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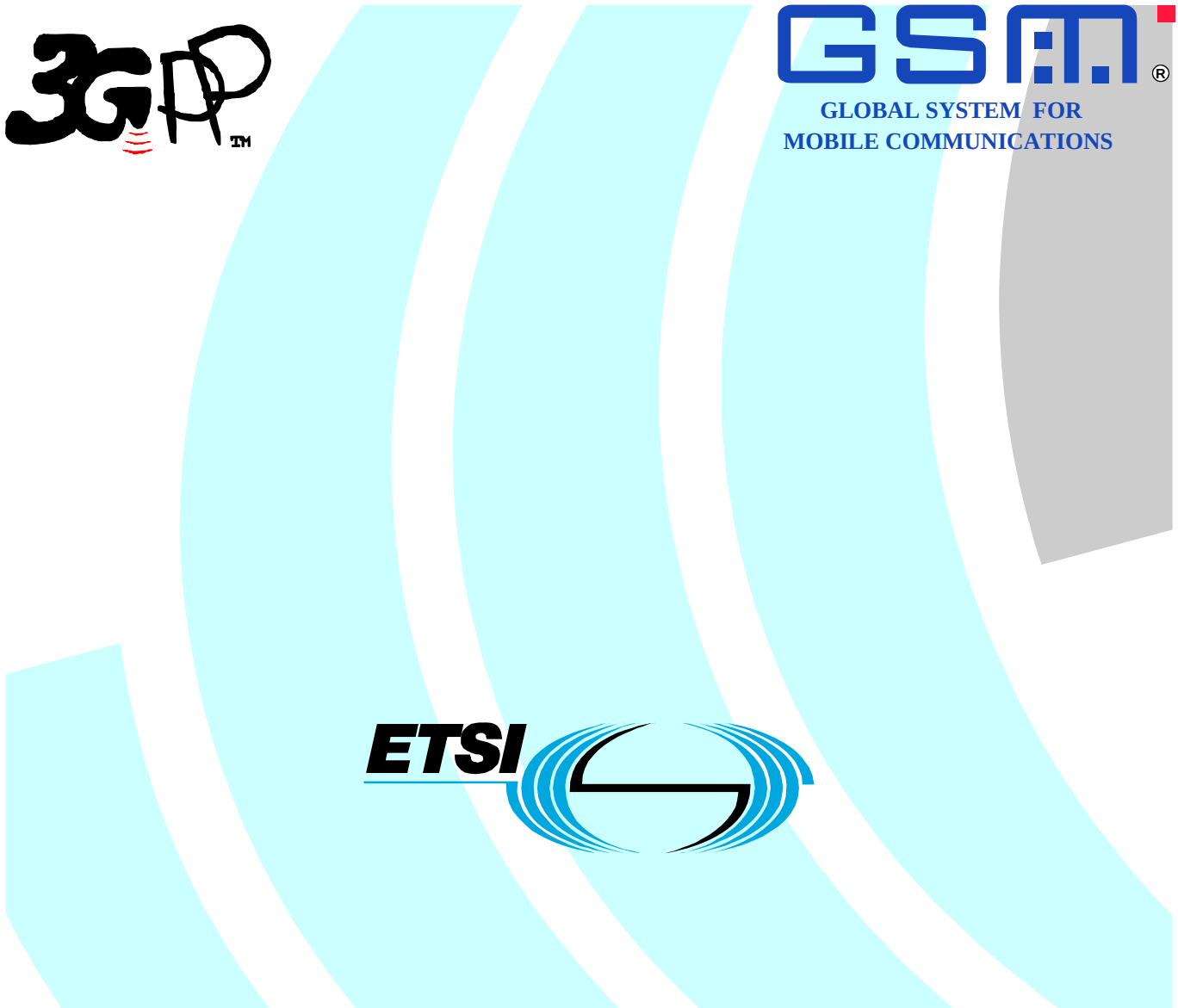
Technical Specification

Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Telecommunication management;
Charging management;
Charging Data Record (CDR) parameter description
(3GPP TS 32.298 version 8.4.0 Release 8)



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Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp.

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

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

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

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

The present document specifies the CDR parameters, the abstract syntax and encoding rules for all the CDR types that are defined in the charging management TSs described above. Therefore, it is only applicable to offline charging. The mechanisms used to transfer the CDRs from the generating node to the operator"s billing domain (e.g. the billing system or a mediation device) are specified in TS 32.297 [42]. Further details with respect to the operator"s billing domain for offline charging are out of scope of 3GPP standardisation.

Note that a generic Diameter application for online charging in 3GPP networks is specified in TS 32.299 [40]. Furthermore, 3GPP TSs are being created to standardise some technical aspects of the operator"s billing domain for online charging, i.e. the Online Charging System (OCS).

All terms, definitions and abbreviations used in the present document, that are common across 3GPP TSs, are defined in the 3GPP Vocabulary, TR 21.905 [50]. Those that are common across charging management in 3GPP domains or subsystems are provided in the umbrella document TS 32.240 [1] and are copied into clause 3 of the present document for ease of reading. Finally, those items that are specific to the present document are defined exclusively in the present document.

Furthermore, requirements that govern the charging work are specified in 3GPP TS 22.115 [101].

2 References

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

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

[1] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging Architecture and Principles".

[2]- [9] Void.

[10] 3GPP TS 32.250: "Telecommunication management; Charging management; Circuit Switched (CS) domain charging".

[11] 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[12] 3GPP TS 32.252: "Telecommunication management; Charging management; Wireless Local Area Network (WLAN) charging".

[13]- [19] Void.

[20] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[21]- [29] Void.

[30] 3GPP TS 32.270: "Telecommunication management; Charging management; Multimedia Messaging Service (MMS) charging".

[31] 3GPP TS 32.271: "Telecommunication management; Charging management; Location Services (LCS) charging".

[32] 3GPP TS 32.272: "Telecommunication management; Charging management; Push-to-talk over Cellular (PoC) charging".

[33] 3GPP TS 32.273: "Telecommunication management; Charging management; Multimedia Broadcast and Multicast Service (MBMS) charging".

[34] Void.

[35] 3GPP TS 32.275: "Telecommunication management; Charging management; MultiMedia Telephony (MMTel) charging".

[36] - [39] Void.

[40] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[42] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Records (CDR) file format and transfer".

[43]- [49] Void.

[50] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[51]- [59] Void.

[60] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[61] 3GPP TS 24.080: "Mobile radio Layer 3 supplementary service specification; Formats and coding". Editor"s note: check if this is the correct reference for the generic ASN.1 module

[62] ETS 300 196: "Digital Subscriber Signalling System No. one (DSS1) protocol".

[63] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[64] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[65] ITU-T Recommendation E.164: The international public telecommunication numbering plan

[66] 3GPP TS 29.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification".

[67] ITU-T Recommendation Q.767: Application of the ISDN user part of CCITT signalling system No. 7 for international ISDN interconnections

[68] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[69] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[70] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[71] 3GPP TS 49.031: "Location Services (LCS); Base Station System Application Part LCS Extension (BSSAP-LE)".

[72] 3GPP TS 23.040: "Technical realization of Short Message Service (SMS)".

[73] 3GPP TS 22.004: "General on supplementary services".

[74] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[75] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[76] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[77] 3GPP TS 23.207: "End-to-end Quality of Service (QoS) concept and architecture".

[78] 3GPP TS 29.207: "Policy control over Go interface".

[79] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[80] 3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[81] 3GPP TS 23.140: "Multimedia Messaging Service (MMS); Functional description; Stage 2".

[82] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[83] OMA Location Working Group "Mobile Location Protocol Specification", [http://www.openmobilealliance.org].

[84] Void.

[85] Void.

[86] 3GPP TS 23.172: "Technical realization of Circuit Switched (CS) multimedia service; UDI/RDI fallback and service modification; Stage 2".

[87] 3GPP TS 23.203: "Policy and Charging control architecture'.

[88] 3GPP TS 29.212: "Policy and Charging control over Gx reference point".

[89] 3GPP TS 29.214: "Policy and Charging control over Rx reference point".

[90] 3GPP TS 24.604: 'Communication Diversion (CDIV) using IP Multimedia (IM); Protocol specification'

[91] 3GPP TS 29.274: "Evolved GPRS Tunnelling Protocol for Control Plane (GTPv2-C); Stage 3".

[92] 3GPP TS 29.275: ' Proxy Mobile IPv6 (PMIPv6) based Mobility and Tunnelling protocols; Stage 3".

[93] - [100] Void.

[101] ITU-T Recommendation X.680 | ISO/IEC 8824-1: "Information technology; Abstract Syntax Notation One (ASN.1): Specification of Basic Notation".

[102] ITU-T Recommendation X.690 | ISO/IEC 8825-1: "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[103] ITU-T Recommendation X.691 | ISO/IEC 8825-2: "Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[104] ITU-T Recommendation X.693 | ISO/IEC 8825-4: "Information technology - ASN.1 encoding rules: XML encoding rules (XER).

[105] ITU-T Recommendation X.2ab CMIP

[106] ITU-T Recommendation X.721 ISO/IEC 10165-2: " Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[107] ITU-T Recommendation X.2cd ACSE

[108] 3GPP TS 29.140: "Multimedia Messaging Service (MMS); MM10 interface Diameter based protocol; Stage 3".

[109] ITU-T Recommendation Q.773: "Transaction capabilities formats and encoding".

[110] IETF RFC 3261: "SIP: Session Initiation Protocol".

[111] IETF RFC 3966: "The tel URI for Telephone Numbers".

[112] IETF RFC 3265: "Session Initiation Protocol (SIP)-Specific Event Notification".

[113] IETF RFC 3455: "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 32.240 [1] and TS 32.297 [42] as well as the following apply:

Billing Domain: part of the operator network, which is outside the core network, which receives and processes CDR files from the core network charging functions. It includes functions that can provide billing mediation and billing or other (e.g. statistical) end applications. It is only applicable to offline charging (see "Online Charging System" for equivalent functionality in online charging).

Charging Data Record (CDR): formatted collection of information about a chargeable event (e.g. time of call set-up, duration of the call, amount of data transferred, etc) for use in billing and accounting. For each party to be charged for parts of or all charges of a chargeable event a separate CDR shall be generated, i.e. more than one CDR may be generated for a single chargeable event, e.g. because of its long duration, or because more than one charged party is to be charged.

offline charging: charging mechanism where charging information **does not** affect, in real-time, the service rendered.

online charging: charging mechanism where charging information can affect, in real-time, the service rendered and therefore a direct interaction of the charging mechanism with bearer/session/service control is required.

Editor"s Note: to be completed based on definitions in TS 32.240 [1] and 32.297 [42].

3.2 Symbols

For the purposes of the present document, the following symbols as specified in TS 32.240 [1], TS 32.297 [42], TS 23.060 [74] and the following apply:

Bx The Interface between a Charging Gateway Function (CGF) and the Billing Domain (BD)
Ga Interface between a node transmitting CDRs (i.e. CDF) and a CDR receiving functionality (CGF)
Gn Interface between two GSNs within the same PLMN.
Gp Interface between two GSNs in different PLMNs. The Gp interface allows support of GPRS network services across areas served by the co-operating GPRS PLMNs.
Rf Offline Charging Reference Point between a Charging Trigger Function (CTF) and the Charging Data Function (CDF)

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3rd Generation Partnership Project
ASN.1	Abstract Syntax Notation One
BD	Billing Domain
BER	Basic Encoding Rules
CS	Circuit Switched
CDF	Charging Data Function
CDIV	Communication Diversion
CDR	Charging Data Record
CGF	Charging Gateway Function
CTF	Charging Trigger Function
GPRS	General Packet Radio Service
IM	IP Multimedia
IMS	IM Subsystem
ISO	International Organisation for Standardisation
ITU	International Telecommunication Union
IP	Internet Protocol
LAN	Local Area Network
LCS	LoCation Service
MME	Mobility Management Entity
MMS	Multimedia Messaging Service
MMTEL	MultiMedia Telephony
PCN	Packet switched Core network Node (SGSN, S–GW, P–GW)
PER	Packed Encoding Rules
P-GW	PDN GateWay
PLMN	Public Land Mobile Network
PS	Packet Switched
RDI	Restricted Digital Information
S-GW	Serving GateWay
SCUDIF	Service Change and UDI/RDI Fallback
UDI	Unrestricted Digital Information
UMTS	Universal Mobile Telecommunications System
WLAN	Wireless LAN
XER	XML Encoding Rules
XML	eXtensible Mark-up Language

4 Architecture Considerations

The following diagram provides a high level view of the parts of the charging architecture that are relevant for the present document. The arrows depict the direction of the charging information flow, where R_f carries charging events, G_a carries CDRs and B_x carries CDR files.

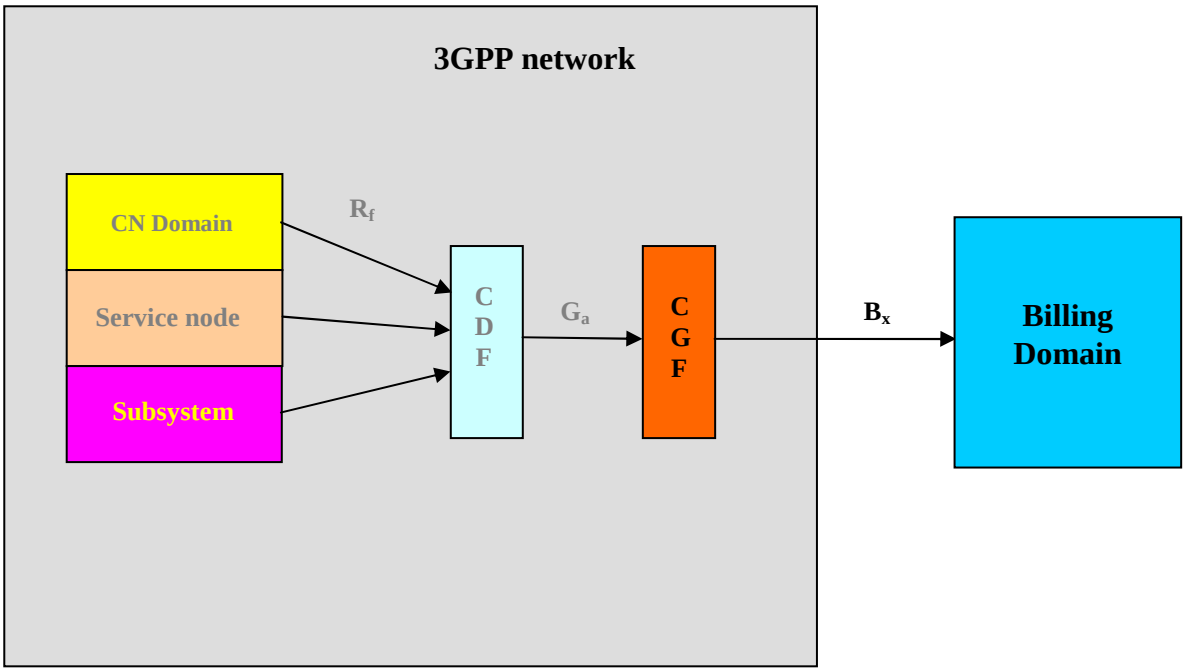


Figure 4.1: Logical offline charging architecture

The present document specifies the parameters, abstract syntax and encoding rules for all 3GPP defined CDR types as applicable to the Bx interface, i.e. the CDR files.

CDF and CGF may or may not be integrated with each others, the core network or service nodes, or the BD.
The possibilities for integration or distribution of these functions are described for each domain, subsystem or service in the respective domain/subsystem/service specific charging TS. In the distributed case, the 3GPP standardised reference points/interfaces depicted above, shall be used.

Refer to TS 32.240 [1] for a complete description of the charging architecture.
Refer to TS 32.297 [42] for the description of the CGF"s file based interface to the BD.

5 CDR parameters and abstract syntax

This clause specifies the parameters and the abstract syntax of the CDRs defined for 3GPP charging management in references[10] to[31]. In doing this, the ASN.1 specified by the ITU-T (ITU-T X.680)[101] is utilised as the notational tool.

This clause is organised in two parts:

- the first part describes the CDR parameters;

- the second part specifies the abstract syntax of the CDRs as seen in the CDR files transferred across the Bx interface.

Each part is further subdivided into a number of subclauses that contain generic, bearer level, service level, and subsystem level CDR parameters and abstract syntax definitions. Word processing features, such as formatting options, have also been used to enhance human readability.

The complete set of all CDR syntax definitions is replicated in annex A in a machine processable format. Technically, the contents of this clause and annex A are completely identical. In case of deviations between this clause and annex A due to errors in the present document, the annex shall prevail.

Note that the encoding rules for the abstract syntax specified in this clause, are detailed in clause 6.

5.1 CDR parameter description

Editor"s note: this subclause needs to be aligned with subclause 5.2 concerning the allocation of parameters to the domains versus making them generic.

5.1.1 Generic CDR parameters

This subclause contains the description of generic CDR parameters, where the term "generic" implies that these parameters are applicable to CDR types of more than one domain/service/subsystem.

5.1.1.1 Serving Network Identity

This field contains a SGSN PLMN Identifier (Mobile Country Code and Mobile Network Code), of the SGSN that was used during the Location request. In case the SGSN changes during the transaction, only the ID of the SGSN that was used at the beginning of the transaction is included in the CDR.

The MCC and MNC are coded as described for "Routing Area Identity" in TS 29.060 [75].

5.1.1.2 Service Context Id

This field contains the Service Context Id from Diameter Accounting, if Diameter Accounting was used and the field included. It identifies the service, sub-system or domain and release that the CDR is applicable to. The contents are described in TS 32.299 [40].

5.1.1.3 Subscription Identifier

This field identifies the charged party . The contents are coded in a similar fashion as for the Subscription-Id AVP in TS 32.299 [50].

5.1.1.4 Service Specific Info

This grouped field holds the sub-fields "service specific data" and "service specific type" if and as provided by an Application Server or PCEF only for pre-defined PCC rules.

5.1.1.5 Service Specific Type

This field holds the type of the Service Specific Data parameter.

5.1.1.6 Service Specific Data

This field contains the value of service specific data.

5.1.2 Bearer level CDR parameters

This subclause contains the description of the CDR parameters that are specific to the bearer level CDR types. This comprises the CDR types from the Circuit Switched (CS) domain (TS 32.250 [10]), the Packet Switched (PS) domain, i.e. GPRS (TS 32.251 [11]), and WLAN (TS 32.252 [12]).

5.1.2.1 CS domain CDR parameters

This subclause contains the description of the CDR parameters that are specific to the CS domain CDR types as specified in TS 32.250 [10].

5.1.2.1.1 Additional Charging Information

This field consists of two parts, a charge indicator and additional charging parameters. The charge indicator is derived from the information contained within the ISUP "backward call indicator" and may be used to store a charge indicator (charge/no charge) received from another network node. The additional charging parameters are non-standard and intended to permit the inclusion of further charging information received from Intelligent Network and/or Value Added Service nodes.

5.1.2.1.2 AoC parameters/change of AoC parameters

The AoC parameter field contains the set of charge advice (AoC) parameters sent to the MS on call set-up. If further sets of parameters are sent during the call, as a result of a tariff switch-over for example, then this may be recorded in the Change of AoC Parameter field including the time at which the change occurred.

It should be noted that the Change of AoC Parms. field is optional and not required if partial records are generated on tariff switch-over.

The AoC parameters are defined in TS 22.024 [63].

5.1.2.1.3 Basic Service/change of service/ISDN Basic Service

The basic service field contains the code of the basic service employed on call set-up. Any alteration to the basic service during the connection may be recorded in the change of service field including the time at which the change took place.

The change of service field is optional and may be omitted if partial records are created whenever the basic service is changed.

The coding of basic services is defined in detail in TS 29.002 [60].

In the case of the transit record the GSM basic service employed is generally not available. However, if the device on which the call originates/terminates is connected via ISDN digital subscriber signalling then the appropriate ISDN basic service code may be recorded in the record. One possible example includes the direct connection of an ISDN PABX to an MSC/VLR.

5.1.2.1.4 Call duration

This field contains the relevant call duration in seconds. For incomplete calls (call attempts) the relevant duration is the call holding time from the seizure to the release of the traffic channel. For complete (answered) calls this is the chargeable duration from answer to release of the traffic channel. For partial records this is the duration of the individual partial record and not the cumulative duration of the call.

It should be noted that the time stamps may be expressed in terms of tenths of seconds or even milliseconds and, as a result, the calculation of the call duration may result in the rounding or truncation of the measured duration to a whole number of seconds.

Whether or not rounding or truncation is to be used is considered to be outside the scope of the present document subject to the following restrictions:

1) A call duration of zero seconds shall not be accepted.

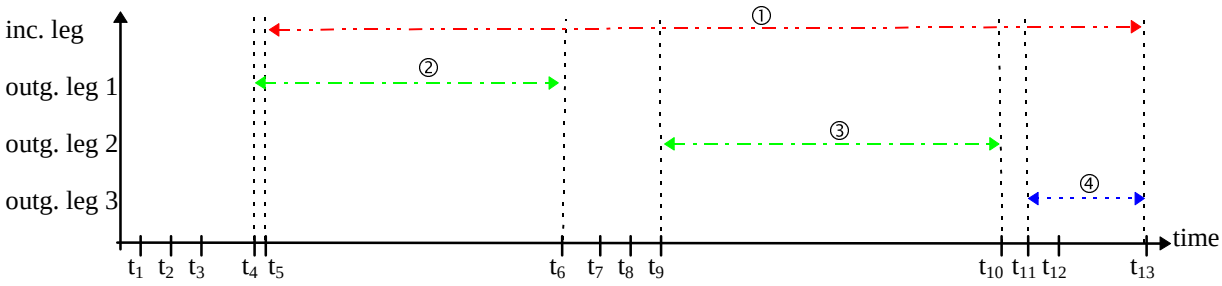
2) The same method of truncation/rounding shall be applied to both single and partial records.

If CAMEL is invoked for the call and a control relationship is existing, the call might continue after a RELEASE or a DISCONNECT from the called party side received by the gsmSSF. The call duration of the incoming leg is stored in the main body of the call record. For each outgoing leg the call duration is stored in the respective 'CAMELInformation' module. If a call leg does not reach answer status and attempt charging is enabled a 'CAMELInformation' module containing the holding time is generated.

An example of how to use the call duration and the timestamps is given in figure 2. It shows a CAMEL controlled mobile originated follow-on scenario. The uppermost arrow ① marks the over all duration of the call that is to be measured and stored in the main body of the respective MOC record. The duration before t_5 (incoming leg) or t_4 (outgoing leg) needs not to be stored since the call is answered later on. The call duration in the first outgoing leg module contains the time interval from t_4 to t_6 (period ②). The call duration measurement of the second outleg is started with t_9 and ended with t_{10} (interval ③).

