision (Online) - alignment with the Diameter Base protocol	
Source:	⌘	S5	
Work item code:	⌘	OAM-CH	Date: ⌘ 28/02/03
Category:	⌘	F	Release: ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	The accounting session supervision for online charging is unclear and not in accordance with the Diameter Base protocol.	
Summary of change:	⌘	Alignment of accounting session supervision with Diameter Base protocol. Addition of IMS online Charging behaviour on top of the Diameter Base session supervision.	
Consequences if not approved:	⌘	Ambiguity and incompatibility with reference [3] (Diameter Base Protocol).	

Clauses affected:	⌘	4.2.2.2													
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> <td></td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> <td>Other core specifications</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> <td>Test specifications</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> <td>O&M Specifications</td> </tr> </table>	Y	N			X	Other core specifications		X	Test specifications		X	O&M Specifications	⌘
Y	N														
	X	Other core specifications													
	X	Test specifications													
	X	O&M Specifications													
Other comments:	⌘														

How to create CRs using this form:

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under [ftp://ftp.3gpp.org/specs/](http://ftp.3gpp.org/specs/). For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Change in Clause 4.2.2.2

4.2.2.2 Online Specific Base Protocol Requirements

~~If *Acct-Interim-Interval* AVP is not used or its value field is set to 0, the timer Ts should have a configurable default value.~~

The usage and values of *Acct-Interim-Interval* AVP and the timer 'Ts' are under the sole control of the credit control server (OCS) and determined by operator configuration of the OCS. There are no specific requirements on the client concerning the *Acct-Interim-Interval* AVP population in the ACR.

**End of Change in Clause 4.2.2.2
End of Document**

CHANGE REQUEST

⌘ **32.225 CR 011** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Correction of the support of local file storage and use of FTP for transfer of Accounting Information
Source:	⌘	S5
Work item code:	⌘	OAM-CH
		Date: ⌘ 28/02/2003
Category:	⌘	F
		<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p>Use <u>one</u> of the following categories:</p> <ul style="list-style-type: none"> F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p> </div> <div style="width: 35%;"> <p>Use <u>one</u> of the following releases:</p> <ul style="list-style-type: none"> 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) </div> </div>
Release:	⌘	Rel-5

Reason for change:	⌘	The description in section 4.1.3 was ambiguous.
Summary of change:	⌘	Section 4.1.3 clarified.
Consequences if not approved:	⌘	Ambiguity and technical non-feasibility of the intent in the section.

Clauses affected:	⌘	4.1.3								
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;">X</td> </tr> </table> Other core specifications ⌘ Test specifications O&M Specifications	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
Other comments:	⌘									

How to create CRs using this form:

Change in Clause 4.1.3**4.1.3 Support of Local File Storage**

The present document does not mandate the support of persistent storage on the IMS nodes nor does it require any protocol except Diameter to be used for either online or offline charging. However, if an IMS node supports a local persistent storage media, ~~it-the IMS application should~~ may be able to copy store the accounting information sent to the Diameter client as contained in the Diameter messages on to this local filestore. Operator's post-processing systems may then ~~collect~~ pull the contents of the filestore (~~e.g. via FTP~~) applying the same file transfer procedures as those specified for the 'Bi' interface ~~that are used when accessing the Bi interface at the CCF~~. Further details are implementation specific and are out of the scope of standardisation.

End of Change in Clause 4.1.3
End of Document

CHANGE REQUEST

⌘ **32.225 CR 012** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Correction of abnormal session termination procedure	
Source:	⌘	S5	
Work item code:	⌘	OAM-CH	Date: ⌘ 28/02/2003
Category:	⌘	F	Release: ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	Table 5.1 incorrectly specifies that a 'SIP final response (4xx, 5xx, 6xx)' should trigger the sending of an ACR[Stop].
Summary of change:	⌘	Remove 'SIP final response (4xx, 5xx, 6xx)' as trigger for sending ACR[Stop] message.
Consequences if not approved:	⌘	Abnormal session termination procedure would not work.