Since the last outgoing leg is not answered, the respective module contains the holding time starting with t_{11} and ending with t_{13} (period ④).

(The timestamps t_1, t_2, t_3, t_7, t_8 and t_{12} are mentioned for completion reasons only.)



call duration of incoming leg =

call duration of outgoing leg =

holding time of outgoing leg =

Point in time	Signalling message sent/received trigger detection point encountered	Duration logging
t_1	SETUP; TDP(control)	
t_2	IAM	seizure of outg. leg 1
t_3	ACM	
t_4	ANSWER	start of call duration (outg. leg 1)
t_5	CONNECT	start of call duration (inc. leg)
t_6	RELEASE; EDP(control)	stop of call duration (outg. leg 1)
t_7	IAM	seizure of outg. leg 2
t_8	ACM	
t_9	ANSWER	start of call duration (outg. leg 2)
t_{10}	RELEASE; EDP(control)	stop of call duration (outg. leg 2)
t_{11}	IAM	seizure of outg. leg 3 start of holding time (outg. leg 3)
t_{12}	ACM	
t_{13}	RELEASE; EDP(control)	stop of holding time (outg. leg 3)

Figure 5.1: Call duration measurement in follow-on scenarios

5.1.2.1.5 Call reference

This field uniquely identifies a call or transaction on one side of the interface (i.e. 'A' or 'B' side) and is derived from the transaction identifier of TS 24.008 [64]. It is also used to identify all partial records and transactions belonging to the same connection.

For the avoidance of doubt, there is **no** global call reference defined within GSM and the call reference field **cannot** be used to combine, for example, the MOC and MTC records of a mobile-to-mobile connection.

5.1.2.1.6 Calling/called/connected/translated number

In general an ITU-T Recommendation E.164 [65] number but may also include other numbering plans e.g. ITU-T Recommendation X.121. Each of these fields includes the type of number and number plan as specified in detail in TS 24.008 [64]. Where appropriate, these fields may also contain the presentation and screening information also specified in TS 24.008 [64].

The called number is the number received from the mobile station on mobile originated call set-up as defined in TS 24.008 [64]. Similarly, the calling number is the number received from the network on mobile terminated call set-up. In case of CAMEL initiated Call Forward (CF), the called (forwarded-to) number is returned by CAMEL.

The translated number is the result of any digit translation performed by the MSC on the called number received from the mobile station on mobile originated call set-up. This parameter is not included in the CDR if no digit translation has taken place.

The connected number is the number of the actual party reached as defined in TS 24.008 [64]. Although this is normally identical to the called number it may differ. This parameter is not included if identical to the called number.

The following examples are intended to explain the use of these fields:

EXAMPLE 1: Called Number = Connected Number

Normal call from a mobile subscriber to a mobile subscriber or to a PSTN subscriber.

EXAMPLE 2: Called Number != Connected Number

In case of routing to a PABX with Automatic Call Distribution or to an ISDN Basic Access with several devices attached. The connected number is that of the party actually reached. N.B. The recording of the actual number connected may be limited by the capability of intermediate signalling connections.

EXAMPLE 3: MTC record for Call Forwarding ("A" -> "B" -> "C")

In case of call forwarding, the connected number recorded in the MTC record of the "B" subscriber is that of the forwarded-to party or "C" subscriber. The calling party field contains the number of the "A" subscriber.

EXAMPLE 4: Translated Number

This field is only present if digit translation is applied by the MSC to the called number received from the mobile station. Examples include abbreviated dialling codes and service numbers.

5.1.2.1.7 Calling Party Number

This field contains Calling Party Number modified by CAMEL service.

5.1.2.1.8 CAMEL call leg information

This field contains a set of CAMEL information IEs according to the number of outgoing CAMEL call legs.

5.1.2.1.9 CAMEL information

This field contains a list of parameters with information related to one CAMEL outgoing call leg. This parameter list is an Information Element (IE) used in the CAMEL Call Leg Information field.

As a network option, parameters that are identical to the corresponding values in the top level structure of the record are not recorded again. That means whenever a value is not mentioned in this set the value provided in the basic record is valid instead. This might lead to an empty or even absent structure, if no parameter was modified.

5.1.2.1.10 CAMEL initiated CF indicator

The purpose of this field is to distinguish CAMEL call forwarding service scenarios from standard GSM call forwarding scenarios.

From the Basic Call State Model (BCSM)'s point of view this field is set to 'CF' whenever the Originating CAMEL Subscription Information (O_CSI) was applied after terminating CAMEL call processing had been taken place changing the call destination. For the avoidance of doubt: this flag does not depend on other modified call parameter(s) (e.g.: redirection information, etc.) received in the CAP_CONNECT message of the Terminating CAMEL Subscription Information (T_CSI) service.

This flag also indicates that another record might be generated, one containing the charging information related to the terminating CAMEL service and one containing the charging information related to the originating CAMEL service.

5.1.2.1.11 CAMEL modified Service Centre

This field contains SMS-C address modified by CAMEL service. If this field is present the field Service Centre contain SMS-C address before CAMEL modification.

5.1.2.1.12 CAMEL SMS Information

This field contains following CAMEL information for mobile originated and terminated SMS:

- Default SMS handling:

  This field indicates whether or not a CAMEL encounters default SMS handling. This field shall be present only if default SMS handling has been applied.

- Free format data:

  See clause 5.1.2.1.26.

- Calling Party Number:

  This field contains Calling Party Number modified by CAMEL service.

- CAMEL modified Service Centre:

  This field contains SMS-C address modified by CAMEL service.

NOTE 1: This field is only applicable for originated SMS.

- CAMEL Destination Subscriber Number

  This field contains short message Destination Number modified by CAMEL service.

NOTE 2: This field is only applicable for originated SMS.

- SMS Reference Number:

  This field contains the SMS Reference Number assigned to the Short Message by the MSC.

5.1.2.1.13 Cause for termination

This field contains a generalised reason for the release of the connection including the following:

- normal release;
- CAMEL initiated call release;
- partial record generation;

- partial record call re-establishment;
- unsuccessful call attempt;
- abnormal termination during the stable phase;
- unauthorized network originating a location service request;
- unauthorized client requesting a location service;
- position method failure at a location service execution;
- unknown or unreachable LCS client at a location service request.

A more detailed reason may be found in the diagnostics field.

5.1.2.1.14 Channel Coding Accepted/Channel Coding Used

A list of traffic channel codings for HSCSD connections accepted/negotiated by the MS.

These parameters are only present in the CDRs for HSCSD connections.

5.1.2.1.15 Data volume

This field includes the number of 64 octet segments transmitted during the use of data services if known (see clause 5.2.1.7 in TS 32.200 [22]).

5.1.2.1.16 Default call/SMS handling

This field indicates whether or not a CAMEL encountered default call/SMS handling. This field shall be present only if default call/SMS handling has been applied. Parameter is defined in HLR as part of CAMEL subscription information.

5.1.2.1.17 Destination Subscriber Number

This field contains Destination/Called Subscriber Number modified by CAMEL service. If not modified then this field may contain original Destination Number also when CAMEL is not active.

5.1.2.1.18 Diagnostics

This field includes a more detailed technical reason for the release of the connection and may contain one of the following:

- a MAP error from TS 29.002 [60];
- a Cause from TS 24.008 [64];
- a Cause from TS 29.078 [66];
- a Cause from ITU-T Recommendation Q.767 [67];
- a LCS diagnostics according TS 29.002 [60].

The diagnostics may also be extended to include manufacturer and network specific information.

5.1.2.1.19 EMS-Digits

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Digits as defined in TS 29.002 [60].

5.1.2.1.20 EMS-Key

This parameter only applies to location for an emergency services call in North America and gives the North American Emergency Services Routing Key as defined in TS 29.002 [60].

5.1.2.1.21 Entity number

This field contains the ITU-T Recommendation E.164 [65] number assigned to the entity (MSC, VLR, HLR etc.) that produced the record. For further details concerning the structure of MSC and location register numbers see TS 23.003 [68].

5.1.2.1.22 Equipment id

This field contains a local identifier used to distinguish between equipment of the same equipment type e.g. the number of the conference circuit employed if more than one is available.

5.1.2.1.23 Equipment type

This field contains the type of common equipment employed e.g. conference circuit for multi-party service.

5.1.2.1.24 Event time stamps

These fields contain the event time stamps relevant for each of the individual record types.

The call records may contain three significant call handling time stamps:

- the time at which the resource in question was seized (Seizure time);
- the time at which the call was answered or at which charging commences (Answer time);
- the time at which the resource was released (Release time).

For both Mobile Originated and Mobile Terminated calls, the Seizure time is the time at which the traffic channel is allocated i.e. the time at which the ASSIGN COMMAND message is sent to the MS.

For Mobile Originated calls the Answer time is the time at which the CONNECT message is sent to the calling party. For Mobile Terminated calls the time at which the CONNECT message is received from the called party. However, if the subscriber has subscribed to the advice of charge charging level service, then the answer time shall be derived from the time at which the FACILITY message is received from the MS containing the acknowledgement of receipt of the AOC parameters. Similarly, if the AOC parameters are changed during the call then the change time recorded for a subscriber with AOC charging level is the receipt of the FACILITY message from the MS. For a subscriber with AOC information level the change time recorded is the time at which the FACILITY is sent to the MS. Finally, in case of call re-establishment the answer time is the time at which the new traffic channel is allocated by the MSC i.e. when the ASSIGN COMMAND is sent to the MS.

The Release time is the time at which the connection is released by either party i.e. a DISCONNECT or RELEASE is sent by the network or a DISCONNECT is received from the MS. In the case of a radio link failure, the release time is the time at which the failure was detected by the MSC.

For unsuccessful call attempts the Seizure time is mandatory. The Release time is optional and the call duration recorded is the call holding time i.e. the difference between the two.

For successful calls the Answer time is mandatory and both the Seizure and Release times are optional. The call duration recorded is the chargeable duration i.e. the difference between the Answer and Release time stamps.

The event records include the following time stamps:

- HLR-int time: The receipt of a MAP_SEND_ROUTING_INFO request by the HLR;
- Loc.Upd. time: The receipt of a MAP_UPDATE_LOCATION_AREA request by the VLR or the receipt of a MAP_UPDATE_LOCATION request by the HLR;
- SS-Action: The receipt of a supplementary service request by the VLR;

  e.g. MAP_REGISTER_SS, MAP_INVOKE_SS
- SMS-MO: The receipt of an RP_DATA message from the MS containing an SMS_SUBMIT PDU;
- SMS-MT: The transmission of an RP_DATA message to the MS containing an SMS_DELIVER PDU;

- LCS: The time the LR was processed.

It should be noted that the events listed above are only examples in order to demonstrate the principles and that the list is by no means exhaustive.

All time-stamps include a minimum of date, hour, minute and second.

5.1.2.1.25 Fixed Network User Rate

This field indicates the user data rate applied for the connection in the fixed network. In UMTS, it shall be present for all bearer services as specified in TS 22.002 [69]. In GSM, this parameter is part of the HSCSD connection parameters, see clause 5.1.2.1.29.

5.1.2.1.26 Free format data

This field contains charging information sent by the gsmSCF in the Furnish Charging Information (FCI) messages as defined in TS 29.078 [66]. The data can be sent either in one FCI message or several FCI messages with append indicator. This data is transferred transparently in the CAMEL clauses of the relevant call records. 'Free format data' sent to the legID=1 is always stored in the top level of the respective record. 'Free format data' sent to the legID >1 is stored in the appropriate CAMEL call leg information field.

If the FCI is received more then once during one continuing incoming/outgoing CAMEL call leg, the append indicator defines whether the FCI information is appended to previous FCI and stored in the relevant record or the information of the last FCI received is stored in the relevant record (the previous FCI information shall be overwritten).

In the event of partial output the currently valid 'Free format data' is stored in the partial record.

5.1.2.1.27 Free format data append indicator

This field contains an indicator whether free format data is to be appended to free format data stored in previous partial CDR. This field is needed in CDR post-processing to sort out valid free format data for that call leg from sequence of partial records. Creation of partial records is independent on received FCIs and thus valid free format data may be divided to different partial records.

If field is missing then free format data in this CDR replaces all received free format data in previous CDRs. Append indicator is not needed in the first partial record. In following partial records indicator shall get value true if all FCIs received during that partial record have append indicator. If one or more of the received FCIs for that call leg during the partial record do not have append indicator then this field shall be missing.

5.1.2.1.28 GsmSCF address

This field identifies the CAMEL server serving the subscriber. Address is defined in HLR as part of CAMEL subscription information.

5.1.2.1.29 Guaranteed Bit Rate

This field contains the Guaranteed Bit Rate based on the FNUR for transparent and Wanted AIUR for non-transparent CS data services based on the described mapping in TS 27.001 [70]. The Guaranteed Bit Rate may be used to facilitate admission control based on available resources, and for resource allocation within UMTS. The bit-rate of the UMTS bearer service shall guarantee to the user or applications refer 3GPP TS 22.002 [69].

Operator may choose any of the possible values less or equal to wanted AIUR (Air Interface User Rate).
(If WAIUR is less or equal to 14,4 kbit/s then Guaranteed Bit Rate and Maximum Bit Rate shall be set to 14,4 kbit/s).

5.1.2.1.30 HSCSD parameters/Change of HSCSD parameters

The basic HSCSD parameters are negotiated between the MS and the network at call set-up time. They comprise of the following parameters:

- the FNUR (Fixed Network User Rate) (optionally);
- the total AIUR (Air Interface User Rate) requested by the MS (for non-transparent HSCSD connections only);

- a list of the channel codings accepted by the MS;
- the maximum number of traffic channels accepted by the MS (this is noted in the channels requested field);
- the channel coding and the number of traffic channels actually used for the call.

In case the network or user initiated modification procedure takes place during the call, the AIUR requested, the channel coding used and the number of traffic channel requested/used might be recorded in the Change of HSCSD parameters field including the time at which the change occurred and which entity requested the change.

It should be noted that the Change of HSCSD Parameters field is optional and not required if partial records are generated when a Change of HSCSD Parameters takes place.

5.1.2.1.31 Incoming/outgoing trunk group

The incoming trunk group describes the trunk on which the call originates as seen from the MSC. For mobile originated calls this will generally be a BSS trunk. Similarly, the outgoing trunk group describes the trunk on which the call leaves the MSC.

For 3G, this parameter may not be available. When available, this parameter shall be supplied in the CDRs.

5.1.2.1.32 Interrogation result

This field contains the result of the HLR interrogation attempt as defined in the MAP (TS 29.002 [60]).

NOTE: This field is only provided if the attempted interrogation was unsuccessful.

5.1.2.1.33 IMEI Check Event

This field identifies the type of event that caused the IMEI check to take place:

- Mobile originating call attempt;
- Mobile terminating call attempt;
- Mobile originating SMS;
- Mobile terminating SMS;
- Supplementary service actions performed by the subscriber;
- Location update.

5.1.2.1.34 IMEI Status

This field contains the result of the IMEI checking procedure:

- Greylisted;
- Blacklisted;
- Non-whitelisted.

5.1.2.1.35 JIP Parameter

This Jurisdiction Information Parameter (JIP) is populated if received via one of the methods listed as JIP Source. The field shall identify the actual originating exchange and may be equal to 6 or 10 digits for North America Region (NAR). Note that this field may not apply for international areas, as it is not currently used. Additionally, it is also possible to use the LRN as the JIP if it properly identifies the originating switch.

5.1.2.1.36 JIP Query Status Indicator

This field indicates the status of Location Routing Number (LRN) query as follows:

1. Number Portability Data Base (NPDB) returns LRN or NULL response (free of any error).
2. No response was received to the query; the query timed out.
4. Protocol error in received response message.
5. Error detected in response data.
6. Query rejected
9. No query performed
99. Query unsuccessful, reason unknown

If the JIP is equal to the LRN, then the JIP query status shall be the same as the LRN query status. If not, this field shall be set to one of the values listed above.

5.1.2.1.37 JIP Source Indicator

This indicator shall be populated if the Jurisdiction Information Parameter is derived. Identifies the method in which the value was derived. Shall be set to the values listed in the LRN Source Indicator.

5.1.2.1.38 LCS Cause

The LCS Cause parameter provides the reason for an unsuccessful location request according TS 49.031 [71].

5.1.2.1.39 LCS Client Identity

This field contains further information on the LCS Client identity:

- Client External ID;
- Client Dialled by MS ID;
- Client Internal ID.

5.1.2.1.40 LCS Client Type

This field contains the type of the LCS Client as defined in TS 29.002 [60].

5.1.2.1.41 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [71]

5.1.2.1.42 LCS QoS

This information element defines the Quality of Service for a location request as defined in TS 49.031 [71].

5.1.2.1.43 Level of CAMEL service

This field describes briefly the complexity of CAMEL invocation:

- 'Basic' means that CAMEL feature is invoked during the set-up phase (e.g. to modify the destination) of the call only;
- 'Online charging' means that CAMEL supported AoC parameter were sent to the mobile station (the Send Charging Information message, SCI, is received from the gsmSCF);
- The flag 'call duration supervision' is set whenever the call duration supervision is applied in the gsmSSF of the VPLMN (apply charging message is received from the gsmSCF).

5.1.2.1.44 Location/change of location

The location field contains a combination of the Location Area Code (LAC), Cell Identity (CI) and MCC+MNC of the cell in which the served party is currently located. Any change of location may be recorded in the change of location field including the time at which the change took place.

The change of location field is optional and not required if partial records are generated when the location changes.

The LAC and CI are both 2 octet quantities and coded according to TS 24.008 [64].

5.1.2.1.45 Location Estimate

The Location Estimate field is providing an estimate of a geographic location of a target MS according to TS 29.002 [60].

5.1.2.1.46 Location Routing Number (LRN)

This field contains Ten-digit Location Routing Number (LRN) for the Number Portability feature. It is populated if received via one of the methods listed as "LRN Source". It identifies the new location of a ported subscriber. For North America Region (NAR) this may be a 10-digit E.164 number. For Europe, other formats may apply.

If more than 10 digits are received, the first ten digits received are recorded. If fewer than 10 digits are received, the information is left justified in the field and padded with 0xF.

5.1.2.1.47 Location Type

This field contains the type of the location as defined in TS 29.002 [60].

5.1.2.1.48 LRN Query Status Indicator

This field indicates the status of Location Routing Number (LRN) query as follows:

1. Number Portability Data Base (NPDB) returns LRN or NULL response (free of any error);
2. No response was received to the query; the query timed out;
4. Protocol error in received response message;
5. Error detected in response data;
5. Query rejected;
9. No query performed;
99. Query unsuccessful, reason unknown.

It is populated if an NP query was performed.

5.1.2.1.49 LRN Source Indicator

This field indicates whether the Location Routing Number is obtained from LRN NP database or it came in incoming signalling or switching system data.

It is populated if routing information for a ported subscriber is received from one of the methods listed below. It shall be equal to one of the following enumerated values:

1. LRN NP Database;
2. SwitchingSystemData;
3. Incomingsignaling;
9. Unknown.

5.1.2.1.50 Maximum Bit Rate

This field contains the Maximum Bit Rate based on the FNUR (Fixed Network User Rate) for transparent and WAIUR(Wanted Air Interface User Rate) for non-transparent CS data services based on the described mapping in TS 27.001 [70]. The parameter can be used to make code reservations in the downlink of the radio interface for the UMTS bearer service (BS20 and BS30) refer TS 22.002 [69]. Its purpose is

- to limit the delivered bit-rate to applications or external networks with such limitations,
- to allow maximum wanted user bit-rate to be defined for applications able to operate with different rates (e.g. applications with adapting codecs).]

Maximum bit rate is set to the highest value ≤ WAIUR (If WAIUR is less or equal to 14.4 kbit/s then Guaranteed Bit Rate and Maximum Bit Rate shall be set to 14.4 kbit/s)

5.1.2.1.51 Measure Duration

This field contains the duration for the section of the location measurement corresponding to the location request and the location report messages.

5.1.2.1.52 Message reference

This field contains a unique message reference number allocated by the mobile station when transmitting a short message to the service centre. This field corresponds to the TP-Message-Reference element of the SMS_SUBMIT PDU defined in TS 23.040 [72].

5.1.2.1.53 MLC Number

This parameter refers to the ISDN (E.164) number of an MLC.

5.1.2.1.54 Mobile station classmark/change of classmark

This MS classmark field contains the mobile station classmark employed by the served MS on call set-up as defined in TS 24.008 [64] (see mobile station classmark 2). Any alteration in the classmark during the connection may be recorded in the change of classmark field and will include the time at which the change took place.

It should be noted that the change of classmark field is optional and not required if partial records are created when the classmark is altered.

5.1.2.1.55 MOLR Type

The MOLR-Type identifier refers to the type of MO-LR that was invoked as defined in TS 24.080 [61].

5.1.2.1.56 MSC Address

This field contains the ITU-T Recommendation E.164 [65] number assigned to the MSC that produced the record. For further details concerning the structure of MSC numbers see TS 23.003 [68].

5.1.2.1.57 MSC Server Indication

This field contains an indicator whether the CAMEL subscription information is active. The parameter is present for the VT-CSI in the VMSC and not present for the T-CSI in the GMSC.

This indication should be used for differentiation between the validity of the record content for T-CSI in the GMSC and VT-CSI in the VMSC.

5.1.2.1.58 Network Call Reference

Whenever CAMEL is applied, this field is used for correlation of call records outputted from the originating MSC (when applicable), the GMSC and the terminating MSC, and a network optional call record from the gsmSCF.

5.1.2.1.59 Notification to MS user

This field contains the privacy notification to MS user that was applicable when the LR was invoked as defined in TS 29.002 [60].

5.1.2.1.60 Number of DP encountered

This field indicates how often CAMEL armed detection points (TDP and EDP) were encountered and is a measure of signalling between serving network and CAMEL service and complements 'Level of CAMEL service' field. Detection points from all applied CAMEL services for a single call leg and processed in the same gsmSSF shall be counted together.

5.1.2.1.61 Number of forwarding

This field, if provided via ISUP signalling, contains the number of times a call has been forwarded prior to the interrogation of the HLR and is defined in TS 29.002 [60].

5.1.2.1.62 Old /new location

These fields contain the location of a mobile subscriber before and after a location update. In case of VLR location update the location information consists of a VMSC number and location area code. In case of HLR location update the field contains the VMSC number and the VLR number.

5.1.2.1.63 Partial Record Type

This field indicates the event that caused the generation of a partial record.

5.1.2.1.64 Positioning Data

This information element is providing positioning data associated with a successful or unsuccessful location attempt for a target MS according TS 49.031 [71].

5.1.2.1.65 Positioning Data

This information element is providing positioning data associated with a successful or unsuccessful location attempt for a target MS according TS 49.031 [71].

5.1.2.1.66 Privacy Override

This parameter indicates if MS privacy is overridden by the LCS client when the GMLC and VMSC/SGSN for an MT-LR are in the same country as defined in TS 29.002 [60].

5.1.2.1.67 Radio channel requested/radio channel used/change of radio channel

The radio channel requested field contains the type of channel requested by the user. The following values are permitted:

- full rate;
- half rate;
- dual mode half rate preferred;
- dual mode full rate preferred.

The radio channel used field indicates the type of traffic channel actually employed for the connection i.e. either full rate (Bm) or half rate (Lm) as described in GSM 05.01 [xx]. Any change in the type of channel used may be recorded in the change of radio channel used field including the time at which the change occurred and the speech version used after the change of radio channel.

5.1.2.1.68 Rate Indication

This parameter specifies the rate adaptation that was used for the connection. The field is constructed from the information in the parameters "rate adaptation" and "other rate adaptation" signalled between the MS/UE and the network, see TS 24.008 [64].

The format of this field is a single octet with the following format:

- Bits 0-1: the Rate Adaptation field as defined in TS 24.008 [64];
- Bits 2-3: the Other Rate Adaptation field as defined in TS 24.008 [64];
- Bits 4-7: not used.

5.1.2.1.68A Reason for Service Change

This field contains the type of service change requested by the subscriber or performed by the network. Possible values include:

- subscriber initiated;
- network initiated;
- call setup fallback;
- call setup change order.

For further details see 3GPP TS 23.172 [86].

5.1.2.1.69 Record extensions

The field enables network operators and/ or manufacturers to add their own extensions to the standard record definitions.

5.1.2.1.70 Record type

The field identifies the type of the record e.g. mobile originated, mobile terminated etc.

5.1.2.1.71 Recording Entity

This field contains the ITU-T E.164 [65] number assigned to the entity (MSC, VLR, HLR etc.) that produced the record. For further details concerning the structure of MSC and location register numbers see TS 23.003 [68].

5.1.2.1.72 Roaming number

The roaming number field of the MOC record contains the mobile station roaming number as defined in TS 23.003 [68] and coded according to TS 29.002 [60].

5.1.2.1.73 Routing number

The routing number field of the HLR interrogation record contains either a mobile station roaming number or, in case of call forwarding, a forwarded-to number.

5.1.2.1.74 Sequence number

This field contains a running sequence number employed to link the partial records generated for a particular connection.

5.1.2.1.75 Served IMEI

This fields contains the international mobile equipment identity (IMEI) of the equipment served. The term "served" equipment is used to describe the ME involved in the transaction recorded e.g. the called ME in case of an MTC record.

The structure of the IMEI is defined in TS 23.003 [68].

5.1.2.1.76 Served IMSI

This fields contains the international mobile subscriber identity (IMSI) of the served party. The term "served" party is used to describe the mobile subscriber involved in the transaction recorded e.g. the calling subscriber in case of an MOC record.

The structure of the IMSI is defined in TS 23.003 [68].

5.1.2.1.77 Served MSISDN

This fields contains the mobile station ISDN number (MSISDN) of the served party. The term "served" party is used to describe the mobile subscriber involved in the transaction recorded e.g. the called subscriber in case of an MTC record. In case of multi-numbering the MSISDN stored in a MOC record will be the primary MSISDN of the calling party.

The structure of the MSISDN is defined in TS 23.003 [68].

5.1.2.1.78 Service centre address

This field contains a ITU-T Recommendation E.164 [65] number identifying a particular service centre e.g. short message service centre (see TS 23.040 [72]).

5.1.2.1.78A Service Change Initiator

This field indicates that the owner of this CDR is the initiator of the service change.

5.1.2.1.79 Service key

This field identifies the CAMEL service logic applied. Service key is defined in HLR as part of CAMEL subscription information.

5.1.2.1.80 Short message service result

This field contains the result of an attempt to deliver a short message either to a service centre or to a mobile subscriber (see TS 29.002 [60]). Note that this field is only provided if the attempted delivery was unsuccessful.

5.1.2.1.81 Speech version supported/Speech version used

The speech version supported field contains the speech version supported by the MS with the highest priority.
The speech version used field contains the speech codec version assigned for that call. The coding is according GSM 08.08 [xx] speech version identifier with the extension bit 8 set to 0.

It should be noted that the change of radio channel field is optional and not required if partial records are generated.

5.1.2.1.82 System type

This field indicates the use of GERAN, UTRAN (or a value of unknown). This field is present when either the UTRAN or GERAN air-interface is used on call set-up. For an open CDR in a 2G NE (responsible for the CDR), the field is not present (even if the call is handed off to a 3G air interface). For a CDR in a 3G NE (responsible for the CDR), the value unknown shall be used after handover.

5.1.2.1.83 Supplementary service(s)

The supplementary service field in the Supplementary Service record type contains the code of the supplementary service on which the action was performed.

The supplementary services field in the MOC/MTC records contains the codes of the supplementary services invoked as a result of, or during, a connection.

The coding of supplementary service is described in detail in TS 29.002 [60].

5.1.2.1.84 Supplementary service action

This field contains the type of supplementary service action requested by the subscriber or performed by the network. Possible values include:

- registration;
- erasure;
- activation;
- deactivation;
- interrogation;
- invocation.

For further details see TS 22.004 [73].

5.1.2.1.85 Supplementary service action result

This field contains the result of an attempted supplementary service action (see TS 29.002 [60]). Note that this field is only provided if the SS-action was at least partially unsuccessful.

5.1.2.1.86 Supplementary service parameters

This field contains the parameters associated with a supplementary service action requested by the subscriber. For further details of the parameters involved see the GSM 02.8n series of documents.

5.1.2.1.87 Supplementary service(s)

The supplementary service field in the Supplementary Service record type contains the code of the supplementary service on which the action was performed.

The supplementary services field in the MOC/MTC records contains the codes of the supplementary services invoked as a result of, or during, a connection.

The coding of supplementary service is described in detail in TS 29.002 [60].

5.1.2.1.88 Transparency indicator

This field indicates whether the basic service was employed in transparent or non-transparent mode. It should also be noted that this field is only relevant for those services which may be operated in both transparent and non-transparent modes.

5.1.2.1.89 Update result

This field contains the result of the location update request as defined in the MAP (TS 29.002 [60]). Note that this field is only provided if the attempted update was unsuccessful.

5.1.2.1.90 Redial attempt

This field indicates that a call is the result of a redial attempt to switch from speech to multimedia or vice-versa.

5.1.2.2 PS domain CDR parameters

This subclause contains the description of the CDR parameters that are specific to the PS domain CDR types as specified in TS 32.251 [11].

5.1.2.2.1 Access Point Name (APN) Network/Operator Identifier

These fields contain the actual connected Access Point Name Network/Operator Identifier determined either by MS, SGSN/MME or modified by CAMEL service. An APN can also be a wildcard, in which case the SGSN/MME selects the access point address.

Following TS 23.003 [68], the APN field is specified in the CDR by two variable strings. The first is the APN Network Identifier (NI portion) and the second is the APN Operator Identifier (OI portion). The APN NI may contain one or more label as described in TS 23.003 [68]. The APN OI is composed of three labels. The first and second labels together shall uniquely identify the PLMN operator (e.g. "mnc<operator mnc>.mcc<operator mcc>.gprs").

To represent the APN NI and OI in the PCN CDRs, the "dot" notation shall be used.

See 3GPP TS 23.003 [68] and 3GPP TS 23.060 [74] for more information about APN format and access point decision rules.

5.1.2.2.2 APN Selection Mode

This field indicates how the SGSN/MME selected the APN to be used. The values and their meaning are as specified in 3GPP TS 29.060 [75] for GTP case and in 3GPP TS 29.274 [84] for eGTP case.

5.1.2.2.3 CAMEL Charging Information

This field contains the CAMEL Information as defined for the PDP context from the SGSN as the copy including Tag and Length from the SGSN's CDR (S-CDR).

5.1.2.2.4 CAMEL Information

This field includes following CAMEL information elements for PDP context (S-CDR), Attach/Detach session (M-CDR), Mobile originated SMS (S-SMO-CDR) and Mobile terminated SMS (S-SMT-CDR) if corresponding CAMEL service is activated.

- CAMEL Access Point Name NI (S-CDR):

  This field contains the network identifier part of APN before modification by the CSE.

- CAMEL Access Point Name OI (S-CDR):

  This field contains the operator identifier part of APN before modification by the CSE.

- CAMEL Calling Party Number (S-SMO-CDR, S-SMT-CDR):

  This field contains the Calling Party Number modified by the CAMEL service.

- CAMEL Destination Subscriber Number (S-SMO-CDR):

  This field contains the short message Destination Number modified by the CAMEL service.

- CAMEL SMSC Address (S-SMO-CDR):

  This field contains the SMSC address modified by the CAMEL service.

- SCF address (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR):

  This field identifies the CAMEL server serving the subscriber. Address is defined in HLR as part of CAMEL subscription information.

- Service key (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR):

  This field identifies the CAMEL service logic applied. Service key is defined in HLR as part of CAMEL subscription information.

- Default Transaction/SMS Handling (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR):

  This field indicates whether or not a CAMEL encountered default GPRS- or SMS-handling. This field shall be present only if default call handling has been applied. Parameter is defined in HLR as part of CAMEL subscription information.

- Free Format Data (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR):

  This field contains charging information sent by the gsmSCF in the Furnish Charging Information GPRS messages as defined in 3GPP TS 29.078 [66]. The data can be sent either in one FCI message or several FCI messages with append indicator. This data is transferred transparently in the CAMEL clauses of the relevant call records.

  If the FCI is received more then once during one CAMEL call, the append indicator defines whether the FCI information is appended to previous FCI and stored in the relevant record or the information of the last FCI received is stored in the relevant record (the previous FCI information shall be overwritten).

  In the event of partial output the currently valid "Free format data" is stored in the partial record.

- FFD Append Indicator (S-CDR, M-CDR):

  This field contains an indicator whether CAMEL free format data is to be appended to free format data stored in previous partial CDR. This field is needed in CDR post processing to sort out valid free format data for that call leg from sequence of partial records. Creation of partial records is independent of received FCIs and thus valid free format data may be divided to different partial records.

  If field is missing then free format data in this CDR replaces all received free format data in previous CDRs. Append indicator is not needed in the first partial record. In following partial records indicator shall get value true if all FCIs received during that partial record have append indicator. If one or more of the received FCIs for that call leg during the partial record do not have append indicator then this field shall be missing.

- Level of CAMEL services (S-CDR, M-CDR):

  This field describes briefly the complexity of CAMEL invocation. Categories are the same as in circuit switched services and measure of resource usage in VPLMN requested by HPLMN.

  -"Basic" means that CAMEL feature is invoked during the PDP context activation phase only (e.g. to modify APN_NI/APN_OI).

  -"Call duration supervision" means that PDP context duration or volume supervision is applied in the gprsSSF of the VPLMN (Apply Charging message is received from the gsmSCF).

- Number of DPs encountered (S-CDR, M-CDR):

  This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements "Level of CAMEL service" field.

- smsReferenceNumber (S-SMO-CDR, S-SMT-CDR)

  This parameter contains the SMS Reference Number assigned to the Short Message by the SGSN.

5.1.2.2.5 Cause for Record Closing

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

- normal release: IP-CAN bearer release or detach;
- data volume limit;
- time (duration) limit;

- maximum number of changes in charging conditions;
- For SGSN: intra SGSN intersystem change (change of radio interface from GSM to UMTS or vice versa);
- For P-GW and S-GW: Radio Access Technology (RAT) change;
- abnormal termination (IP-CAN bearer or MM context);
- For SGSN: SGSN change;
- For S-GW: S-GW change;
- Timezone change;
- SGSN or S-GW PLMN change;
- unauthorized network originating a location service request;
- unauthorized client requesting a location service;
- position method failure at a location service execution;
- unknown or unreachable LCS client at a location service request;
- management intervention (request due to O&M reasons);

A more detailed reason may be found in the diagnostics field.

5.1.2.2.6 Cell Identifier

For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008 [64], and for UMTS it is defined as the Service Area Code in TS 25.413 [76].

5.1.2.2.7 Charging Characteristics

The Charging Characteristics field allows the operator to apply different kind of charging methods in the CDRs.
A subscriber may have Charging Characteristics assigned to his subscription. These characteristics can be supplied by the HLR/HSS to the SGSN/MME as part of the subscription information, and, upon activation of an IP-CAN bearer, the SGSN/MME forwards the charging characteristics to the GGSN/S-GW according to the rules specified in Annex A of TS 32.251 [11]. This information can be used by the PCNs to activate charging generation and e.g. control the closure of the CDR or the traffic volume containers (see clause 5.1.2.2.23) and applied charging characteristics is included in CDRs transmitted to nodes handling the CDRs via the Ga reference point. It can also be used in nodes handling the CDRs (e.g., the CGF or the billing system) to influence the CDR processing priority and routing. These functions are accomplished by specifying the charging characteristics as sets of charging profiles and the expected behaviour associated with each profile.
The interpretations of the profiles and their associated behaviours can be different for each PLMN operator and are not subject to standardisation. In the present document only the charging characteristic formats and selection modes are specified.

The functional requirements for the Charging Characteristics as well as the profile and behaviour bits are further defined in normative Annex A of TS 32.251 [11], including the definitions of the trigger profiles associated with each CDR type.

The format of charging characteristics field is depicted in Figure 4. Px (x =0..3) refers to the Charging Characteristics Profile index. Bits classified with a "B" may be used by the operator for non-standardised behaviour (see Annex A of TS 32.251 [11]).

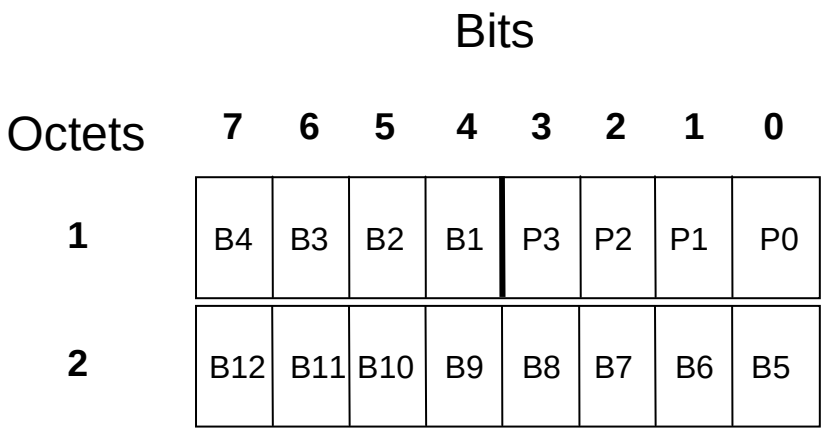


Figure 5.1.2.2.7.1: Charging Characteristics flags

5.1.2.2.8 Charging Characteristics Selection Mode

This field indicates the charging characteristic type that the PCNs applied to the CDR. In the SGSN the allowed values are:

- Home default;
- Visiting default;
- Roaming default;
- APN specific;
- Subscription specific.

In the S-GW/P-GW the allowed values are:

- Home default;
- Visiting default;
- Roaming default;
- Serving node supplied.

NOTE: The value 'Serving Node Supplied' is used if the CC what was received from e.g. S-GW is used i.e. the one what comes during bearer activation.

Further details are provided in TS 32.251 [11] Annex A.

5.1.2.2.9 Charging ID

This field is a charging identifier, which can be used together with P-GW address to identify all records produced in SGSN(s), S-GW and P-GW involved in a single IP-CAN bearer. Charging ID is generated by P-GW at IP-CAN bearer activation and transferred to bearer requesting SGSN/S-GW. At inter-SGSN/S-GW change the charging ID is transferred to the new SGSN/S-GW as part of each active IP-CAN bearer.

Editor"s note: The generation of the Charging ID incase of PMIP is ffs.

Different P-GWs allocate the charging ID independently of each other and may allocate the same numbers.
The CGF and/or BS may check the uniqueness of each charging ID together with the P-GWs address and optionally (if still ambiguous) with the record opening time stamp.

5.1.2.2.10 Destination Number

This field contains short message Destination Number requested by the user. See 32.250 [10].

5.1.2.2.11 Diagnostics

This field includes a more detailed technical reason for the releases of the connection refer TS 32.250 [10]. The diagnostics may also be extended to include manufacturer and network specific information.

5.1.2.2.12 Duration

This field contains the relevant duration in seconds for IP-CAN bearer (S-CDR, SGW-CDR, PGW-CDR, and attachment (M-CDR).
It is the duration from Record Opening Time to record closure. For partial records this is the duration of the individual partial record and not the cumulative duration.

It should be noted that the internal time measurements may be expressed in terms of tenths of seconds or even milliseconds and, as a result, the calculation of the duration may result in the rounding or truncation of the measured duration to a whole number of seconds.

Whether or not rounding or truncation is to be used is considered to be outside the scope of the present document subject to the following restrictions:

1) A duration of zero seconds shall be accepted providing that the transferred data volume is greater than zero.

2) The same method of truncation/rounding shall be applied to both single and partial records.

5.1.2.2.13 Dynamic Address Flag

This field indicates that PDN address has been dynamically allocated for that particular IP CAN bearer (PDN connection). This field is missing if address is static. Dynamic address allocation might be relevant for charging e.g. as one resource offered and possible owned by network operator.

5.1.2.2.14 Event Time Stamps

These fields contain the event time stamps relevant for each of the individual record types.

All time-stamps include a minimum of date, hour, minute and second.

5.1.2.2.15 External Charging Identifier

A Charging Identifier received from a non-EPC, external network entity.

- When inter-working with IMS the external charging identifier is the ICID (IMS Charging IDentifier) as received from the IMS network by the P-GW;

- If required, Inter-working with other external entities will be subject of specification for further releases.

5.1.2.2.16 GGSN Address Used

This field is the current serving GGSN/P-GW IP Address for the Control Plane. If both an IPv4 and an IPv6 address of the GGSN/P-GW are available, the SGSN shall include the IPv4 address in the CDR.

5.1.2.2.17 IMS Signalling Context

Indicates if the IP-CAN bearer is used for IMS signalling. It is only present if the IP-CAN bearer is an IMS signalling bearer. A IP-CAN bearer for IMS signalling is determined via the "IM CN Subsystem Signalling Flag" conveyed via the "Activate PDP context request" message from the MS to the network (refer to TS 24.008 [64]).

5.1.2.2.18 LCS Cause

The LCS Cause parameter provides the reason for an unsuccessful location request according TS 49.031 [71].

5.1.2.2.19 LCS Client Identity

This field contains further information on the LCS Client identity:

- Client External ID;

- Client Dialled by MS ID;

- Client Internal ID.

5.1.2.2.20 LCS Client Type

This field contains the type of the LCS Client as defined in TS 29.002 [60].

5.1.2.2.21 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [71].

5.1.2.2.22 LCS QoS

This information element defines the Quality of Service for a location request as defined in TS 49.031 [71].

5.1.2.2.22A List of Service Data

This list includes one or more service data containers. Depending the reporting level of PCC rules one service data container either includes charging data for one rating group or for one rating group and service id combination. Each service data container may include the following fields:

AF-Record-Information
Charging Rule Base Name
Data Volume Downlink
Data Volume Uplink
Event Based Charging Information
Local Sequence Number
PS Furnish Charging Information
Qos Information
Rating Group
Report Time
Result Code
Service Condition Change
Service Identifier
Service Specific Info
Serving Node Address
Time of First Usage
Time of Last Usage
Time Quota Mechanism
Time Usage
user location information

Rating Group is the identifier of rating group. This field is mandatory. The parameter corresponds to the Charging Key as specified in TS 23.203 [87].

Charging Rule Base Name is the reference to group of PCC rules predefined at the PCEF. This field is included if any of the PCC rules, which usage is reported within this service data container, was activated by using the Charging Rule Base Name as specified in TS 29.212 [88]. In case multiple Charging Rule Base Names activate PCC rules, which usage is reported within this service data container, the P-GW shall include only one occurrence to the service data container.

Result Code contains the result code after the interconnection with the OCS. This field may be added to the service data container if online and offline charging are both used for same rating group. The result code in service data container is the value of the Result-Code AVP received within last CCA message in corresponding MSCC AVP to this service data container.

Local Sequence Number is a service data container sequence number. It starts from 1 and is increased by 1 for each service date container generated within the lifetime of this IP-CAN bearer.

Time of First Usage is the time stamp for the first IP packet to be transmitted and mapped to the current service data container. For envelope reporting controlled by the Time Quota Mechanism, this indicates the time stamp for the first IP packet to be transmitted that causes an envelope to be opened – see TS 32.299 [40].

Time of Last Usage is the time stamp for the last IP packet to be transmitted and mapped to the current service data container. For envelope reporting, controlled by the Time Quota Mechanism, this indicates the time stamp for an envelope to be closed – see TS 32.299 [40] for conditions for envelope closure.

Time Usage contains the effective used time within the service data container recording interval.

Service Condition Change defines the reason for closing the service data container (see TS 32.251 [11]), such as tariff time change, IP-CAN bearer modification(e.g. QoS change, S-GW change, user location change), service usage thresholds, service idled out, termination or failure handling procedure. This field is specified as bitmask for support of multiple change trigger (e.g. S-GW and QoS change). For envelope reporting, the Service Condition Change value shall always take the value "envelopeClosure". The mechanism for creating the envelope is identified within the Time Quota Mechanism field.

Qos Information in IP CAN bearer specific service data container contains the negotiated QoS applied for the IP CAN bearer. QoS Information in service specific service data containers contains the QoS applied for the service. This is included in the first service data container. In following container QoS information is present if previous change condition is "QoS change". The P-GW shall include only one QoS Information occurrence to one service data container.

Serving Node Address contains the valid serving node (e.g.SGSN/S-GW) control plane IP address during the service data container recording interval.

Data Volume Uplink and **Downlink,** includes the number of octets transmitted during the service data container recording interval in the uplink and/or downlink direction, respectively.

Report Time is a time stamp, which defines the moment when the service data container is closed.

Service Identifier is an identifier for a service. The service identifier may designate an end user service, a part of an end user service or an arbitrarily formed group thereof. This field is only included if reporting is per combination of the rating group and service id.

PS Furnish Charging Information includes charging information per rating group in case it is sent by OCS.

User location information contains the user location (e.g. CGI/SAI, ECGI/TAI or RAI) where the UE was located during the service data container recording interval. This is included in the service data container only if previous container"s change condition is "user location change". Note the user location information in PGW-CDR main level contains the location where the UE was when PGW-CDR was opened.

AF-Record-Information includes the "AF Charging Identifier" (ICID for IMS) and associated flow identifiers generated by the AF and received by the P-GW over Gx interfaces as defined in TS 29.212 [88]. In case usage of PCC rules, which usage is reported within the container, has different AF-Record-Information then the P-GW shall include only one occurrence to the service data container.

Event Based Charging Information includes the number of events and associated timeStamps (each event is timestamped) during the service data container recording interval.