Clauses affected:	⌘	5.1.1, 5.1.2.2.1.1								
Other specs affected:	⌘	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications O&M Specifications	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
Other comments:	⌘									

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- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Change in Clause 5.1.1

Table 5.1: Accounting Request Messages Triggered by SIP Methods or ISUP Messages for all IMS nodes except for MRFC and AS

Diameter Message	Triggering SIP Method /ISUP Message	Mandatory/Configurable
ACR [Start]	SIP 200 OK acknowledging an initial SIP INVITE	Mandatory
	ISUP:ANM (applicable for the MGCF)	Mandatory
ACR [Interim]	SIP 200 OK acknowledging a SIP RE-INVITE [e.g. change in media components]	Configurable
	Expiration of AVP [Acct-Interim-Interval]	Configurable
ACR [Stop]	SIP BYE message (both normal and abnormal session termination cases)	Mandatory
	SIP Final Response with error codes 4xx, 5xx or 6xx, indicating termination of an ongoing session	Mandatory
	ISUP:REL (applicable for the MGCF)	Mandatory
ACR [Event]	SIP 200 OK acknowledging non-session related SIP messages, which are: SIP NOTIFY SIP MESSAGE SIP REGISTER SIP SUBSCRIBE	Configurable Configurable Configurable Configurable
	SIP Final Response (4xx, 5xx or 6xx), indicating an unsuccessful SIP session set-up	Configurable *
	SIP Final Response (4xx, 5xx or 6xx), indicating an unsuccessful session-unrelated procedure	Configurable *
	SIP CANCEL, indicating abortion of a SIP session set-up	Configurable *
	I-CSCF completing a Cx Query that was issued in response to a SIP INVITE	Configurable

End of Change in Clause 5.1.1

Change in Clause 5.1.2.2.1.1

5.1.2.2.1.1 Reception of SIP error messages

~~Normally a~~ SIP session is closed ~~abnormally~~ by the reception of ~~the a~~ BYE message ~~indicating the reason for such termination~~. ~~There are, however, a few cases when no BYE message is received and the ACR [Stop] message must be triggered by the reception of other messages.~~

~~ACR [Stop] can also be triggered by the reception of a SIP Final Response with error codes 4xx, 5xx or 6xx, indicating termination of an ongoing session as described in [16].~~

~~NOTE:— This also covers the error handling in originating procedures, as a CANCEL request sent by the originating party to cancel a session invitation will trigger the terminating party to reply with a 487 final response to the INVITE.~~

~~In this case, The an~~ ACR [Stop] message ~~that~~ includes an appropriate error indication ~~is sent~~.

End of Change in Clause 5.1.2.2.1.1

CHANGE REQUEST

⌘ **32.225 CR 013** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Correction of network initiated session release procedure - alignment with SIP (IETF RFC 3261)	
Source:	⌘	S5	
Work item code:	⌘	OAM-CH	Date: ⌘ 28/02/2003
Category:	⌘	F	Release: ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		F (correction)	2 (GSM Phase 2)
		A (corresponds to a correction in an earlier release)	R96 (Release 1996)
		B (addition of feature),	R97 (Release 1997)
		C (functional modification of feature)	R98 (Release 1998)
		D (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	⌘	Alignment with SIP RFC regarding network initiated session release.
Summary of change:	⌘	It is clarified that in case of network initiated session release, the network node will initiate a BYE message immediately, without sending any intermediate requests to the UE, as currently indicated in TS 32.225.
Consequences if not approved:	⌘	The specification will contain faulty information regarding network initiated session release.

Clauses affected:	⌘	5.1.2.1.1.5								
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N	X	X	X	X	X	X
Y	N									
X	X									
X	X									
X	X									
Other comments:	⌘									

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- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Change in Clause 5.1.2.1.1.5

5.1.2.1.1.5 Session Release - Network Initiated

In the case of network initiated session release the IMS node sends a SIP BYE message which is replied to by the UE with a SIP 200 OK message. The charging message flow for this case is identical to the mobile initiated session release described in subclause 5.1.2.1.1.4. ~~However, before invoking the procedure, the UE receives a command requesting session release from the network.~~

End of Change in Clause 5.1.2.1.1.5

CHANGE REQUEST

⌘ **32.225 CR 014** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Correction of media modification procedures - add the UPDATE SIP method		
Source:	⌘ S5		
Work item code:	⌘ OAM-CH Date: ⌘ 28/02/2003		
Category:	<table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> ⌘ F Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900. </td> <td style="width: 50%; vertical-align: top;"> Release: ⌘ Rel-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) </td> </tr> </table>	⌘ F Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Release: ⌘ Rel-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)
⌘ F Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Release: ⌘ Rel-5 Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)		

Reason for change:	⌘ UPDATE SIP method not listed as charging trigger for sending ACR[Interim] in case of media modification.
Summary of change:	⌘ SIP UPDATE is added as a trigger for sending interim charging requests in case of media modification.
Consequences if not approved:	⌘ Media modifications initiated with the UPDATE SIP method can not be charged.