Time Quota Mechanism contains two further subfields and is included if envelope reporting is required:

Time Quota Type identifies the mechanism by which time based usage should be reported – as defined in 3GPP TS 32.299 [50].

Base Time Interval identifies the length of the base time interval, for controlling the reporting of time based usage, in seconds.

Service Specific Info holds service specific data for a pre-defined PCC rule that is used for enhanced packet filtering.

5.1.2.2.23 List of Traffic Data Volumes

This list applicable in S-CDR and SGW-CDR includes one or more containers, each includes the following fields:

Data Volume Uplink, Data Volume Downlink, Change Condition and Change Time.

Data Volume Uplink includes the number of octets transmitted during the use of the packet data services in the uplink direction. In MBMS charging, this field is normally to be set to zero, because MBMS charging is based on the volume of the downlink data. The counting of uplink data volumes is optional. In S-CDR this field is not present when the SGSN has successfully established Direct Tunnel between the RNC and the GGSN.

Data Volume Downlink includes the number of octets transmitted during the use of the packet data services in the downlink direction. In S-CDR this field is not present when the SGSN has successfully established Direct Tunnel between the RNC and the GGSN.

Change Condition defines the reason for closing the container (see TS 32.251 [11]), such as tariff time change, QoS change or closing of the CDR.

Change Time is a time stamp, which defines the moment when the volume container is closed or the CDR is closed. All the active IP-CAN bearers do not need to have exactly the same time stamp e.g. due to same tariff time change (variance of the time stamps is implementation and traffic load dependent, and is out of the scope of standardisation).

User Location Information contains the location (e.g. CGI/SAI, ECGI/TAI or RAI) where the UE is located and used during the transfer of the data volume captured by the container (applicable only to the SGW-CDR). This is included in the Traffic data container only if previous container"s change condition is "user location change". Note the user location information in SGW-CDR main level contains the location where the UE was when PGW-CDR was opened.

First container includes following optional fields: QoS Requested (not in SGW-CDR) and QoS Negotiated. In following containers QoS Negotiated is present if previous change condition is "QoS change". In addition to the QoS Negotiated parameter the QoS Requested parameter is present in following containers if the change condition is "QoS change" and the QoS change was initiated by the MS via a IP-CAN bearer modification procedure.

Table 5.1.2.2.23.1 illustrates an example of a list, which has five containers (sets of volume counts) caused by one QoS change, one location change, one tariff time change and one Direct Tunnel establishment (direct tunnel change applicable in S-CDR only). When CDR is opened the subscriber is in CGI1.

Table 5.1.2.2.23.1: Example list of traffic data volumes

QoS Requested = QoS1 QoS Negotiated = QoS1 Data Volume Uplink = 1 Data Volume Downlink = 2 Change Condition = QoS change Time Stamp = TIME1	QoS Requested = QoS2 (if requested by the MS) QoS Negotiated = QoS2 Data Volume Uplink = 5 Data Volume Downlink = 6 Change Condition = Tariff change Time Stamp = TIME2	 Data Volume Uplink = 10 Data Volume Downlink = 3 Change Condition = CGI/SAI Change Time Stamp = TIME3

Data Volume Uplink = 3 Data Volume Downlink = 4 User Location Info = CGI2 Change Condition = Direct Tunnel establishment Occurrence Time Stamp = TIME4	Change Condition = Record closed Time Stamp = TIME5

First container includes initial QoS values and corresponding volume counts. Second container includes new QoS values and corresponding volume counts before tariff time change. Third container includes the indication of location change and corresponding volume counts before the location change and after the tariff time change. Fourth container includes volume counts after the location change and contains the indication of Direct Tunnel establishment. Last container includes no volume count as it refers to Direct Tunnel establishment. The total volume counts can be itemised as shown in Table 5.1.2.2.23.2 (tariff1 is used before and tariff2 after the tariff time change):

Table 5.1.2.2.23.2: Itemised list of total volume count corresponding to Table 5.1.2.2.23.1

		Container
QoS1+Tariff1	uplink = 1, downlink = 2	1
QoS2+Tariff1	uplink = 5, downlink = 6	2
QoS2+Tariff2	uplink = 13, downlink = 7	3+4
QoS1	uplink = 1, downlink = 2	1
QoS2	uplink = 18, downlink = 13	2+3+4
Tariff1	uplink = 6, downlink = 8	1+2
Tariff2	uplink = 13, downlink = 7	3+4
CGI1	uplink = 16, downlink = 11	1+2+3
CGI2	uplink = 3, downlink = 4	4
No Direct Tunnel	uplink = 19, downlink = 15	1+2+3+4
Direct Tunnel	-, -	5

The amount of data counted in the S-GW shall be the payload of the user plane at the S1-U/S4/S2interface. Therefore the data counted already includes the IP PDP bearer protocols i.e. IP or PPP.

The data volume counted in the SGSN is dependent on the system. For GSM SGSN the data volume is the payload of the SNDCP PDUs at the Gb interface. For UMTS-SGSN it is the GTP-U PDUs at the Iu-PS interface. Therefore, in both systems, the data counted already includes the overheads of any PDP bearer protocols.

In GSM, in order to avoid that downstream packets transmitted from the old SGSN to the new SGSN at inter SGSN RA update induce the increase of the PDP CDR downstream volume counters in both SGSN the following rules must be followed:

- For PDP contexts using LLC in unacknowledged mode: an SGSN shall update the PDP CDR when the packet has been sent by the SGSN towards the MS;

  For PDP contexts using LLC in acknowledged mode, a GSM-SGSN shall only update the PDP CDR at the reception of the acknowledgement by the MS of the correct reception of a downstream packet. In other worlds, for inter SGSN RA update, the new SGSN shall update the PDP CDR record when a downstream packet sent by the old SGSN is received by the MS and acknowledged by the MS towards the new SGSN through the RA update complete message.

In UMTS, the not transferred downlink data can be accounted for in the S-CDR with "RNC Unsent Downlink Volume" field, which is the data that the RNC has either discarded or forwarded during handover. Data volumes retransmitted (by RLC or LLC) due to poor radio link conditions shall not be counted.

5.1.2.2.24 Local Record Sequence Number

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 one node, which is identified either by field Node ID or by record-dependent node address (SGSN address, S-/P-GW address, Recording Entity).

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

5.1.2.2.25 Location Estimate

The Location Estimate field is providing an estimate of a geographic location of a target MS according to 3GPP TS 29.002 [60].

5.1.2.2.26 Location Method

The Location Method identifier refers to the argument of LCS-MOLR that was invoked as defined in 24.080 [61].

5.1.2.2.27 Location Type

This field contains the type of the location as defined in TS 29.002 [60].

5.1.2.2.28 Measurement Duration

This field contains the duration for the section of the location measurement corresponding to the Perform_Location_Request and Perform_Location_Response by the SGSN.

5.1.2.2.29 Message reference

This field contains a unique message reference number allocated by the Mobile Station (MS) when transmitting a short message to the service centre. This field corresponds to the TP-Message-Reference element of the SMS_SUBMIT PDU defined in 3GPP TS 23.040 [72].

5.1.2.2.30 MLC Number

This parameter refers to the ISDN (E.164) number of a GMLC.

5.1.2.2.31 MS Network Capability

This MS Network Capability field contains the MS network capability value of the MS network capability information element of the served MS on PDP context activation or on GPRS attachment as defined in 3GPP TS 24.008 [64].

5.1.2.2.32 MS Time Zone

This field contains the 'Time Zone' IE provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification procedure as specified in TS 29.060 [75].

5.1.2.2.33 Network Initiated PDP Context

This field in S-CDR indicates that PDP context is network initiated. The field is missing in case of mobile activated PDP context.

5.1.2.2.34 Node ID

This field contains an optional, operator configurable, identifier string for the node that had generated the CDR. The Node ID may or may not be the DNS host name of the node.

5.1.2.2.35 Notification to MS user

This field contains the privacy notification to MS user that was applicable when the LR was invoked as defined in TS 29.002 [60].

5.1.2.2.35a P-GW Address Used

These field is the serving P-GW IP Address for the Control Plane. If both an IPv4 and an IPv6 address of the P-GW is available, the P-GW shall include the IPv4 address in the CDR.

5.1.2.2.36 PDP Type

This field defines the PDP type, e.g. IP, PPP, or IHOSS:OSP (see 3GPP TS 29.060 [75] for exact format).

5.1.2.2.36a PDP/PDN Type

This field defines the bearer type, e.g. IP, PPP, or IHOSS:OSP. See

- TS 29.060 [75] for exact format of PDP type for GTP case,
- TS 29.274 [91] for exact format of PDN type for eGTP
- TS 29.275 [92] for exact format of PDN type for PMIP.

5.1.2.2.37 Positioning Data

This information element is providing positioning data associated with a successful or unsuccessful location attempt for a target MS according TS 49.031 [71].

5.1.2.2.38 Privacy Override

This parameter indicates if the LCS client overrides MS privacy when the GMLC and VMSC/SGSN for an MT-LR are in the same country as defined in TS 29.002 [60].

5.1.2.2.39 PS Furnish Charging Information

This field includes following information elements for IP-CAN bearer (PGW-CDR):

- PS Free Format Data

  This field contains charging information sent by the OCS in the Diameter Credit Control *Credit-Control-Answer* messages as defined in TS 32.251 [11]. The data can be sent either in one Diameter Credit Control *Credit-Control-Answer* message or several Diameter Credit Control *Credit-Control-Answer* messages with append indicator. This data is transferred transparently in the PS Furnish Charging Information field of the relevant call records.

  If the PS Free Format Data is received more than once during one IP-CAN bearer for which an offline session is established, the append indicator defines whether the PS Free Format Data is appended to previous received PS Free Format Data and stored in the relevant record or the information of the last PS Free Format Data received is stored in the relevant record (the previous PS Free Format Data information shall be overwritten).

  In the event of partial output the currently valid "PS Free format data" is stored in the partial record.

- PS FFD Append Indicator:

  This field contains an indicator whether PS free format data is to be appended to the PS free format data stored in previous partial CDR. This field is needed in CDR post processing to sort out valid PS free format data for that IP-CAN bearer from sequence of partial records. Creation of partial records is independent of received PS Free Format Data and thus valid PS free format data may be divided to different partial records.

  If field is missing then the PS free format data in this CDR replaces all received PS free format data in previous CDRs. Append indicator is not needed in the first partial record. In following partial records indicator shall get value true if all PS Free Format Data received during that partial record have append indicator. If one or more of the received PS Free Format Data for that PDP Context during the partial record do not have append indicator then this field shall be missing.

5.1.2.2.40 QoS Requested/QoS Negotiated

Quality of Service Requested contains the QoS desired by MS at IP-CAN bearer activation. QoS Negotiated indicates the applied QoS accepted by the network.

If a pre-Release '99 only capable terminal is served, the applicable QoS parameters and their encoding in the CDRs are specified in TS 32.015 [xx].

In all other cases, the applicable QoS attributes are defined in the "Quality of Service profile" in TS 23.060 [74], and their encoding in the CDR corresponds to the "Quality of Service profile" specified in TS 29.060.[75].

5.1.2.2.41 RAT Type

Holds the value of RAT Type, as provided to S-GW and P-GW, described in

- TS 29.060 [75] for GTP case.
- TS 29.274 [91] for eGTP case and
- TS 29.275 [92] for PMIP case.

The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification.

5.1.2.2.42 Record Extensions

This field enables network operators and/or manufacturers to add their own recommended extensions to the standard record definitions. This field contains a set of "management extensions" as defined in ITU-T X.721 [106]. This is conditioned upon the existence of an extension.

5.1.2.2.43 Record Opening Time

This field contains the time stamp when the MS is attached to a SGSN (M-CDR) or IP-CAN bearer is activated in SGSN/S-GW/P-GW (S-CDR, SGW-CDR, PGW-CDR) or record opening time on subsequent partial records (see 3GPP TS 32.250 [4] for exact format).

Record opening reason does not have a separate field. For SGW/PGW-CDRs and M-CDR it can be derived from the field "Sequence number"; i.e. either a missing field or a value one (1) means activation of IP-CAN bearer (SGW/PGW-CDR) or GPRS attachment (M-CDR). For the S-CDR the field "SGSN change" also needs to be taken into account.

5.1.2.2.44 Record Sequence Number

This field contains a running sequence number employed to link the partial records generated in the SGSN/SGW/PGW for a particular MM context or IP-CAN bearer (characterised with the same Charging ID and PGW address pair). For M-CDR or S-CDR the sequence number always restarts from one (1) after an inter-SGSN routing area update, see field "SGSN change". The Record Sequence Number is missing if the record is the only one produced in the SGSN/SGW/PGW (e.g. inter-SGSN routing area update can result to two M-CDR or two S-CDRs without sequence number and field "SGSN change" present in the second record).

5.1.2.2.45 Record Type

The field identifies the type of the record e.g. S-CDR, SGW-CDR, PGW-CDR, M-CDR, S-SMO-CDR and S-SMT-CDR.

5.1.2.2.46 Recording Entity Number

This field contains the ITU-T E.164 number assigned to the entity that produced the record. For further details see 3GPP TS 23.003 [68].

5.1.2.2.47 RNC Unsent Downlink Volume

This field contains the unsent downlink volume that the RNC has either discarded or forwarded to 2G-SGSN and already included in S-CDR. This field is present when RNC has provided unsent downlink volume count at RAB release and can be used by a downstream system to apply proper charging for this PDP context.

5.1.2.2.48 Routing Area Code/Location/Cell Identifier/Change of location

These fields can occur only in SGSN generated CDRs. The location information contains a combination of the Routing Area Code (RAC) and an optional Cell Identifier of the routing area and cell in which the served party is currently located. In GSM the Cell Identifier is defined by the Cell Identity (CI) and in UMTS by the Service Area Code (SAC). Any change of location (i.e. Routing Area change) may be recorded in the change of location field including the time at which the change took place.

The location field contains a combination of the location area code (LAC), cell identity (CI) and MCC+MNC of the cell in which the served party is currently located.

The change of location field is optional and not required if partial records are generated when the location changes.

The RAC and (optionally) CI are coded according to 3G TS 24.008 [64] and the SAC according 3GPP TS 25.413 [76].

5.1.2.2.48a S-GW Address Used

These field is the serving S-GW IP Address for the Control Plane. If both an IPv4 and an IPv6 address of the S-GW is available, the S-GW shall include the IPv4 address in the CDR.

5.1.2.2.49 Served IMEI

This field contains the International Mobile Equipment Identity (IMEI) of the equipment served, if available. The term "served" equipment is used to describe the ME involved in the transaction recorded e.g. the called ME in the case of a network initiated PDP context.

The structure of the IMEI is defined in 3GPP TS 23.003 [68].

5.1.2.2.50 Served IMEISV

This field contains the International Mobile Equipment Identity and Software Version Number (IMEISV) and is defined in 3GPP TS 23.003 [68].

5.1.2.2.51 Served IMSI

This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The term "served" party is used to describe the mobile subscriber involved in the transaction recorded e.g. the calling subscriber in case of a mobile initiated PDP context.

The structure of the IMSI is defined in 3GPP TS 23.003 [68].

5.1.2.2.52 Served MSISDN

This field contains the Mobile Station (MS) ISDN number (MSISDN) of the served party. The term "served" party is used to describe the mobile subscriber involved in the transaction recorded. In case of multi-numbering the MSISDN stored in a CDR will be the primary MSISDN of the calling party.

The structure of the MSISDN is defined in 3GPP TS 23.003 [68].

5.1.2.2.53 Served PDP Address

This field contains the PDP address of the served IMSI. This is a network layer address i.e. of type IP version 4 or IP version 6. The address for each PDP type is allocated either temporarily or permanently (see "Dynamic Address Flag"). This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.

5.1.2.2.53a Served PDP/PDN Address

This field contains the IP address for the PDN connection (PDP context, IP-CAN bearer). This is a network layer address i.e. of type IP version 4 or IP version 6. The address for each Bearer type is allocated either temporarily or permanently (see "Dynamic Address Flag"). This parameter shall be present except when both the Bearer type is PPP and dynamic address assignment is used.

5.1.2.2.54 Service Centre Address

This field contains a ITU-T E.164 number identifying a particular service centre e.g. Short Message Service (SMS) centre (see 3GPP TS 23.040 [72]).

5.1.2.2.55a Serving Node Address

These fields contain one or several control plane IP addresses of SGSN, MME, ePDG, HSGW or S-GW, which have been connected during the record.

If both an IPv4 and an IPv6 address of the SGSN/S-GW/MME/ePDG/HSGW are available, the S-GW/P-GW shall include the IPv4 address in the CDR.

5.1.2.2.55b Serving Node PLMN Identifier

This field contains a serving node (SGSN/S-GW/MME/ePDG/HSGW) PLMN Identifier (Mobile Country Code and Mobile Network Code).

The MCC and MNC are coded as described for "Routing Area Identity" in TS 29.060 [75].

5.1.2.2.55c Serving Node Type

These fields contain one or several serving node types in control plane of S-GW or P-GW, which have been connected during the record. The serving node types listed here map to the serving node addresses listed in the field 'Serving node Address' in sequence.

5.1.2.2.55 SGSN Address

These fields contain one or several IP addresses of SGSN. The IP address of the SGSN can be either control plane address or user plane address.

The S-CDR fields contain single address of current SGSN.

The M-CDR fields only contain the address of the current SGSN.

If both an IPv4 and an IPv6 address of the SGSN are available, the SGSNs shall include the IPv4 address in the CDR.

5.1.2.2.56 SGSN Change

This field is present only in the S-CDR to indicate that this is the first record after an inter-SGSN routing area update.

5.1.2.2.56a S-GW Change

This field is present only in the SGW-CDR to indicate that this is the first record after an S-GW change.

5.1.2.2.57 Short Message Service (SMS) Result

This field contains the result of an attempt to deliver a short message either to a service centre or to a mobile subscriber (see 3GPP TS 29.002 [60]). Note that this field is only provided if the attempted delivery was unsuccessful.

5.1.2.2.59 User Location Information

This field contains the User Location Information as described in

- TS 29.060 [75] for GTP case (e.g. CGI, SAI, RAI),
- TS 29.274 [91] for eGTP case (e.g. CGI, SAI, RAI TAI and ECGI) and
- TS 29.275 [92] for PMIP case.

The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification.

5.1.2.3 WLAN CDR parameters

This subclause contains the description of the CDR parameters that are specific to the PS domain CDR types as specified in TS 32.252 [12].

5.1.3 Subsystem level CDR parameters

This subclause contains the description of the CDR parameters that are specific to the subsystem level CDR types. This comprises the CDR types from the CN IM subsystem (TS 32.260 [20]).

5.1.3.1 IMS CDR parameters

This clause contains the description of each field of the IMS CDRs specified in TS 32.260 [20].

5.1.3.1.0A Access Correlation ID

This field holds the charging identifier of the access network. For GPRS and I-WLAN access, this shall be the GPRS Charging ID and for other access networks this shall be the Access Network Charging Identifier Value.

5.1.3.1.0B Access Network Information

Holds the SIP P-header "P-Access-Network-Info".

5.1.3.1.0C Alternate Charged Party Address

Holds the address of an alternate charged party determined by an AS at IMS session initiation.

5.1.3.1.1 Application Provided Called Parties

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

5.1.3.1.2 Application Servers Information

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

5.1.3.1.3 Application Servers Involved

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

5.1.3.1.4 Authorised QoS

Authorised QoS as defined in TS 23.207 [77] and TS 29.207 [78] and applied via the Go interface.

5.1.3.1.5 Bearer Service

Holds the used bearer service for the PSTN leg.

5.1.3.1.6 Called Party Address

In the context of an end-to-end SIP transaction (except for SIP REGISTER and SIP SUBSCRIBE transactions) this field holds the address of the party (Public User ID or Public Service ID) to whom the SIP transaction is posted. The Called Party Address shall be populated with the SIP URI (according to IETF RFC3261 [110]) or TEL URI (according to IETF RFC3966 [111]) contained in the outgoing Request-URI of the request (e.g. after ENUM query or after AS interaction). For a registration procedure this field holds the party (Public User ID) to be registered. In this case, the Called Party Address field is obtained from the 'To' SIP header of the SIP Request. For a subscription procedure this field holds the address of the resource for which the originator wants to receive notifications of change of states. In this case, the Called Party Address field is obtained from the outgoing Request-URI of the SIP Request.

5.1.3.1.7 List of Calling Party Address

The address or addresses (Public User ID or Public Service ID) of the party requesting a service or initiating a session. This field may hold the SIP URI (according to IETF RFC 3261 [110]), the TEL URI (according to RFC 3966 [111]) or both the SIP URI and the TEL URI of the calling party. The address is obtained from the P-Asserted-Identity header of a non-REGISTER SIP Request, either initiating a dialog or a standalone transaction.

5.1.3.1.7A Carrier Select Routing

This item holds information on carrier select routing, received by S-CSCF during ENUM/DNS processes.
The parameter corresponds to the *CarrierSelectRoutingInformation* AVP.

5.1.3.1.8 Cause for Record Closing

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 Reason Return Code field.

5.1.3.1.9 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.

5.1.3.1.10 Content Length

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

5.1.3.1.11 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.

5.1.3.1.12 Expires

The *Expires* parameter holds the content of the "Expires" header.

5.1.3.1.13 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].

5.1.3.1.14 GPRS Charging ID

This parameter holds the GPRS charging ID (GCID) 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].

5.1.3.1.15 IMS Charging Identifier

This parameter holds the IMS charging identifier (ICID) as generated by the IMS node for the SIP session/transaction. The value of the ICID parameter is identical with the 'icid-value' parameter defined in TS 24.229 [79]. The 'icid-value' is a mandatory part of the P-Charging-Vector and coded as a text-based UTF-8 charset (as are all SIP messages). For further information regarding the composition and usage of the P-Charging-Vector refer to TS 32.260 [20], TS 24.229 [79] and RFC 3455 [113].

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. The one month minimum uniqueness period counts from the time of release of the ICID, i.e. the ICID value no longer being used. 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.

At each SIP session unrelated method, both initial and subsequent (e.g., REGISTER, NOTIFY, MESSAGE etc.), a new, session unrelated ICID is generated at the first IMS network element that processes the method. This ICID value is contained in the SIP request and response of that SIP transaction and must be valid for the duration of the transaction.

At each SIP session establishment a new, session specific ICID is generated at the first IMS network element that processes the session-initiating SIP INVITE message. This ICID is then used in all subsequent SIP messages for that session (e.g., 200 OK, (re-)INVITE, BYE etc.) until the session is terminated.

5.1.3.1.15A IMS Communication Service Identifier

This parameter holds the IMS Communication Service Identifier (ICSI) as contained in the P-Asserted-Service header of a SIP request to identify an IMS Communication Service as defined in TS 24.229 [79].