Clauses affected:	⌘ 5.1.1, 5.1.2.1.1.3						
Other specs affected:	<table border="1" style="border-collapse: collapse;"> <tr> <td style="padding: 2px;">Y</td> <td style="padding: 2px;">N</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> </table>	Y	N	⌘	X	Other core specifications	⌘
Y	N						
⌘	X						
	⌘	Test specifications					
	⌘	O&M Specifications					
Other comments:	⌘						

How to create CRs using this form:

Change in Clause 5.1.1

Table 5.1: Accounting Request Messages Triggered by SIP Methods or ISUP Messages for all IMS nodes except for MRFC and AS

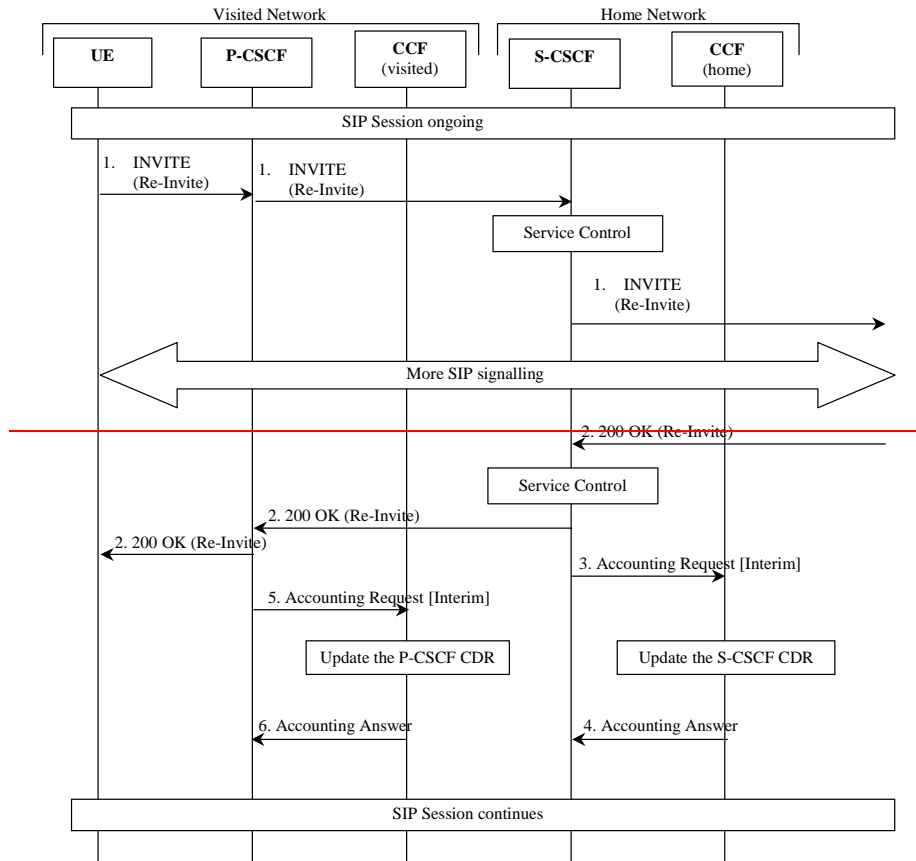
Diameter Message	Triggering SIP Method /ISUP Message	Mandatory/Configurable
ACR [Start]	SIP 200 OK acknowledging an initial SIP INVITE	Mandatory
	ISUP:ANM (applicable for the MGCF)	Mandatory
ACR [Interim]	SIP 200 OK acknowledging a SIP RE-INVITE or SIP UPDATE [e.g. change in media components]	Configurable
	Expiration of AVP [Acct-Interim-Interval]	Configurable
ACR [Stop]	SIP BYE message	Mandatory
	SIP Final Response with error codes 4xx, 5xx or 6xx, indicating termination of an ongoing session	Mandatory
	ISUP:REL (applicable for the MGCF)	Mandatory
ACR [Event]	SIP 200 OK acknowledging non-session related SIP messages, which are: SIP NOTIFY SIP MESSAGE SIP REGISTER SIP SUBSCRIBE	Configurable Configurable Configurable Configurable
	SIP Final Response (4xx, 5xx or 6xx), indicating an unsuccessful SIP session set-up	Configurable *
	SIP Final Response (4xx, 5xx or 6xx), indicating an unsuccessful session-unrelated procedure	Configurable *
	SIP CANCEL, indicating abortion of a SIP session set-up	Configurable *
	I-CSCF completing a Cx Query that was issued in response to a SIP INVITE	Configurable

End of Change in Clause 5.1.1

Change in Clause 5.1.2.1.1.3

5.1.2.1.1.3 Mid-Session Procedures

Figure 5.3 shows the Diameter transactions that are required between CSCF and CCF when a UE generates a [SIP \(Re-\)Invite-INVITE or SIP UPDATE](#) in mid-session, e.g. in order to modify media component(s), or when the hold and resume procedure is executed.



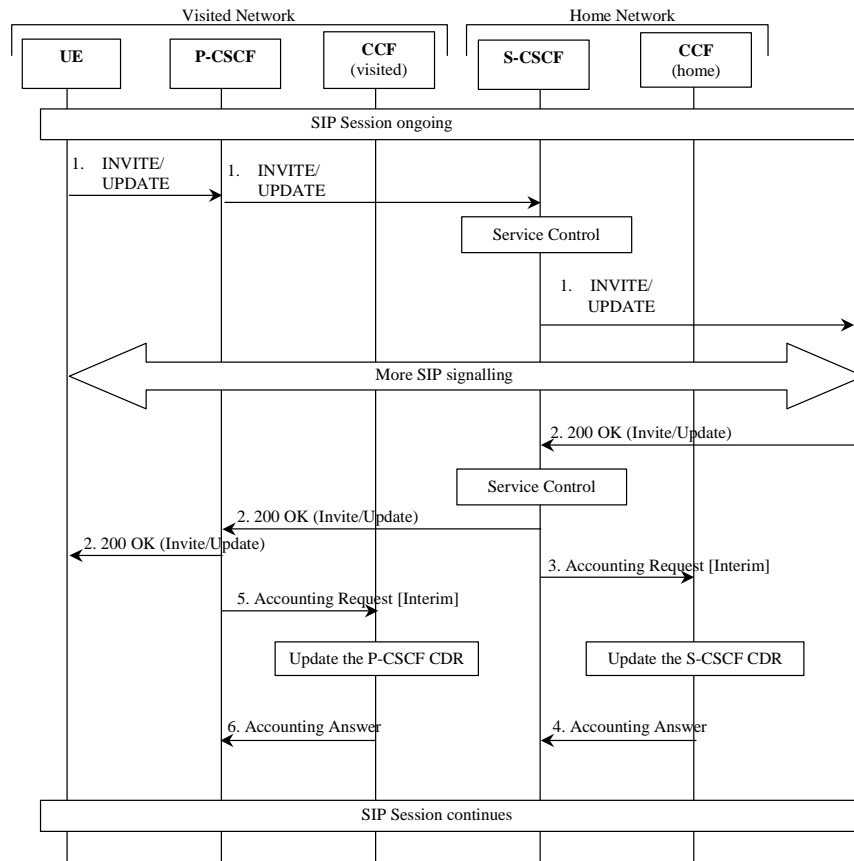


Figure 5.3: Message Sequence Chart for Media Modification

1. Modified media information is received from the subscriber.
2. The destination party acknowledges the media modification.
3. At modification of a media, the S-CSCF sends *Accounting-Request* with *Accounting-Record-Type* indicating INTERIM_RECORD to record modification of a media component in the S-CSCF CDR.
4. The CCF acknowledges the reception of the data and updates the S-CSCF CDR.
5. Same as 3, but for P-CSCF.
6. Same as 4, updating the P-CSCF CDR.

End of Change in Clause 5.1.2.1.1.3
End of Document