5.1.3.1.16 Incomplete CDR Indication

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

5.1.3.1.17 List of Inter Operator Identifiers

This list holds the identification of the pair of originating network and terminating network if exchanged via SIP signalling, as recorded in the Inter Operator Identifier (IOI) AVP as described in TS 32.299 [50]. It may occur several times in one CDR. For further information on the IOI exchange via SIP signalling please refer to TS 24.229 [79].

5.1.3.1.17A List of Early SDP Media Components

This is a grouped field which may occur several times in one CDR. This field describes session, media parameters and timestamps related to media components set to active according to SDP signalling exchanged during a SIP session establishment and before the final successful or unsuccessful SIP answer to the initial SIP INVITE message is received. Once a media component has been set to active, subsequent status changes shall also be registered.

This field applies only to SIP session related cases, but it may be present both in event CDRs (unsuccessful session establishment) and session CDRs (successful session establishment).

The List of Early SDP Media Components contains the following elements:

- SDP Offer Timestamp;
- SDP Answer Timestamp;
- SDP Media Components;
- Media Initiator flag;
- SDP Session Description.

These fields are described in the appropriate subclause.

5.1.3.1.18 List of Message Bodies

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.

5.1.3.1.19 List of SDP Media Components

This is a grouped field which may occur several times in one CDR. The first occurrence describes the initial SIP session negotiation whilst the other would stem from session re-negotiations.

The field is present only in a SIP session related case.

The List of SDP Media Components contains the following elements:

- SIP Request Timestamp;
- SIP Response Timestamp;
- SDP Media Components;
- Media Initiator flag;
- SDP Session Description.
- Media Initiator Party.

The Media Initiator Party is only used for PoC charging.

These field elements are described in the appropriate subclause.

5.1.3.1.20 Local Record Sequence Number

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.

5.1.3.1.21 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.

5.1.3.1.21A Media Initiator Party

This field indicates initiating party who has requested the session modification in PoC charging.

5.1.3.1.22 Node Address

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 O*rigin-Host* AVP.

5.1.3.1.22A Number Portability Routing

This item holds information on number portability routing, received by S-CSCF during ENUM/DNS processes.
The parameter corresponds to the *NumberPortabilityRoutingInformation* AVP.

5.1.3.1.23 Originator

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

5.1.3.1.24 Private User ID

Holds the used Network Access Identifier of the served party according to RFC 2486 [xx]. This parameter corresponds to the *User-Name* AVP.

5.1.3.1.25 Record Closure Time

A Time stamp reflecting the time the CCF closed the record.

5.1.3.1.26 Record Extensions

A set of operator/manufacturer specific extensions to the record, conditioned upon existence of an extension.

5.1.3.1.27 Record Opening Time

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

5.1.3.1.28 Record Sequence Number

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).

5.1.3.1.29 Record Type

Identifies the type of record. The parameter is derived from the Node-Functionality AVP, defined in TS 32.299 [40].

5.1.3.1.30 Retransmission

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

5.1.3.1.31 Role of Node

This fields indicates the role of the AS/CSCF. As specified in TS 23.218 [80] 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.

5.1.3.1.31A SDP Answer Timestamp

This parameter contains the time of the response to the SDP Offer.

5.1.3.1.32 SDP Media Components

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.

5.1.3.1.33 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' [xx].

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

5.1.3.1.34 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' [xx].

5.1.3.1.34A SDP Offer Timestamp

This parameter contains the time of the SDP Offer.

5.1.3.1.35 SDP Session Description

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.

5.1.3.1.35A SDP Type

This field identifies if the SDP media component was an SDP offer or an SDP answer.

5.1.3.1.36 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.

5.1.3.1.37 Service Reason Return Code

Provides the returned cause code for the service request (both successful and failure). This parameter corresponds to the Cause-Code AVP.

5.1.3.1.38 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.

5.1.3.1.39 Service ID

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

5.1.3.1.40 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.

5.1.3.1.40A Void

5.1.3.1.40B Void

5.1.3.1.41 Void

5.1.3.1.42 Session ID

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

5.1.3.1.43 Served Party IP Address

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.

5.1.3.1.44 SIP Method

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

5.1.3.1.45 SIP Request Timestamp

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

5.1.3.1.46 SIP Response Timestamp

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

5.1.3.1.47 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.

5.1.3.1.48 Trunk Group ID Incoming/Outgoing

Contains the outgoing trunk group ID for an outgoing session/call or the incoming trunk group ID for an incoming session/call.

5.1.3.1.49 List of Associated URI

The list of non-barred public user identities (SIP URIs and/or TEL URIs) associated to the public user identity under registration. The list of identities is obtained from the P-Associated-URI header of a 200 OK SIP response to a REGISTER request.

5.1.3.1.50 List of Called Asserted Identity

This field holds the address or addresses (SIP URI and/or TEL URI according to RFC 3261 [110] and RFC 3966 [111] respectively) of the party (Public User ID or Public Service ID) of the finally asserted called party.

These address/addresses are obtained from the P-Asserted-Identity SIP header field of the 2xx responses corresponding to a SIP request either initiating a dialog or a standalone transaction.

This field shall be present when the P-Asserted-Identity SIP header field is available in the SIP 2xx response.

5.1.3.1.51 Requested Party Address

This field holds the address of the party (Public User ID or Public Service ID) to whom the SIP transaction was originally posted. The Requested Party Address shall be populated with the SIP URI or TEL URI (according to RFC 3261 [110] and RFC 3966 [111] respectively) contained in the incoming Request-URI of the request. This field is only present if different from the Called Party Address parameter.

5.1.3.1.52 Event

The *Event* parameter holds the content of the "Event" header defined in RFC 3265 [112],

5.1.4 Service level CDR parameters

5.1.4.1 MMS CDR parameters

This clause contains the description of each field of the MMS CDRs specified in TS 32.270 [30].

5.1.4.1.1 3GPP MMS Version

The MMS version of the originator MMS Relay/Server as defined in TS 23.140 [81].

5.1.4.1.2 Access Correlation

If the parameter is provided and is not an empty string, it is a unique identifier delivered by the used access network domain of the originator or recipient MMS User Agent. It may be used for correlation of the MMS CDRs with the corresponding MSC server CDRs in CS domain or GSN CDRs in PS domain. It is an empty string if the parameter is not delivered by the access network.

5.1.4.1.3 Acknowledgement Request

This Boolean value indicates whether (value TRUE) or not (value FALSE) a response has been requested in a request at the MM4 reference point.

5.1.4.1.4 Attributes List

This field contains a list of information element names that are used in the MM1_mmbox_view.REQ, which request corresponding information elements from the MMs to be conveyed in the MM1_mmbox_view.RES. The list of known information element names are those currently defined for the MM1_retrieve.RES and MM1_notification.REQ. In the absence of the Attributes list information element, the MMS Relay/Server shall, by default and if available, select these

information elements from each viewed MM: Message ID, Date and time, Sender address, Subject, Message size, MM State, and MM Flags.

5.1.4.1.5 Billing Information

This field contains transparent charging information provided by the MSCF to the MMS R/S for use by the billing system to properly bill the user for the service being supplied as defined in TS 29.140 [108]. Only the format, but not the content of the "Billing information" field is defined.

5.1.4.1.6 Charge Information

This field consists of two parts, the charged party and the charge type.

The Charged Party is an indication on which party is expected to be charged for an MM e.g. the sending, receiving, both parties or neither. This indicator is only applicable to MM7 CDRs (for VASP-originated MMs). It may be provided by the VASP when submitting an MM.

The Charge Type indicates the type of subscription (i.e. postpaid or prepaid). This indicator is derived from the subscription parameters and only applicable to MM1 CDRs.

The Charged Parties are as follows:

- Sender: This indicates the sending party is expected to be charged ('normal' charging model);
- Recipient: This indicates the receiving party is expected to be charged ('reverse' charging model). This model implies there is a commercial agreement between the Recipient and the VASP;
- Both: This indicates both the sending and the receiving parties are expected to be charged ('shared' charging model);
- Neither: This indicates neither the sending nor the receiving parties are expected to be charged ('free of charge' charging model).

The Charge types are as follows:

- Postpaid;
- Prepaid.

5.1.4.1.7 Content Type

The Content Type of the MM as defined in TS 23.140 [81].

5.1.4.1.8 Delivery Report Requested

This is an indication of type Boolean whether (value TRUE) or not (value FALSE) the originator/forwarding MMS User Agent has requested a delivery report in the MM1_submit.REQ/MM1_forward.REQ.

5.1.4.1.9 Duration of Transmission

This field contains the relevant time in seconds. The Duration of Transmission is the time from the beginning to the end of the MM transfer between the MMS User Agent and the MMS Relay/Server; e.g. for streaming purposes.

Note that the CDRs purposely do not contain any information about the duration of storage on the MMS Relay/Server. If such information is required it can be calculated by post-processing systems from the CDR timestamps. For instance, the total duration of storage on the originator MMS Relay/Server could be calculated by taking the difference between the "Record Time Stamp" of the O1S-CDR and the "Record Time Stamp" of the OMD-CDR.

5.1.4.1.10 Earliest Time of Delivery

This field contains either the earliest time to deliver message or the number of seconds to wait before delivering the message.

5.1.4.1.11 Forward Counter

A Counter indicating the number of times the particular MM was forwarded as defined in TS 23.140 [81].

5.1.4.1.12 Forwarding Address

This field contains a forwarding MMS User Agent address. The MMS supports the use of E-Mail addresses (RFC 822 [xx]), MSISDN (E.164) or IP addresses.

5.1.4.1.13 Forwarding MMS Relay/Server Address

This field contains one or more addresses of the forwarding MMS Relay/Server. The address is either an IP address or a domain name.

5.1.4.1.14 Limit

This field contains a number that may be provided in the MM1_mmbox_view.REQ to specify a limit for the number of MMs the information elements to which shall be returned in the MM1_mmbox_view.RES.

5.1.4.1.15 Linked ID

This field identifies a correspondence to a previous valid message delivered to the VASP

5.1.4.1.16 Local Record Sequence Number

This field includes a unique record number created by this node. The number is allocated sequentially including all CDR types. The number is unique within one node, which is identified either by field Node ID or by record-dependent MMS Relay/Server.

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

5.1.4.1.17 Managing Address

This field contains the managing MMS User Agent address i.e. the MMS User Agent that sends and receives transactions related to the MMBox management . The MMS supports the use of E-Mail addresses (RFC 822) [xx], MSISDN (E.164) or IP address.

5.1.4.1.18 Message Class

A class of messages such as personal, advertisement, information service etc. For more information see TS 23.140 [81].

5.1.4.1.19 Message Distribution Indicator

This is an indication of type Boolean whether (value TRUE) or not (value FALSE) the VASP has indicated the content of the MM is intended for redistribution.

5.1.4.1.20 Message ID

This field specifies the MM Message ID of the MM as defined in TS 23.140 [81]. The concrete syntax of this MM Message ID is given by the body of the field introduced by the string "X-Mms-Message-ID:" in the concrete syntax of the message MM4_Forward.REQ. All CDRs pertaining to the same MM must employ the same value of this parameter, i.e. the value initially assigned by the originator MMS Relay/Server upon submission of the MM by the Originator MMS User Agent.

5.1.4.1.21 Message Reference

A reference as specified in TS 23.140 [81], e.g. URI, for the MM that can be used for retrieving the MM from the recipient MMS Relay/Server.

5.1.4.1.22 Message selection

Messages which are to be viewed may be selected by a list of Message References or by a selection based on MM State and/or MM Flags keywords.

5.1.4.1.23 Message Size

This field contains the number of octets of the MM that is calculated as specified in TS 23.140 [81].

5.1.4.1.24 MMBox Storage Information

This field includes following storage information elements for the MMBox containing the MM State, MM Flags, Store Status, Store Status Text and Stored Message Reference.

- MM State;

  This field contains the state of the MM.

- MM Flags:

  This field contains the keyword flags of the MM.

- Store Status:

  This field contains an appropriate status value of the stored MM, e.g. stored, error-transient-mailbox-full,…

- Store Status Text;

  This field includes a more detailed technical description of the store status at the point in time when the CDR is generated.

- Stored Message Reference;

  A reference of the newly stored MM.

5.1.4.1.25 MM component list

The MM component list is a set of subject and media components from type of media formats including the size of all elements in octets. For a complete description of media formats that may be supported by MMS, refer to IANA [xx].

5.1.4.1.26 MM Date and Time

The date and time field contains the time stamp relevant for the handling of the MM by the recipient MMS Relay/ Server (read, deleted without being read, etc.). The time-stamp includes at a minimum: date, hour, minute and second.

5.1.4.1.27 MM Listing

This field contains a list of information elements from the MMs returned within the MM1_mmbox_view.RES. The listing shall consist of the following information elements, separately grouped for each MM returned in the list:

- Message reference: a unique reference to an MM;
- Information elements corresponding to those requested in the Message Selection information element on the MM1_mmbox_view.REQ.

5.1.4.1.28 MM Status Code

This field contains an appropriate status value of the delivered MM (e.g. retrieved, rejected, etc.).

5.1.4.1.29 MSCF Information

This is a grouped field comprising several the following sub-fields associated with the invocation of the MSCF for advanced addressing:

- Billing Information;
- Routeing address List.

These field elements are described in the appropriate subclause.

5.1.4.1.30 Originator Address

This field contains an originator MMS User Agent address. The MMS supports the use of E-Mail addresses (RFC 822 [xx]) or MSISDN (ITU E.164 [65]).

5.1.4.1.31 Originator MMS Relay/Server Address

This field contains an address of the originator MMS Relay/Server. This address is composed of a mandatory IP address and/or an optional domain name.

5.1.4.1.32 Priority

The priority (importance) of the message, see TS 23.140 [81].

5.1.4.1.33 Quotas

The quotas of the MMBox in messages and/or octets identified with Messages or Octets

5.1.4.1.34 Quotas requested

This is an indication that the Managing User Agent has requested the current message and/or size quotas.

5.1.4.1.35 Read Reply Requested

A Boolean value indicating whether the originator MMS User Agent has requested a read-reply report (value TRUE) or not (value FALSE).

5.1.4.1.36 Read Status

See TS 23.140 [81]: Status of the MM, e.g. Read, Deleted without being read.

5.1.4.1.37 Recipient Address

This field contains a recipient MMS User Agent address. The MMS supports the use of E-Mail addresses (RFC 822 [xx]), MSISDN (E.164 [65]) or Service provider specific addresses (short code).

5.1.4.1.38 Recipient MMS Relay/Server Address

This field contains an address of the recipient MMS Relay/Server. This address is composed of a mandatory IP address and/or an optional domain name.

5.1.4.1.39 Recipients Address List

This field contains a list of recipient MMS User Agent addresses.

5.1.4.1.40 Record Extensions

The field enables network operators and/or manufacturers to add their own extensions to the standard record definitions.

5.1.4.1.41 Record Time Stamp

This field indicates the date and time when the CDR was produced.

5.1.4.1.42 Record Type

The field identifies the type of the record, see TS 32.250 [10].

5.1.4.1.43 Reply Charging

This field indicates whether the originator of the MM is willing to take over the charge for the sending of a reply-MM to their submitted MM from the recipient(s). In this case the originator MMS Relay/Server marks the MM as no charge (reply-charged).

In the Originator MM1 Submission CDR (O1S-CDR) this parameter indicates whether the originator MMS User Agent has requested reply-charging (value TRUE) or not (value FALSE).

In the Recipient MM1 Notification Request record (R1NRq -CDR) it indicates whether a reply to this particular original MM is free of charge (value TRUE) or not (value FALSE).

In the MM7 Submission CDR (7S-CDR) this parameter indicates whether the originator MMS VASP has requested reply-charging (value TRUE) or not (value FALSE).

5.1.4.1.44 Reply Charging ID

This field is present in the CDR only if the MM is a reply-MM to an original MM. The Reply Charging ID is the Message ID of the original MM.

5.1.4.1.45 Reply Charging Size

In the Originator MM1 Submission CDR (O1S-CDR), in case of reply-charging, this field indicates the maximum size for reply-MM(s) granted to the recipient(s) as specified by the originator MMS User Agent.

In the Recipient MM1 Notification Request CDR (R1NRq-CDR), in case of reply-charging, this field indicates the maximum size of a reply-MM granted to the recipient as specified in the MM1_notification.REQ.

In the MM7 Submission CDR (7S-CDR), in case of reply-charging, this field indicates the maximum size for reply-MM(s) granted to the recipient(s) as specified by the originator MMS VASP.

5.1.4.1.46 Reply Deadline

In the Originator MM1 Submission CDR (O1S-CDR), in case of reply-charging, this field indicates the latest time of submission of replies granted to the recipient(s) as specified by the originator MMS User Agent.

In the Recipient MM1 Notification Request CDR (R1NRq-CDR), in case of reply-charging, this field indicates the latest time of submission of a reply granted to the recipient as specified in the MM1_notification.REQ.

In the MM7 Submission CDR (7S-CDR), in case of reply-charging, this field indicates the latest time of submission of replies granted to the recipient(s) as specified by the originator MMS VASP.

5.1.4.1.47 Report allowed

A Boolean value indicating, if present whether sending of a delivery report is permitted (value TRUE) or not (value FALSE).

5.1.4.1.48 Request Status code

The status of the MM as reflected in the corresponding MM4 message (e.g. error service denied, error network problem, error unsupported message, etc.). For further details see TS 23.140 [81].

5.1.4.1.49 Routeing Address

The field contains a recipient address for routeing of a multimedia message. For a complete description of the routeing address, refer to TS 29.140 [108].

5.1.4.1.50 Routeing Address List

This field contains a list of routeing addresses.

5.1.4.1.51 Sender Address

The address of the MMS User Agent as used in the MM1_notification_REQ/MM1_retrieve.RES. This parameter is present in the CDR even if address hiding was requested, resulting in the sender address is not being included in the above messages.

5.1.4.1.52 Sender Visibility

This Boolean value indicates whether the originator MMS User Agent has requested her address to be hidden from the recipient (value TRUE) or not (value FALSE).

5.1.4.1.53 Service code

This field contains charging information provided by the VASP to the MMS R/S for use by the billing system to properly bill the user for the service being supplied. The usage of the "service code" is, in the release, open to any usage envisioned by the operators, service providers or MMS Relay/Server vendors. In this release only the format, but not the content of the "service code" field is defined.

5.1.4.1.54 Start

This field contains a number that may be used in the MM1_mmbox_view.REQ to index the first MM to be viewed, relative to the selected set of MMs, allowing partial views to be requested

5.1.4.1.55 Status Text

This field includes a more detailed technical status of the message at the point in time when the CDR is generated..

5.1.4.1.56 Submission Time

The submission time field contains the time stamps relevant for the submission of the MM. The time-stamp includes a minimum of date, hour, minute and second.

5.1.4.1.57 Time of Expiry

This field contains the desired date or the number of seconds to expiry of the MM, if specified by the originator MMS User Agent.

5.1.4.1.58 Totals

The total number of messages and/or octets for the MMBox, identified with Messages or Octets

5.1.4.1.59 Totals requested

This is an indication that the Managing User Agent has requested the current total number of messages and/or size contained by the MMBox.

5.1.4.1.60 Upload Time

The upload time field contains the time stamps relevant for the upload of the MM. The time-stamp includes a minimum of date, hour, minute and second.

5.1.4.1.61 VAS ID

This field specifies the identification of the VASP as defined in TS 23.140 [81].

5.1.4.1.62 VASP ID

This field specifies the identification of the originating application as defined in TS 23.140 [81].

5.1.4.2 LCS CDR parameters

This clause contains the description of each field of the LCS CDRs specified in TS 32.271 [31].

5.1.4.2.1 Home GMLC Identity

This field contains the IP address of the Home GMLC (H-GMLC) involved in the location request.

5.1.4.2.2 LCS Client Identity

This field contains further information on the LCS Client identity as defined in 3GPP TS 29.002 [60].

5.1.4.2.3 LCS Client Type

This field contains the type of the LCS Client as defined in 3GPP TS 29.002 [60].

5.1.4.2.4 LCS Priority

This parameter gives the priority of the location request as defined in 3GPP TS 49.031 [71].

5.1.4.2.5 Location Estimate

The Location Estimate field is providing an estimate of a geographic location of a target MS according to 3GPP TS 29.002 [60].

5.1.4.2.6 Location Type

This field contains the type of the location as defined in 3GPP TS 29.002 [60].

5.1.4.2.7 Positioning Data

This information element is providing positioning data associated with a successful or unsuccessful location attempt for a target MS according 3GPP TS 49.031 [71].

5.1.4.2.8 Provider Error

This parameter is used to indicate a protocol related type of error as defined in 3GPP TS 29.002 [60].

5.1.4.2.9 Requesting GMLC Identity

This field contains the IP address of the Requesting GMLC (R-GMLC) involved in the location request.

5.1.4.2.10 Result code

This field indicates the result of the request or individual positioning as defined in OMA Mobile Location Protocol [83].

5.1.4.2.11 Target IMSI

This field contains the International Mobile Subscriber Identity (IMSI) of the targeted party. The term "targeted" party is used to describe the mobile subscriber involved in the transaction recorded e.g. the subscriber whose location is requested in case of mobile terminated location request.

The structure of the IMSI is defined in TS 23.003 [68].

5.1.4.2.12 Target MSISDN

This field contains the mobile station ISDN number (MSISDN) of the targeted party. The term "targeted" party is used to describe the mobile subscriber involved in the transaction recorded e.g. the subscriber whose location is requested in case of mobile terminated location request.

In case of multi-numbering the MSISDN stored in a LCS CDR will be the primary MSISDN of the requesting party.

The structure of the MSISDN is defined in 3GPP TS 23.003 [68].

5.1.4.2.13 User Error

This parameter is sent by the responder when the location request has failed or cannot proceed and if present, takes one of the following values defined in 3GPP TS 29.002 [60]:

- System Failure;
- Data Missing;
- Unexpected Data Value;
- Facility Not Supported;
- Unidentified Subscriber;
- Illegal Subscriber;
- Illegal Equipment;
- Absent Subscriber (diagnostic information may also be provided);
- Unauthorised requesting network;
- Unauthorised LCS Client with detailed reason;
- Position method failure with detailed reason.

5.1.4.2.14 Visited GMLC Identity

This field contains the IP address of the Visited GMLC (V-GMLC) involved in the location request.

5.1.4.3 PoC CDR parameters

This clause contains the description of each field of the PoC CDRs specified in TS 32.272 [32].

5.1.4.3.1 Charged Party

This field indicates the party accepting the charge for the session, whether participating in the session or not. The contents are obtained from the Charged-Party AVP in offline charging.

5.1.4.3.2 List of Talk Burst Exchange

This list contains a number of containers consisting of the following fields:

Change Condition
Change Time
Number of participants
Number of received talk bursts
Number of talk bursts
Received talk burst volume
Received talk bursts time
Talk burst volume
Talk bursts time

Number of talk bursts and **Number of received talk bursts** indicate the number of talk bursts sent and received respectively by the charged party (for the participating PoC functions) or for the whole session (for the controlling PoC function).

Talk burst volume and **Received talk burst volume** indicate the total data volume for talk bursts sent and received respectively by the charged party (for the participating PoC functions) or for the whole session (for the controlling PoC function).

Talk burst Time and **Received talk burst time** indicate the total duration of talk bursts sent and received respectively by the charged party (for the participating PoC functions) or for the whole session (for the controlling PoC function).

Change Time is a time stamp, which defines the moment when the container is closed or the CDR is closed.

Change Condition indicates the reason for closing the container and the addition of a new container.

Number of participants indicates the number of attached participants involved in the talk burst exchange within a container.

5.1.4.3.3 Number of participants

For PoC, this field indicates the number of active participants within the PoC session. For MMtel Charging, this field indicates the number of active participants attached in the MMTel conference.

5.1.4.3.4 PoC controlling address

This field contains the address of the server performing the controlling PoC function.

5.1.4.3.4A PoC Event Type

This field contains the PoC session unrelated charging event type.

5.1.4.3.5 PoC group name

This field indicates the name of a group used for the PoC session.

5.1.4.3.6 PoC session id

This field uniquely identifies the overall PoC session.

5.1.4.3.7 PoC session type

The field identifies the type of the PoC session.

5.1.4.3.7A PoC session initiation type

The field is of type Enumerated. It identifies the type of the PoC session initiation.

The identifier can be one of the following:

0 Pre-established

1 On-demand

5.1.4.3.8 Participants involved

This field indicates the participants involved in the PoC session.

The field is of type grouped. It contains the participant address (Called party address), the participant access priority and User Participating Type.

5.1.4.3.8A Called Party Address

Called Party Address is of type UTF8String. It indicates address (Public User ID, SIP URL, E.164, etc.) of the participants involved in the PoC session.

5.1.4.3.8B Participant Access Priority

This field indicates the access priority for each participant involved in the PoC session.

5.1.4.3.8C User Participating Type

Indicates the User Participating Type participating in the PoC session i.e. Normal, NW PoC Box, UE PoC Box.

5.1.4.3.9 User location info

This field contains any available location information for the charged party. The field is coded as per the 3GPP-User-Location-Info RADIUS VSA defined in TS 29.061 [82].

5.1.4.4 MBMS CDR parameters

This clause contains the description of each field of the MBMS CDRs specified in TS 32.273 [33].

5.1.4.4.1 TMGI

The field contains the Temporary Mobile Group Identity allocated to a particular MBMS bearer service. TMGI use and structure is specified in 3GPP TS 23.003 [68].

5.1.4.4.2 Required MBMS Bearer Capabilities

The field contains the minimum bearer capabilities the UE needs to support.

5.1.4.4.3 MBMS Service Area

The field indicates the area over which the MBMS bearer service has to be distributed.

5.1.4.4.4 MBMS Service Type

The field is used to indicate the type of MBMS bearer service: multicast or broadcast.

5.1.4.4.5 MBMS 2G 3G Indicator

The MBMS 2G 3G Indicator is used to indicate the radio access type that can receive the MBMS bearer service.

5.1.4.4.6 MBMS Session Identity

This field together with TMGI identifies a transmission of a specific MBMS session.

5.1.4.5 MMTel CDR parameters

This subclause contains the description of each of the CDR fields needed to support the charging of MMTel services as specified in TS 32.275 [35].

5.1.4.5.1 Associated Party Address

This field holds the address (SIP URI or TEL URI) of the user, for MMTel supplementary service this field is used for : the 'forwarding party' for CDIV, the 'transferor' for ECT as specified in TS 32.275 [35]. The content is obtained from the Associated-Party-Address AVP.

5.1.4.5.2 List of Supplementary services

This list includes several MMTel Supplementary services. Each Supplementary Service may contain the following fields as specified in TS 32.275 [35] :

- Service Type;
- Service Mode;
- Number Of Diversions;
- Associated Party Address;
- Service ID
- Change Time
- Number Of Participants
- Participant Action Type

Service Type is defined in 5.1.4.5.6

Service Mode is defined in 5.1.4.5.5

Number Of Diversions is defined in 5.1.4.5.3

Associated Party Address is defined in 5.1.4.5.1

Service ID is an identifier of the conference.

Change Time is a time stamp, which defines the moment when the conference participant has an action (e.g. creating the conference, joining in the conference, being invited into the conference or quiting the conference) triggering the Accounting Request message to CDF in MMTel Charging.

Number Of Participants indicates the number of attached participants involved in the conference.

Participant Action Type indicates the participant"s action type during the conference. It"s just for Billing Domain"s information in each CDR, e.g. creating the conference, joining in the conference, being invited into the conference and quiting the conference.

5.1.4.5.3 Number Of Diversions

This field identifies the number of diversions related to a CDIV service as defined in TS 32.275 [35] and TS 24.604 [90]. When counting the number of diversions, all types of diversion are included.

5.1.4.5.4 Participant Action Type

This field indicates the participant"s action type during the conference. The content is obtained from the Participants-Action-Type AVP in TS 32.299 [50].

5.1.4.5.5 Service Mode

This field of Supplementary service indicates the mode for MMTel supplementary services (e.g CDIV, CB and ECT). The content is obtained from the Service-Mode AVP and described in TS 32.299 [40].

Service Mode values ≥ 1024 are reserved for specific Network/Manufacturer variants.

5.1.4.5.6 Service Type

This field identifies the MMTel supplementary service type as defined in TS 32.275 [35]. . The content is obtained from the Service-Type AVP and described in TS 32.299 [40].

Service Type values ≥ 1024 are reserved for specific Network/Manufacturer variants

5.1.4.5.7 Subscriber Role

This field indicates subscriber role (originating party or terminating party) for UE when AS acts as B2BUA role and used for AS only, as specified in TS 32.275 [35] for MMTel service and supplementary services. The content is obtained from the Subscriber-Role AVP.

5.2 CDR abstract syntax specification

5.2.1 Generic ASN.1 definitions

This subclause contains generic CDR syntax definitions, where the term "generic" implies that these constructs are applicable for more than one domain/service/subsystem. Examples of this are syntax definitions that are imported from non-charging 3GPP TSs, e.g. TS 29.002 [60].

```
GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS


CallReferenceNumber, NumberOfForwarding
FROM MAP-CH-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-CH-DataTypes (13) version6 (6) }
-- from TS 29.002 [60]


AddressString, BasicServiceCode, IMSI, IMEI, ISDN-AddressString, LCSClientExternalID,
LCSClientInternalID
FROM MAP-CommonDataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18) version6 (6) }
-- from TS 29.002 [60]


DestinationRoutingAddress
FROM CAP-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) cap-datatypes (52) version1 (0) }
-- from TS 29.078 [66]


DefaultCallHandling, DefaultSMS-Handling, NotificationToMSUser, ServiceKey
FROM MAP-MS-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6) }
-- from TS 29.002 [60]


Ext-GeographicalInformation, LCSClientType, LCS-Priority, LocationType
FROM MAP-LCS-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-LCS-DataTypes (25) version7 (7)}
-- from TS 29.002 [60]

PositionMethodFailure-Diagnostic, UnauthorizedLCSClient-Diagnostic
FROM MAP-ER-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-ER-DataTypes (17) version7 (7)}
-- from TS 29.002 [60]

BasicService
FROM Basic-Service-Elements { itu-t identified-organization (4) etsi (0)
196 basic-service-elements (8) }
--
-- from "Digital Subscriber Signalling System No. one (DSS1) protocol"
-- ETS 300 196 [62]
--

ObjectInstance
FROM CMIP-1 {joint-iso-itu-t ms (9) cmip (1) version1 (1) protocol (3)}

-- from ITU-T Rec. X.2ab[105]  Editor"s note:  clarify if this definition is still needed.  It
appears that it ends in Nirvana.

ManagementExtension
FROM Attribute-ASN1Module {joint-iso-itu-t ms (9) smi (3) part2 (2) asn1Module (2) 1}

-- from ITU-T Rec. X.721 [106]  Editor"s note:  clarify if this definition is still needed.
AE-title
```

```
FROM ACSE-1 {joint-iso-itu-t association-control (2) abstract-syntax (1) apdus (0) version (1) };
--
-- From ITU-T Rec. X.2cd[107].  Note that the syntax of AE-title to be used is from
-- ITU-T Rec. X.227 / ISO 8650 corrigendum and not "ANY"  Editor"s note:  clarify if this definition
is still needed.  It appears that it ends in Nirvana.
;
--------------------------------------------------------------------------------
--
--  Generic Data Types
--
--------------------------------------------------------------------------------

BCDDirectoryNumber      ::= OCTET STRING
    -- This type contains the binary coded decimal representation of
    -- a directory number e.g. calling/called/connected/translated number.
    -- The encoding of the octet string is in accordance with the
    -- the elements "Calling party BCD number", "Called party BCD number"
    -- and "Connected number" defined in TS 24.008 [64].
    -- This encoding includes type of number and number plan information
    -- together with a BCD encoded digit string.
    -- It may also contain both a presentation and screening indicator
    -- (octet 3a).
    -- For the avoidance of doubt, this field does not include
    -- octets 1 and 2, the element name and length, as this would be
    -- redundant.

CallDuration            ::= INTEGER
    --
    -- The call duration is counted in seconds.
    -- For successful calls /sessions / PDP contexts, this is the chargeable duration.
    -- For call attempts this is the call holding time.
    --

Editor"s note:  the explanation above should be removed as proper definitions are required in the
individual CDR parameter descriptions in[10] -[31]

CalledNumber            ::= BCDDirectoryNumber

RecordType  ::= INTEGER
{

--  Record values 0..17 are CS specific.
--  The contents are defined in TS 32.250 [10]

    moCallRecord        (0),
    mtCallRecord        (1),
    roamingRecord       (2),
    incGatewayRecord    (3),
    outGatewayRecord    (4),
    transitCallRecord   (5),
    moSMSRecord         (6),
    mtSMSRecord         (7),
    moSMSIWRecord       (8),
    mtSMSGWRecord       (9),
    ssActionRecord      (10),
    hlrIntRecord        (11),
    locUpdateHLRRecord  (12),
    locUpdateVLRRecord  (13),
    commonEquipRecord   (14),
    moTraceRecord       (15),   --- used in earlier releases
    mtTraceRecord       (16),   --- used in earlier releases
    termCAMELRecord     (17),
--
--  Record values 18..22 are GPRS specific.
--  The contents are defined in TS 32.251 [11]
--
    sgsnPDPRecord       (18),
    sgsnMMRecord        (20),
    sgsnSMORecord       (21),
    sgsnSMTRecord       (22),
--
--  Record values 23..25 are CS-LCS specific.
--  The contents are defined in TS 32.250 [10]
--
    mtLCSRecord         (23),
    moLCSRecord         (24),
    niLCSRecord         (25),
--
```

```
--  Record values 26..28 are GPRS-LCS specific.
--  The contents are defined in TS 32.251 [11]
--
    sgsnMtLCSRecord     (26),
    sgsnMoLCSRecord     (27),
    sgsnNiLCSRecord     (28),
--
--  Record values 30..62 are MMS specific.
--  The contents are defined in TS 32.270 [30]
--
    mMO1SRecord         (30),
    mMO4FRqRecord       (31),
    mMO4FRsRecord       (32),
    mMO4DRecord         (33),
    mMO1DRecord         (34),
    mMO4RRecord         (35),
    mMO1RRecord         (36),
    mMOMDRecord         (37),
    mMR4FRecord         (38),
    mMR1NRqRecord       (39),
    mMR1NRsRecord       (40),
    mMR1RtRecord        (41),
    mMR1AFRecord        (42),
    mMR4DRqRecord       (43),
    mMR4DRsRecord       (44),
    mMR1RRRecord        (45),
    mMR4RRqRecord       (46),
    mMR4RRsRecord       (47),
    mMRMDRecord         (48),
    mMFRecord           (49),
    mMBx1SRecord        (50),
    mMBx1VRecord        (51),
    mMBx1URecord        (52),
    mMBx1DRecord        (53),
    mM7SRecord          (54),
    mM7DRqRecord        (55),
    mM7DRsRecord        (56),
    mM7CRecord          (57),
    mM7RRecord          (58),
    mM7DRRqRecord       (59),
    mM7DRRsRecord       (60),
    mM7RRqRecord        (61),
    mM7RRsRecord        (62),
--
--  Record values 63..69, 82 are IMS specific.
--  The contents are defined in TS 32.260 [20]
--
    sCSCFRecord         (63),
    pCSCFRecord         (64),
    iCSCFRecord         (65),
    mRFCRecord          (66),
    mGCFRecord          (67),
    bGCFRecord          (68),
    aSRecord            (69),
    iBCFRecord          (82),
--
--  Record values 70 is for Flow based Charging
--  The contents are defined in TS 32.251 [11]
--
--
--  Record values 71..75 are LCS specific.
--  The contents are defined in TS 32.271 [31]
--
    lCSGMORecord        (71),
    lCSRGMTRecord       (72),
    lCSHGMTRecord       (73),
    lCSVGMTRecord       (74),
    lCSGNIRecord        (75),
--
--  Record values 76..79 are MBMS specific.
--  The contents are defined in TS 32.251 [11]
--  Record values 76 and 77 are MBMS bearer context specific
--
    sgsnMBMSRecord      (76),
    ggsnMBMSRecord      (77),
--
--  And TS 32.273 [33]
--  Record values 78 and 79 are MBMS service specific
```

```
--  and defined in TS 32.273 [33]
--
    sUBBMSCRecord       (78),
    cONTENTBMSCRecord   (79),
--
--  Record Values 80..81 are PoC specific.
--  The contents are defined in TS 32.272 [32]
--
    pPFRecord           (80),
    cPFRecord           (81)

--  Record values 84..85 are EPC specific.
--  The contents are defined in TS 32.251 [11]
--
    sGWRecord           (84),
    pGWRecord           (85)
--
--  Record Value 83 is MMTel specific.
--  The contents are defined in TS 32.275 [35]
--

    mMTelRecord         (83)

}

CallingNumber   ::= BCDDirectoryNumber

CallReference           ::= INTEGER

CellId  ::= OCTET STRING (SIZE(2))
    --
    -- Coded according to TS 24.008 [64]
    --

ChargeIndicator         ::= INTEGER
{
    noCharge            (0),
    charge              (1)
}

Diagnostics                     ::= CHOICE
{
    gsm0408Cause                [0] INTEGER,
    -- See TS 24.008 [64]
    gsm0902MapErrorValue        [1] INTEGER,
    -- Note: The value to be stored here corresponds to
    -- the local values defined in the MAP-Errors and
    -- MAP-DialogueInformation modules, for full details
    -- see TS 29.002 [60].
    itu-tQ767Cause              [2] INTEGER,
    -- See ITU-T Q.767 [67]
    networkSpecificCause        [3] ManagementExtension,
    -- To be defined by network operator
    manufacturerSpecificCause   [4] ManagementExtension,
    -- To be defined by manufacturer
    positionMethodFailureCause  [5] PositionMethodFailure-Diagnostic,
    -- see TS 29.002 [60]
    unauthorizedLCSClientCause  [6] UnauthorizedLCSClient-Diagnostic
    -- see TS 29.002 [60]
}

IPAddress   ::= CHOICE
{
    iPBinaryAddress  IPBinaryAddress,
    iPTextRepresentedAddress     IPTextRepresentedAddress
}

IPBinaryAddress ::= CHOICE
{
    iPBinV4Address          [0] OCTET STRING (SIZE(4)),
    iPBinV6Address          [1] OCTET STRING (SIZE(16))
}

IPTextRepresentedAddress    ::= CHOICE
{
    --
    -- IP address in the familiar "dot" notation
    --
```

```
    iPTextV4Address         [2] IA5String (SIZE(7..15)),
    iPTextV6Address         [3] IA5String (SIZE(15..45))
}

LCSCause                ::= OCTET STRING (SIZE(1))
    --
    -- See LCS Cause Value, TS 49.031 [71]
    --

LCSClientIdentity       ::= SEQUENCE
{
    lcsClientExternalID [0] LCSClientExternalID OPTIONAL,
    lcsClientDialedByMS [1] AddressString OPTIONAL,
    lcsClientInternalID [2] LCSClientInternalID OPTIONAL
}

LCSQoSInfo              ::= OCTET STRING (SIZE(4))
    --
    -- See LCS QoS IE, TS 49.031 [71]
    --

LevelOfCAMELService     ::= BIT STRING
{
    basic                       (0),
    callDurationSupervision     (1),
    onlineCharging              (2)
}

LocalSequenceNumber ::= INTEGER (0..4294967295)
    --
    -- Sequence number of the record in this node
    -- 0.. 4294967295 is equivalent to 0..2**32-1, unsigned integer in four octets

LocationAreaAndCell     ::= SEQUENCE
{
    locationAreaCode    [0] LocationAreaCode,
    cellId              [1] CellId,
    mCC-MNC             [2] MCC-MNC     OPTIONAL
}

LocationAreaCode        ::= OCTET STRING (SIZE(2))
    --
    -- See TS 24.008 [64]
    --

MCC-MNC     ::= OCTET STRING (SIZE(3))
    --
    -- See TS 24.008 [64]
    --

ManagementExtensions    ::= SET OF ManagementExtension

MessageReference        ::= OCTET STRING

MscNo                   ::= ISDN-AddressString
    --
    -- See TS 23.003 [68]
    --

MSISDN                  ::= ISDN-AddressString
    --
    -- See TS 23.003 [68]
    --

MSTimeZone  ::= OCTET STRING (SIZE (2))
    --
    -- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060 [75]
    --

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

PositioningData ::= OCTET STRING (SIZE(1..33))
    --
    -- See Positioning Data IE (octet 3..n), TS 49.031 [71]
```

```
    --

RecordingEntity         ::= AddressString

ServiceContextID        ::= UTF8String


ServiceSpecificInfo  ::=  SEQUENCE
{

   serviceSpecificData  [0] GraphicString OPTIONAL,
   serviceSpecificType      [1] INTEGER OPTIONAL
}


SMSResult                   ::= Diagnostics

SmsTpDestinationNumber ::= OCTET STRING
    --
    -- This type contains the binary coded decimal representation of
    -- the SMS address field the encoding of the octet string is in
    -- accordance with the definition of address fields in TS 23.040 [72].
    -- This encoding includes type of number and numbering plan indication
    -- together with the address value range.
    --

SubscriptionID  ::= SET
{
    subscriptionIDType  [0] SubscriptionIDType,
    subscriptionIDData  [1] UTF8String
}

SubscriptionIDType  ::= ENUMERATED
{
    END_USER_E164       (0),
    END_USER_IMSI       (1),
    END_USER_SIP_URI    (2),
    END_USER_NAI        (3),
    END_USER_PRIVATE    (4)
}

SystemType  ::= ENUMERATED
{
    --
    --  "unknown" is not to be used in PS domain.
    --
    unknown             (0),
    iuUTRAN             (1),
    gERAN               (2)
}

TimeStamp                   ::= OCTET STRING (SIZE(9))
    --
    -- The contents of this field are a compact form of the UTCTime format
    -- containing local time plus an offset to universal time. Binary coded
    -- decimal encoding is employed for the digits to reduce the storage and
    -- transmission overhead
    -- e.g. YYMMDDhhmmssShhmm
    -- where
    -- YY   =   Year 00 to 99       BCD encoded
    -- MM   =   Month 01 to 12      BCD encoded
    -- DD   =   Day 01 to 31        BCD encoded
    -- hh   =   hour 00 to 23       BCD encoded
    -- mm   =   minute 00 to 59     BCD encoded
    -- ss   =   second 00 to 59     BCD encoded
    -- S    =   Sign 0 = "+", "-"   ASCII encoded
    -- hh   =   hour 00 to 23       BCD encoded
    -- mm   =   minute 00 to 59     BCD encoded
    --


END
```

5.2.2 Bearer level CDR definitions

This subclause contains the syntax definitions of the CDRs on the bearer level. This comprises the CDR types from the Circuit Switched (CS) domain (TS 32.250 [10]), the Packet Switched (PS) domain, i.e. GPRS (TS 32.251 [11]), and WLAN (TS 32.252 [12]).

5.2.2.1 CS domain CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.250 [10].

```
CSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
csChargingDataTypes (1) asn1Module (0) version1 (0)}  DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration, CalledNumber, RecordType, CallingNumber, CallReferenceNumber, CellId, DefaultSMS-
Handling, Diagnostics, Ext-GeographicalInformation, IMSI, IMEI, IPAddress, ISDN-AddressString,
LCSCause, LCSClientExternalID, LCSClientIdentity, LCSClientInternalID, LCSClientType, LCS-Priority,
LCSQoSInfo, LevelOfCAMELService, LocalSequenceNumber, LocationAreaAndCell, LocationAreaCode,
LocationType, ManagementExtensions, MessageReference, MSISDN, NotificationToMSUser, PositioningData,
RecordingEntity, ServiceKey, SMSResult, SmsTpDestinationNumber, TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}

BearerServiceCode
FROM MAP-BS-Code { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-BS-Code (20) version6 (6) }
-- from TS 29.002 [60]

TeleserviceCode
FROM MAP-TS-Code { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-TS-Code (19) version2 (2) }
-- from TS 29.002 [60]

SS-Code
FROM MAP-SS-Code { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-SS-Code (15) version6 (6) }
-- from TS 29.002 [60]

MOLR-Type
FROM SS-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2)
modules (3) ss-DataTypes (2) version7 (7)}
-- from TS 24.080 [61]

;

--------------------------------------------------------------------------------
--
--  CS CALL AND EVENT RECORDS
--
--------------------------------------------------------------------------------
CSRecord    ::= CHOICE
--
-- Record values 0..19 are circuit switch specific
--
{
    moCallRecord            [0] MOCallRecord,
    mtCallRecord            [1] MTCallRecord,
    roamingRecord           [2] RoamingRecord,
    incGatewayRecord        [3] IncGatewayRecord,
    outGatewayRecord        [4] OutGatewayRecord,
    transitRecord           [5] TransitCallRecord,
    moSMSRecord             [6] MOSMSRecord,
    mtSMSRecord             [7] MTSMSRecord,
    moSMSIWRecord           [8] MOSMSIWRecord,
    mtSMSGWRecord           [9] MTSMSGWRecord,
    ssActionRecord          [10] SSActionRecord,
    hlrIntRecord            [11] HLRIntRecord,
    locUpdateHLRRecord      [12] LocUpdateHLRRecord,
    locUpdateVLRRecord      [13] LocUpdateVLRRecord,
    commonEquipRecord       [14] CommonEquipRecord,
```

```
    recTypeExtensions       [15] ManagementExtensions,
    termCAMELRecord         [16] TermCAMELRecord,
    mtLCSRecord             [17] MTLCSRecord,
    moLCSRecord             [18] MOLCSRecord,
    niLCSRecord             [19] NILCSRecord
}

MOCallRecord    ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI OPTIONAL,
    servedIMEI                  [2] IMEI OPTIONAL,
    servedMSISDN                [3] MSISDN OPTIONAL,
    callingNumber               [4] CallingNumber OPTIONAL,
    calledNumber                [5] CalledNumber OPTIONAL,
    translatedNumber            [6] TranslatedNumber OPTIONAL,
    connectedNumber             [7] ConnectedNumber OPTIONAL,
    roamingNumber               [8] RoamingNumber OPTIONAL,
    recordingEntity             [9] RecordingEntity,
    mscIncomingTKGP             [10] TrunkGroup OPTIONAL,
    mscOutgoingTKGP             [11] TrunkGroup OPTIONAL,
    location                    [12] LocationAreaAndCell OPTIONAL,
    changeOfLocation            [13] SEQUENCE OF LocationChange OPTIONAL,
    basicService                [14] BasicServiceCode OPTIONAL,
    transparencyIndicator       [15] TransparencyInd OPTIONAL,
    changeOfService             [16] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed           [17] SEQUENCE OF SuppServiceUsed OPTIONAL,
    aocParameters               [18] AOCParameters OPTIONAL,
    changeOfAOCParms            [19] SEQUENCE OF AOCParmChange OPTIONAL,
    msClassmark                 [20] Classmark OPTIONAL,
    changeOfClassmark           [21] ChangeOfClassmark OPTIONAL,
    seizureTime                 [22] TimeStamp OPTIONAL,
    answerTime                  [23] TimeStamp OPTIONAL,
    releaseTime                 [24] TimeStamp OPTIONAL,
    callDuration                [25] CallDuration,
    dataVolume                  [26] DataVolume OPTIONAL,
    radioChanRequested          [27] RadioChanRequested OPTIONAL,
    radioChanUsed               [28] TrafficChannel OPTIONAL,
    changeOfRadioChan           [29] ChangeOfRadioChannel OPTIONAL,
    causeForTerm                [30] CauseForTerm,
    diagnostics                 [31] Diagnostics OPTIONAL,
    callReference               [32] CallReference,
    sequenceNumber              [33] INTEGER OPTIONAL,
    additionalChgInfo           [34] AdditionalChgInfo OPTIONAL,
    recordExtensions            [35] ManagementExtensions OPTIONAL,
    gsm-SCFAddress              [36] Gsm-SCFAddress OPTIONAL,
    serviceKey                  [37] ServiceKey OPTIONAL,
    networkCallReference        [38] NetworkCallReference OPTIONAL,
    mSCAddress                  [39] MSCAddress OPTIONAL,
    cAMELInitCFIndicator        [40] CAMELInitCFIndicator OPTIONAL,
    defaultCallHandling         [41] DefaultCallHandling OPTIONAL,
    hSCSDChanRequested          [42] NumOfHSCSDChanRequested OPTIONAL,
    hSCSDChanAllocated          [43] NumOfHSCSDChanAllocated OPTIONAL,
    changeOfHSCSDParms          [44] SEQUENCE OF HSCSDParmsChange OPTIONAL,
    fnur                        [45] Fnur OPTIONAL,
    aiurRequested               [46] AiurRequested OPTIONAL,
    chanCodingsAcceptable       [47] SEQUENCE OF ChannelCoding OPTIONAL,
    chanCodingUsed              [48] ChannelCoding OPTIONAL,
    speechVersionSupported      [49] SpeechVersionIdentifier OPTIONAL,
    speechVersionUsed           [50] SpeechVersionIdentifier OPTIONAL,
    numberOfDPEncountered       [51] INTEGER OPTIONAL,
    levelOfCAMELService         [52] LevelOfCAMELService OPTIONAL,
    freeFormatData              [53] FreeFormatData OPTIONAL,
    cAMELCallLegInformation     [54] SEQUENCE OF CAMELInformation OPTIONAL,
    freeFormatDataAppend        [55] BOOLEAN OPTIONAL,
    defaultCallHandling-2       [56] DefaultCallHandling OPTIONAL,
    gsm-SCFAddress-2            [57] Gsm-SCFAddress OPTIONAL,
    serviceKey-2                [58] ServiceKey OPTIONAL,
    freeFormatData-2            [59] FreeFormatData OPTIONAL,
    freeFormatDataAppend-2      [60] BOOLEAN OPTIONAL,
    systemType                  [61] SystemType OPTIONAL,
    rateIndication              [62] RateIndication OPTIONAL,
    locationRoutNum             [63] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [64] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus               [65] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                     [66] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [67] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus               [68] JurisdictionInformationParameterQueryStatus OPTIONAL,
```

```
    partialRecordType           [69] PartialRecordType OPTIONAL,
    guaranteedBitRate           [70] GuaranteedBitRate OPTIONAL,
    maximumBitRate              [71] MaximumBitRate OPTIONAL,
    redial                      [72] BOOLEAN OPTIONAL,  -- set indicates redial attempt
    reasonForServiceChange      [73] ReasonForServiceChange OPTIONAL,
    serviceChangeInitiator      [74] BOOLEAN OPTIONAL
}

MTCallRecord            ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] CalledNumber OPTIONAL,
    callingNumber           [4] CallingNumber OPTIONAL,
    connectedNumber         [5] ConnectedNumber OPTIONAL,
    recordingEntity         [6] RecordingEntity,
    mscIncomingTKGP         [7] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [8] TrunkGroup OPTIONAL,
    location                [9] LocationAreaAndCell OPTIONAL,
    changeOfLocation        [10] SEQUENCE OF LocationChange OPTIONAL,
    basicService            [11] BasicServiceCode OPTIONAL,
    transparencyIndicator   [12] TransparencyInd OPTIONAL,
    changeOfService         [13] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed       [14] SEQUENCE OF SuppServiceUsed OPTIONAL,
    aocParameters           [15] AOCParameters OPTIONAL,
    changeOfAOCParms        [16] SEQUENCE OF AOCParmChange OPTIONAL,
    msClassmark             [17] Classmark OPTIONAL,
    changeOfClassmark       [18] ChangeOfClassmark OPTIONAL,
    seizureTime             [19] TimeStamp OPTIONAL,
    answerTime              [20] TimeStamp OPTIONAL,
    releaseTime             [21] TimeStamp OPTIONAL,
    callDuration            [22] CallDuration,
    dataVolume              [23] DataVolume OPTIONAL,
    radioChanRequested      [24] RadioChanRequested OPTIONAL,
    radioChanUsed           [25] TrafficChannel OPTIONAL,
    changeOfRadioChan       [26] ChangeOfRadioChannel OPTIONAL,
    causeForTerm            [27] CauseForTerm,
    diagnostics             [28] Diagnostics OPTIONAL,
    callReference           [29] CallReference,
    sequenceNumber          [30] INTEGER OPTIONAL,
    additionalChgInfo       [31] AdditionalChgInfo OPTIONAL,
    recordExtensions        [32] ManagementExtensions OPTIONAL,
    networkCallReference    [33] NetworkCallReference OPTIONAL,
    mSCAddress              [34] MSCAddress OPTIONAL,
    hSCSDChanRequested      [35] NumOfHSCSDChanRequested OPTIONAL,
    hSCSDChanAllocated      [36] NumOfHSCSDChanAllocated OPTIONAL,
    changeOfHSCSDParms      [37] SEQUENCE OF HSCSDParmsChange OPTIONAL,
    fnur                    [38] Fnur OPTIONAL,
    aiurRequested           [39] AiurRequested OPTIONAL,
    chanCodingsAcceptable   [40] SEQUENCE OF ChannelCoding OPTIONAL,
    chanCodingUsed          [41] ChannelCoding OPTIONAL,
    speechVersionSupported  [42] SpeechVersionIdentifier OPTIONAL,
    speechVersionUsed       [43] SpeechVersionIdentifier OPTIONAL,
    gsm-SCFAddress          [44] Gsm-SCFAddress OPTIONAL,
    serviceKey              [45] ServiceKey OPTIONAL,
    systemType              [46] SystemType OPTIONAL,
    rateIndication          [47] RateIndication OPTIONAL,
    locationRoutNum         [48] LocationRoutingNumber OPTIONAL,
    lrnSoInd                [49] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQueryStatus          [50] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [51] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                [52] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus          [53] JurisdictionInformationParameterQueryStatus OPTIONAL,
    partialRecordType       [54] PartialRecordType OPTIONAL,
    guaranteedBitRate       [55] GuaranteedBitRate OPTIONAL,
    maximumBitRate          [56] MaximumBitRate OPTIONAL,
    reasonForServiceChange  [57] ReasonForServiceChange OPTIONAL,
    serviceChangeInitiator  [58] BOOLEAN OPTIONAL
}

RoamingRecord           ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedMSISDN            [2] MSISDN OPTIONAL,
    callingNumber           [3] CallingNumber OPTIONAL,
    roamingNumber           [4] RoamingNumber OPTIONAL,
```

```
    recordingEntity         [5] RecordingEntity,
    mscIncomingTKGP         [6] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [7] TrunkGroup OPTIONAL,
    basicService            [8] BasicServiceCode OPTIONAL,
    transparencyIndicator   [9] TransparencyInd OPTIONAL,
    changeOfService         [10] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed       [11] SEQUENCE OF  SuppServiceUsed OPTIONAL,
    seizureTime             [12] TimeStamp OPTIONAL,
    answerTime              [13] TimeStamp OPTIONAL,
    releaseTime             [14] TimeStamp OPTIONAL,
    callDuration            [15] CallDuration,
    dataVolume              [16] DataVolume OPTIONAL,
    causeForTerm            [17] CauseForTerm,
    diagnostics             [18] Diagnostics OPTIONAL,
    callReference           [19] CallReference,
    sequenceNumber          [20] INTEGER OPTIONAL,
    recordExtensions        [21] ManagementExtensions OPTIONAL,
    networkCallReference    [22] NetworkCallReference OPTIONAL,
    mSCAddress              [23] MSCAddress OPTIONAL,
    locationRoutNum         [24] LocationRoutingNumber OPTIONAL,
    lrnSoInd                [25] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus           [26] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [27] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                [28] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus           [29] JurisdictionInformationParameterQueryStatus OPTIONAL,
    partialRecordType       [30] PartialRecordType OPTIONAL
}

TermCAMELRecord ::= SET
{
    recordtype                  [0] RecordType,
    servedIMSI                  [1] IMSI,
    servedMSISDN                [2] MSISDN OPTIONAL,
    recordingEntity             [3] RecordingEntity,
    interrogationTime           [4] TimeStamp,
    destinationRoutingAddress   [5] DestinationRoutingAddress,
    gsm-SCFAddress              [6] Gsm-SCFAddress,
    serviceKey                  [7] ServiceKey,
    networkCallReference        [8] NetworkCallReference OPTIONAL,
    mSCAddress                  [9] MSCAddress OPTIONAL,
    defaultCallHandling         [10] DefaultCallHandling OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    calledNumber                [12] CalledNumber,
    callingNumber               [13] CallingNumber OPTIONAL,
    mscIncomingTKGP             [14] TrunkGroup OPTIONAL,
    mscOutgoingTKGP             [15] TrunkGroup OPTIONAL,
    seizureTime                 [16] TimeStamp OPTIONAL,
    answerTime                  [17] TimeStamp OPTIONAL,
    releaseTime                 [18] TimeStamp OPTIONAL,
    callDuration                [19] CallDuration,
    dataVolume                  [20] DataVolume OPTIONAL,
    causeForTerm                [21] CauseForTerm,
    diagnostics                 [22] Diagnostics OPTIONAL,
    callReference               [23] CallReference,
    sequenceNumber              [24] INTEGER OPTIONAL,
    numberOfDPEncountered       [25] INTEGER OPTIONAL,
    levelOfCAMELService         [26] LevelOfCAMELService OPTIONAL,
    freeFormatData              [27] FreeFormatData OPTIONAL,
    cAMELCallLegInformation     [28] SEQUENCE OF CAMELInformation OPTIONAL,
    freeFormatDataAppend        [29] BOOLEAN OPTIONAL,
        defaultCallHandling-2       [30] DefaultCallHandling OPTIONAL,
    gsm-SCFAddress-2            [31] Gsm-SCFAddress OPTIONAL,
    serviceKey-2                [32] ServiceKey OPTIONAL,
    freeFormatData-2            [33] FreeFormatData OPTIONAL,
    freeFormatDataAppend-2      [34] BOOLEAN OPTIONAL,
    mscServerIndication         [35] BOOLEAN OPTIONAL,
    locationRoutNum             [36] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [37] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus               [38] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                     [39] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [40] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus               [41] JurisdictionInformationParameterQueryStatus OPTIONAL,
    partialRecordType           [42] PartialRecordType OPTIONAL
}

IncGatewayRecord        ::= SET
{
    recordType              [0] RecordType,
```

```
    callingNumber           [1] CallingNumber OPTIONAL,
    calledNumber            [2] CalledNumber,
    recordingEntity         [3] RecordingEntity,
    mscIncomingTKGP         [4] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [5] TrunkGroup OPTIONAL,
    seizureTime             [6] TimeStamp OPTIONAL,
    answerTime              [7] TimeStamp OPTIONAL,
    releaseTime             [8] TimeStamp OPTIONAL,
    callDuration            [9] CallDuration,
    dataVolume              [10] DataVolume OPTIONAL,
    causeForTerm            [11] CauseForTerm,
    diagnostics             [12] Diagnostics OPTIONAL,
    callReference           [13] CallReference,
    sequenceNumber          [14] INTEGER OPTIONAL,
    recordExtensions        [15] ManagementExtensions OPTIONAL,
    locationRoutNum         [16] LocationRoutingNumber OPTIONAL,
    lrnSoInd                [17] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQueryStatus          [18] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [19] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [20] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus          [21] JurisdictionInformationParameterQueryStatus OPTIONAL,
    reasonForServiceChange  [22] ReasonForServiceChange OPTIONAL,
    serviceChangeInitiator  [23] BOOLEAN OPTIONAL}

OutGatewayRecord        ::= SET
{
    recordType              [0] RecordType,
    callingNumber           [1] CallingNumber OPTIONAL,
    calledNumber            [2] CalledNumber,
    recordingEntity         [3] RecordingEntity,
    mscIncomingTKGP         [4] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [5] TrunkGroup OPTIONAL,
    seizureTime             [6] TimeStamp OPTIONAL,
    answerTime              [7] TimeStamp OPTIONAL,
    releaseTime             [8] TimeStamp OPTIONAL,
    callDuration            [9] CallDuration,
    dataVolume              [10] DataVolume OPTIONAL,
    causeForTerm            [11] CauseForTerm,
    diagnostics             [12] Diagnostics OPTIONAL,
    callReference           [13] CallReference,
    sequenceNumber          [14] INTEGER OPTIONAL,
    recordExtensions        [15] ManagementExtensions OPTIONAL,
    locationRoutNum         [16] LocationRoutingNumber OPTIONAL,
    lrnSoInd                [17] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQueryStatus          [18] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [19] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                [20] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus          [21] JurisdictionInformationParameterQueryStatus OPTIONAL,
    reasonForServiceChange  [22] ReasonForServiceChange OPTIONAL,
    serviceChangeInitiator  [23] BOOLEAN OPTIONAL
}

TransitCallRecord       ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    mscIncomingTKGP         [2] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [3] TrunkGroup OPTIONAL,
    callingNumber           [4] CallingNumber OPTIONAL,
    calledNumber            [5] CalledNumber,
    isdnBasicService        [6] BasicService OPTIONAL,
    seizureTimestamp        [7] TimeStamp OPTIONAL,
    answerTimestamp         [8] TimeStamp OPTIONAL,
    releaseTimestamp        [9] TimeStamp OPTIONAL,
    callDuration            [10] CallDuration,
    dataVolume              [11] DataVolume OPTIONAL,
    causeForTerm            [12] CauseForTerm,
    diagnostics             [13] Diagnostics OPTIONAL,
    callReference           [14] CallReference,
    sequenceNumber          [15] INTEGER OPTIONAL,
    recordExtensions        [16] ManagementExtensions OPTIONAL,
    locationRoutNum         [17] LocationRoutingNumber OPTIONAL,
    lrnSoInd                [18] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQueryStatus          [19] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [20] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                [21] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus          [22] JurisdictionInformationParameterQueryStatus OPTIONAL
}
```

```
MOSMSRecord             ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] MSISDN OPTIONAL,
    msClassmark             [4] Classmark,
    serviceCentre           [5] AddressString,
    recordingEntity         [6] RecordingEntity,
    location                [7] LocationAreaAndCell OPTIONAL,
    messageReference        [8] MessageReference,
    originationTime         [9] TimeStamp,
    smsResult               [10] SMSResult OPTIONAL,
    recordExtensions        [11] ManagementExtensions OPTIONAL,
    destinationNumber       [12] SmsTpDestinationNumber OPTIONAL,
    cAMELSMSInformation     [13] CAMELSMSInformation OPTIONAL,
    systemType              [14] SystemType OPTIONAL
}

MTSMSRecord             ::= SET
{
    recordType              [0] RecordType,
    serviceCentre           [1] AddressString,
    servedIMSI              [2] IMSI,
    servedIMEI              [3] IMEI OPTIONAL,
    servedMSISDN            [4] MSISDN OPTIONAL,
    msClassmark             [5] Classmark,
    recordingEntity         [6] RecordingEntity,
    location                [7] LocationAreaAndCell OPTIONAL,
    deliveryTime            [8] TimeStamp,
    smsResult               [9] SMSResult OPTIONAL,
    recordExtensions        [10] ManagementExtensions OPTIONAL,
    systemType              [11] SystemType OPTIONAL,
    cAMELSMSInformation     [12] CAMELSMSInformation OPTIONAL
}

MOSMSIWRecord           ::= SET
{
    recordType          [0] RecordType,
    serviceCentre       [1] AddressString,
    servedIMSI          [2] IMSI,
    recordingEntity     [3] RecordingEntity,
    eventTime           [4] TimeStamp,
    smsResult           [5] SMSResult OPTIONAL,
    recordExtensions    [6] ManagementExtensions OPTIONAL
}

MTSMSGWRecord           ::= SET
{
    recordType          [0] RecordType,
    serviceCentre       [1] AddressString,
    servedIMSI          [2] IMSI,
    servedMSISDN        [3] MSISDN OPTIONAL,
    recordingEntity     [4] RecordingEntity,
    eventTime           [5] TimeStamp,
    smsResult           [6] SMSResult OPTIONAL,
    recordExtensions    [7] ManagementExtensions OPTIONAL
}

SSActionRecord          ::= SET
{
    recordType          [0] RecordType,
    servedIMSI          [1] IMSI,
    servedIMEI          [2] IMEI OPTIONAL,
    servedMSISDN        [3] MSISDN OPTIONAL,
    msClassmark         [4] Classmark,
    recordingEntity     [5] RecordingEntity,
    location            [6] LocationAreaAndCell OPTIONAL,
    basicServices       [7] BasicServices OPTIONAL,
    supplService        [8] SS-Code OPTIONAL,
    ssAction            [9] SSActionType OPTIONAL,
    ssActionTime        [10] TimeStamp,
    ssParameters        [11] SSParameters OPTIONAL,
    ssActionResult      [12] SSActionResult OPTIONAL,
    callReference       [13] CallReference,
    recordExtensions    [14] ManagementExtensions OPTIONAL,
    systemType          [15] SystemType OPTIONAL
```

```
}

HLRIntRecord            ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedMSISDN            [2] MSISDN,
    recordingEntity         [3] RecordingEntity,
    basicService            [4] BasicServiceCode OPTIONAL,
    routingNumber           [5] RoutingNumber,
    interrogationTime       [6] TimeStamp,
    numberOfForwarding      [7] NumberOfForwarding OPTIONAL,
    interrogationResult     [8] HLRIntResult OPTIONAL,
    recordExtensions        [9] ManagementExtensions OPTIONAL
}
```

Editor"s note: clarify if the above is really still a CS specific record

```
LocUpdateHLRRecord      ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    recordingEntity         [2] RecordingEntity,
    oldLocation             [3] Visited-Location-info OPTIONAL,
    newLocation             [4] Visited-Location-info,
    updateTime              [5] TimeStamp,
    updateResult            [6] LocUpdResult OPTIONAL,
    recordExtensions        [7] ManagementExtensions OPTIONAL
}

LocUpdateVLRRecord      ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedMSISDN            [2] MSISDN OPTIONAL,
    recordingEntity         [3] RecordingEntity,
    oldLocation             [4] Location-info OPTIONAL,
    newLocation             [5] Location-info,
    msClassmark             [6] Classmark,
    updateTime              [7] TimeStamp,
    updateResult            [8] LocUpdResult OPTIONAL,
    recordExtensions        [9] ManagementExtensions OPTIONAL
}

CommonEquipRecord       ::= SET
{
    recordType              [0] RecordType,
    equipmentType           [1] EquipmentType,
    equipmentId             [2] EquipmentId,
    servedIMSI              [3] IMSI,
    servedMSISDN            [4] MSISDN OPTIONAL,
    recordingEntity         [5] RecordingEntity,
    basicService            [6] BasicServiceCode OPTIONAL,
    changeOfService         [7] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed       [8] SEQUENCE OF SuppServiceUsed OPTIONAL,
    seizureTime             [9] TimeStamp,
    releaseTime             [10] TimeStamp OPTIONAL,
    callDuration            [11] CallDuration,
    callReference           [12] CallReference,
    sequenceNumber          [13] INTEGER OPTIONAL,
    recordExtensions        [14] ManagementExtensions OPTIONAL,
    systemType              [15] SystemType OPTIONAL,
    rateIndication          [16] RateIndication OPTIONAL,
    fnur                    [17] Fnur OPTIONAL
}

--------------------------------------------------------------------------------
--
--  OBSERVED IMEI TICKETS
--
--------------------------------------------------------------------------------

ObservedIMEITicket      ::= SET
{
    servedIMEI          [0] IMEI,
    imeiStatus          [1] IMEIStatus,
    servedIMSI          [2] IMSI,
    servedMSISDN        [3] MSISDN OPTIONAL,
```

```
    recordingEntity     [4] RecordingEntity,
    eventTime           [5] TimeStamp,
    location            [6] LocationAreaAndCell ,
    imeiCheckEvent      [7] IMEICheckEvent OPTIONAL,
    callReference       [8] CallReference OPTIONAL,
    recordExtensions    [9] ManagementExtensions OPTIONAL

}

-------------------------------------------------------------------------------
--
--  CS LOCATION SERVICE RECORDS
--
-------------------------------------------------------------------------------

MTLCSRecord             ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType,
    lcsClientIdentity       [3] LCSClientIdentity,
    servedIMSI              [4] IMSI,
    servedMSISDN            [5] MSISDN OPTIONAL,
    locationType            [6] LocationType,
    lcsQos                  [7] LCSQoSInfo OPTIONAL,
    lcsPriority             [8] LCS-Priority OPTIONAL,
    mlc-Number              [9] ISDN-AddressString,
    eventTimeStamp          [10] TimeStamp,
    measureDuration         [11] CallDuration OPTIONAL,
    notificationToMSUser    [12] NotificationToMSUser OPTIONAL,
    privacyOverride         [13] NULL OPTIONAL,
    location                [14] LocationAreaAndCell OPTIONAL,
    locationEstimate        [15] Ext-GeographicalInformation OPTIONAL,
    positioningData         [16] PositioningData OPTIONAL,
    lcsCause                [17] LCSCause OPTIONAL,
    diagnostics             [18] Diagnostics OPTIONAL,
    systemType              [19] SystemType OPTIONAL,
    recordExtensions        [20] ManagementExtensions OPTIONAL,
    causeForTerm            [21] CauseForTerm
}

MOLCSRecord             ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType OPTIONAL,
    lcsClientIdentity       [3] LCSClientIdentity OPTIONAL,
    servedIMSI              [4] IMSI,
    servedMSISDN            [5] MSISDN OPTIONAL,
    molr-Type               [6] MOLR-Type,
    lcsQos                  [7] LCSQoSInfo OPTIONAL,
    lcsPriority             [8] LCS-Priority OPTIONAL,
    mlc-Number              [9] ISDN-AddressString OPTIONAL,
    eventTimeStamp          [10] TimeStamp,
    measureDuration         [11] CallDuration OPTIONAL,
    location                [12] LocationAreaAndCell OPTIONAL,
    locationEstimate        [13] Ext-GeographicalInformation OPTIONAL,
    positioningData         [14] PositioningData OPTIONAL,
    lcsCause                [15] LCSCause OPTIONAL,
    diagnostics             [16] Diagnostics OPTIONAL,
    systemType              [17] SystemType OPTIONAL,
    recordExtensions        [18] ManagementExtensions OPTIONAL,
    causeForTerm            [19] CauseForTerm
}

NILCSRecord             ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType OPTIONAL,
    lcsClientIdentity       [3] LCSClientIdentity OPTIONAL,
    servedIMSI              [4] IMSI OPTIONAL,
    servedMSISDN            [5] MSISDN OPTIONAL,
    servedIMEI              [6] IMEI OPTIONAL,
    emsDigits               [7] ISDN-AddressString OPTIONAL,
    emsKey                  [8] ISDN-AddressString OPTIONAL,
    lcsQos                  [9] LCSQoSInfo OPTIONAL,
    lcsPriority             [10] LCS-Priority OPTIONAL,
```

```
    mlc-Number              [11] ISDN-AddressString OPTIONAL,
    eventTimeStamp          [12] TimeStamp,
    measureDuration         [13] CallDuration OPTIONAL,
    location                [14] LocationAreaAndCell OPTIONAL,
    locationEstimate        [15] Ext-GeographicalInformation OPTIONAL,
    positioningData         [16] PositioningData OPTIONAL,
    lcsCause                [17] LCSCause OPTIONAL,
    diagnostics             [18] Diagnostics OPTIONAL,
    systemType              [19] SystemType OPTIONAL,
    recordExtensions        [20] ManagementExtensions OPTIONAL,
    causeForTerm            [21] CauseForTerm
}

-------------------------------------------------------------------------------
--
--  NP Fields
--
-------------------------------------------------------------------------------


LocationRoutingNumber           ::= OCTET STRING (SIZE (5))
--
--  The format is selected to meet the existing standards for the wireline in Telcordia
--   Belcore GR-1100-CORE, BAF Module 720.
--

LocationRoutingNumberSourceIndicator                ::= INTEGER
{
    lRN-NP-Database             (1),
    switchingSystemData         (2),
    incomingsignaling           (3),
    unknown                     (9)
}

LocationRoutingNumberQueryStatus            ::= INTEGER
{
    successfulQuery             (1),
    noQueryResponseMsg          (2),
    queryProtocolErr            (4),
    queryResponseDataErr        (5),
    queryRejected               (6),
    queryNotPerformed           (9),
    queryUnsuccessful           (99)
}

JurisdictionInformationParameter    ::= OCTET STRING (SIZE (5))
--
-- /* JIP Parameter */


JurisdictionInformationParameterSourceIndicator                 ::= INTEGER
-- Identical to LocationRoutingNumberSourceIndicator
{
    lRN-NP-Database             (1),
    switchingSystemData         (2),
    incomingsignaling           (3),
    unknown                     (9)
}

JurisdictionInformationParameterQueryStatus             ::= INTEGER
{
    successfulQuery             (1),
    noQueryResponseMsg          (2),
    queryProtocolErr            (4),
    queryResponseDataErr        (5),
    queryRejected               (6),
    queryNotPerformed           (9),
    queryUnsuccessful           (99)
}

-------------------------------------------------------------------------------
--
--  CS DATA TYPES
--
-------------------------------------------------------------------------------
AdditionalChgInfo       ::= SEQUENCE
{
    chargeIndicator     [0] ChargeIndicator OPTIONAL,
```

```
    chargeParameters    [1] OCTET STRING OPTIONAL
}

AiurRequested           ::= ENUMERATED
{
    --
    -- See Bearer Capability TS 24.008 [64]
    -- (note that value "4" is intentionally missing
    --  because it is not used in TS 24.008 [64])
    --
    aiur09600BitsPerSecond      (1),
    aiur14400BitsPerSecond      (2),
    aiur19200BitsPerSecond      (3),
    aiur28800BitsPerSecond      (5),
    aiur38400BitsPerSecond      (6),
    aiur43200BitsPerSecond      (7),
    aiur57600BitsPerSecond      (8),
    aiur38400BitsPerSecond1     (9),
    aiur38400BitsPerSecond2     (10),
    aiur38400BitsPerSecond3     (11),
    aiur38400BitsPerSecond4     (12)
}

AOCParameters           ::= SEQUENCE
{
    --
    -- See TS 22.024 [63].
    --
    e1                  [1] EParameter OPTIONAL,
    e2                  [2] EParameter OPTIONAL,
    e3                  [3] EParameter OPTIONAL,
    e4                  [4] EParameter OPTIONAL,
    e5                  [5] EParameter OPTIONAL,
    e6                  [6] EParameter OPTIONAL,
    e7                  [7] EParameter OPTIONAL
}

AOCParmChange           ::= SEQUENCE
{
    changeTime          [0] TimeStamp,
    newParameters       [1] AOCParameters
}

BasicServices           ::= SET OF BasicServiceCode

CallingPartyCategory    ::= Category

CallType                ::= INTEGER
{
    mobileOriginated    (0),
    mobileTerminated    (1)
}

CallTypes               ::= SET OF CallType

CAMELDestinationNumber  ::= DestinationRoutingAddress

CAMELInformation        ::= SET
{
    cAMELDestinationNumber      [1] CAMELDestinationNumber OPTIONAL,
    connectedNumber             [2] ConnectedNumber OPTIONAL,
    roamingNumber               [3] RoamingNumber OPTIONAL,
    mscOutgoingTKGP             [4] TrunkGroup OPTIONAL,
    seizureTime                 [5] TimeStamp OPTIONAL,
    answerTime                  [6] TimeStamp OPTIONAL,
    releaseTime                 [7] TimeStamp OPTIONAL,
    callDuration                [8] CallDuration OPTIONAL,
    dataVolume                  [9] DataVolume OPTIONAL,
    cAMELInitCFIndicator        [10] CAMELInitCFIndicator OPTIONAL,
    causeForTerm                [11] CauseForTerm OPTIONAL,
    cAMELModification           [12] ChangedParameters OPTIONAL,
    freeFormatData              [13] FreeFormatData OPTIONAL,
    diagnostics                 [14] Diagnostics OPTIONAL,
    freeFormatDataAppend        [15] BOOLEAN OPTIONAL,
    freeFormatData-2            [16] FreeFormatData OPTIONAL,
    freeFormatDataAppend-2      [17] BOOLEAN OPTIONAL
}
```

```
CAMELInitCFIndicator    ::= ENUMERATED
{
    noCAMELCallForwarding       (0),
    cAMELCallForwarding         (1)
}

CAMELModificationParameters ::= SET
    --
    -- The list contains only parameters changed due to CAMEL call
    -- handling.
    --
{
    callingPartyNumber          [0] CallingNumber OPTIONAL,
    callingPartyCategory        [1] CallingPartyCategory OPTIONAL,
    originalCalledPartyNumber   [2] OriginalCalledNumber OPTIONAL,
    genericNumbers              [3] GenericNumbers OPTIONAL,
    redirectingPartyNumber      [4] RedirectingNumber OPTIONAL,
    redirectionCounter          [5] NumberOfForwarding OPTIONAL
}

CAMELSMSInformation     ::= SET
{
    gsm-SCFAddress                      [1] Gsm-SCFAddress OPTIONAL,
    serviceKey                          [2] ServiceKey OPTIONAL,
    defaultSMSHandling                  [3] DefaultSMS-Handling OPTIONAL,
    freeFormatData                      [4] FreeFormatData OPTIONAL,
    callingPartyNumber                  [5] CallingNumber OPTIONAL,
    destinationSubscriberNumber         [6] SmsTpDestinationNumber OPTIONAL,
    cAMELSMSCAddress                    [7] AddressString OPTIONAL,
    smsReferenceNumber                  [8] CallReferenceNumber OPTIONAL
}

Category        ::= OCTET STRING (SIZE(1))
    --
    -- The internal structure is defined in ITU-T Recommendation Q.763.
    --

CauseForTerm            ::= INTEGER
    --
    -- Cause codes from 16 up to 31 are defined in GSM12.15 as "CauseForRecClosing"
    -- (cause for record closing).
    -- There is no direct correlation between these two types.
    -- LCS related causes belong to the MAP error causes acc. TS 29.002 [60].
    --
{
    normalRelease                       (0),
    partialRecord                       (1),
    partialRecordCallReestablishment    (2),
    unsuccessfulCallAttempt             (3),
    stableCallAbnormalTermination       (4),
    cAMELInitCallRelease                (5),
    unauthorizedRequestingNetwork       (52),
    unauthorizedLCSClient               (53),
    positionMethodFailure               (54),
    unknownOrUnreachableLCSClient       (58)
}

ChangedParameters       ::= SET
{
    changeFlags     [0] ChangeFlags,
    changeList      [1] CAMELModificationParameters OPTIONAL
}

ChangeFlags             ::= BIT STRING
{
    callingPartyNumberModified          (0),
    callingPartyCategoryModified        (1),
    originalCalledPartyNumberModified   (2),
    genericNumbersModified              (3),
    redirectingPartyNumberModified      (4),
    redirectionCounterModified          (5)
}

ChangeOfClassmark       ::= SEQUENCE
{
    classmark           [0] Classmark,
    changeTime          [1] TimeStamp
}
```

```
ChangeOfRadioChannel    ::= SEQUENCE
{
    radioChannel        [0] TrafficChannel,
    changeTime          [1] TimeStamp,
    speechVersionUsed   [2] SpeechVersionIdentifier OPTIONAL
}

ChangeOfService         ::= SEQUENCE
{
    basicService        [0] BasicServiceCode,
    transparencyInd     [1] TransparencyInd OPTIONAL,
    changeTime          [2] TimeStamp,
    rateIndication      [3] RateIndication OPTIONAL,
    fnur                [4] Fnur OPTIONAL
}

ChannelCoding               ::= ENUMERATED
{
    tchF4800                    (1),
    tchF9600                    (2),
    tchF14400               (3)
}

Classmark               ::= OCTET STRING
    --
    -- See Mobile station classmark  2,  TS 24.008 [64]
    --

ConnectedNumber         ::= BCDDirectoryNumber

DataVolume              ::= INTEGER
    --
    -- The volume of data transferred in segments of 64 octets.
    --

Day                     ::= INTEGER (1..31)

DayClass                ::= ObjectInstance

DayClasses              ::= SET OF DayClass

DayDefinition           ::= SEQUENCE
{
    day                 [0] DayOfTheWeek,
    dayClass            [1] ObjectInstance
}

DayDefinitions          ::= SET OF DayDefinition

DateDefinition          ::= SEQUENCE
{
    month               [0] Month,
    day                 [1] Day,
    dayClass            [2] ObjectInstance
}

DateDefinitions         ::= SET OF DateDefinition

DayOfTheWeek            ::= ENUMERATED
{
    allDays             (0),
    sunday              (1),
    monday              (2),
    tuesday             (3),
    wednesday           (4),
    thursday            (5),
    friday              (6),
    saturday            (7)
}

Destinations            ::= SET OF AE-title

EmergencyCallIndEnable  ::= BOOLEAN

EmergencyCallIndication ::= SEQUENCE
{
    cellId              [0] CellId,
```

```
    callerId            [1] IMSIorIMEI
}

EParameter  ::= INTEGER (0..1023)
    --
    -- Coded according to  TS 22.024 [63] and TS 24.080 [61]
    --

EquipmentId             ::= INTEGER

EquipmentType           ::= INTEGER
{
    conferenceBridge    (0)
}

FileType                ::= INTEGER
{
    callRecords         (1),
    traceRecords        (9),
    observedIMEITicket  (14)
}

Fnur                            ::= ENUMERATED
{
    --
    -- See Bearer Capability TS 24.008 [64]
    --
    fnurNotApplicable           (0),
    fnur9600-BitsPerSecond      (1),
    fnur14400BitsPerSecond      (2),
    fnur19200BitsPerSecond      (3),
    fnur28800BitsPerSecond      (4),
    fnur38400BitsPerSecond      (5),
    fnur48000BitsPerSecond      (6),
    fnur56000BitsPerSecond      (7),
    fnur64000BitsPerSecond      (8),
    fnur33600BitsPerSecond      (9),
fnur32000BitsPerSecond          (10),
fnur31200BitsPerSecond          (11)
}

ForwardToNumber         ::= AddressString

FreeFormatData          ::= OCTET STRING (SIZE(1..160))
    --
    -- Free formatted data as sent in the FCI message
    -- See TS 29.078 [66]
    --

GenericNumber           ::= BCDDirectoryNumber

GenericNumbers          ::= SET OF GenericNumber

Gsm-SCFAddress          ::= ISDN-AddressString
    --
    -- See TS 29.002 [60]
    --

GuaranteedBitRate ::= ENUMERATED
{
     GBR14400BitsPerSecond (1),     -- BS20 non-transparent
     GBR28800BitsPerSecond (2),     -- BS20 non-transparent and transparent,
                                    -- BS30 transparent and multimedia
     GBR32000BitsPerSecond (3),     -- BS30 multimedia
     GBR33600BitsPerSecond (4),     -- BS30 multimedia
     GBR56000BitsPerSecond (5),     -- BS30 transparent and multimedia
     GBR57600BitsPerSecond (6),     -- BS20 non-transparent
     GBR64000BitsPerSecond (7)      -- BS30 transparent and multimedia
}

HLRIntResult            ::= Diagnostics

HSCSDParmsChange        ::= SEQUENCE
{
    changeTime              [0] TimeStamp,
    hSCSDChanAllocated      [1] NumOfHSCSDChanAllocated,
    initiatingParty         [2] InitiatingParty OPTIONAL,
    aiurRequested           [3] AiurRequested OPTIONAL,
```

```
    chanCodingUsed          [4] ChannelCoding,
    hSCSDChanRequested      [5] NumOfHSCSDChanRequested OPTIONAL
}

IMEICheckEvent          ::= INTEGER
{
    mobileOriginatedCall    (0),
    mobileTerminatedCall    (1),
    smsMobileOriginating    (2),
    smsMobileTerminating    (3),
    ssAction                (4),
    locationUpdate          (5)
}

IMEIStatus              ::= ENUMERATED
{
    greyListedMobileEquipment       (0),
    blackListedMobileEquipment      (1),
    nonWhiteListedMobileEquipment   (2)
}

IMSIorIMEI              ::= CHOICE
{
    imsi                [0] IMSI,
    imei                [1] IMEI
}

InitiatingParty         ::= ENUMERATED
{
    network             (0),
    subscriber          (1)
}

LocationChange          ::= SEQUENCE
{
    location            [0] LocationAreaAndCell,
    changeTime          [1] TimeStamp
}

Location-info           ::= SEQUENCE
{
    mscNumber           [1] MscNo OPTIONAL,
    location-area       [2] LocationAreaCode,
    cell-identification [3] CellId OPTIONAL
}

LocUpdResult            ::= Diagnostics

MaximumBitRate ::= ENUMERATED
{
     MBR14400BitsPerSecond (1),     -- BS20 non-transparent
     MBR28800BitsPerSecond (2),     -- BS20 non-transparent and transparent,
                                    -- BS30 transparent and multimedia
     MBR32000BitsPerSecond (3),     -- BS30 multimedia
     MBR33600BitsPerSecond (4),     -- BS30 multimedia
     MBR56000BitsPerSecond (5),     -- BS30 transparent and multimedia
     MBR57600BitsPerSecond (6),     -- BS20 non-transparent
}

MCCMNC  ::= GraphicString (SIZE(6))
    --
    -- This type contains the mobile country code (MCC) and the mobile
    -- network code (MNC) of a PLMN.
    --

Month                   ::= INTEGER (1..12)

MSCAddress              ::= AddressString

MSPowerClasses          ::= SET OF RFPowerCapability

NetworkCallReference    ::= CallReferenceNumber --
    -- See TS 29.002 [60]
    --

NetworkSpecificCode     ::= INTEGER
    --
    -- To be defined by network operator
```

```
    --

NetworkSpecificServices ::= SET OF NetworkSpecificCode

NumOfHSCSDChanRequested     ::= INTEGER

NumOfHSCSDChanAllocated     ::= INTEGER

ObservedIMEITicketEnable    ::= BOOLEAN

OriginalCalledNumber        ::= BCDDirectoryNumber

OriginDestCombinations      ::= SET OF OriginDestCombination

OriginDestCombination       ::= SEQUENCE
{
    origin                  [0] INTEGER OPTIONAL,
    destination             [1] INTEGER OPTIONAL
    --
    -- Note that these values correspond to the contents
    -- of the attributes originId and destinationId
    -- respectively. At least one of the two must be present.
    --
}

PartialRecordTimer      ::= INTEGER

PartialRecordType       ::= ENUMERATED
{
    timeLimit                   (0),
    serviceChange               (1),
    locationChange              (2),
    classmarkChange             (3),
    aocParmChange               (4),
    radioChannelChange          (5),
    hSCSDParmChange             (6),
    changeOfCAMELDestination    (7)
}

PartialRecordTypes      ::= SET OF PartialRecordType

RadioChannelsRequested  ::= SET OF RadioChanRequested

RadioChanRequested      ::= ENUMERATED
{
    --
    -- See Bearer Capability TS 24.008 [64]
    --
    halfRateChannel             (0),
    fullRateChannel             (1),
    dualHalfRatePreferred       (2),
    dualFullRatePreferred       (3)
}

RateIndication ::= OCTET STRING(SIZE(1))

ReasonForServiceChange      ::= ENUMERATED
{
    msubInitiated               (0),
    mscInitiated                (1),
    callSetupFallBack           (2),
    callSetupChangeOrder        (3)
}

RecordClassDestination  ::= CHOICE
{
    osApplication       [0] AE-title,
    fileType            [1] FileType
}

RecordClassDestinations ::= SET OF RecordClassDestination

RecordingMethod         ::= ENUMERATED
{
    inCallRecord        (0),
    inSSRecord          (1)
}
```

```
RedirectingNumber       ::= BCDDirectoryNumber

RFPowerCapability       ::= INTEGER
    --
    -- This field contains the RF power capability of the
    -- Mobile station
    -- classmark 1 and 2 of TS 24.008 [64] expressed as an integer.
    --

RoamingNumber           ::= ISDN-AddressString
    --
    -- See TS 23.003 [68]
    --

RoutingNumber           ::= CHOICE
{
    roaming             [1] RoamingNumber,
    forwarded           [2] ForwardToNumber
}

Service                     ::= CHOICE
{
    teleservice                 [1] TeleserviceCode,
    bearerService               [2] BearerServiceCode,
    supplementaryService        [3] SS-Code,
    networkSpecificService      [4] NetworkSpecificCode
}

ServiceDistanceDependencies ::= SET OF ServiceDistanceDependency

ServiceDistanceDependency   ::= SEQUENCE
{
    aocService              [0] INTEGER,
    chargingZone            [1] INTEGER OPTIONAL
    --
    -- Note that these values correspond to the contents
    -- of the attributes aocServiceId and zoneId
    -- respectively.
    --
}

SimpleIntegerName           ::= INTEGER

SimpleStringName            ::= GraphicString

SpeechVersionIdentifier ::= OCTET STRING (SIZE(1))
    --
    --  see GSM 08.08
    --
    --  000 0001    GSM speech full rate version 1
    --  001 0001    GSM speech full rate version 2   used for enhanced full rate
    --  010 0001    GSM speech full rate version 3   for future use
    --  000 0101    GSM speech half rate version 1
    --  001 0101    GSM speech half rate version 2  for future use
    --  010 0101    GSM speech half rate version 3  for future use
    --
SSActionResult              ::= Diagnostics

SSActionType                ::= ENUMERATED
{
    registration            (0),
    erasure                 (1),
    activation              (2),
    deactivation            (3),
    interrogation           (4),
    invocation              (5),
    passwordRegistration    (6)
}

SSParameters                ::= CHOICE
{
    forwardedToNumber       [0] ForwardToNumber,
    unstructuredData        [1] OCTET STRING
}

SupplServices               ::= SET OF SS-Code

SuppServiceUsed             ::= SEQUENCE
```

```
{
    ssCode                  [0] SS-Code,
    ssTime                  [1] TimeStamp OPTIONAL
}

SwitchoverTime              ::= SEQUENCE
{
    hour                    INTEGER (0..23),
    minute                  INTEGER (0..59),
    second                  INTEGER (0..59)
}

TariffId                    ::= INTEGER

TariffPeriod                ::= SEQUENCE
{
    switchoverTime          [0] SwitchoverTime,
    tariffId                [1] INTEGER
    --
    -- Note that the value of tariffId corresponds
    -- to the attribute tariffId.
    --
}

TariffPeriods               ::= SET OF TariffPeriod

TariffSystemStatus          ::= ENUMERATED
{
    available               (0),    -- available for modification
    checked                 (1),    -- "frozen" and checked
    standby                 (2),    -- "frozen" awaiting activation
    active                  (3) -- "frozen" and active
}

TrafficChannel          ::= ENUMERATED
{
    fullRate            (0),
    halfRate            (1)
}

TranslatedNumber        ::=     BCDDirectoryNumber

TransparencyInd         ::= ENUMERATED
{
    transparent         (0),
    nonTransparent      (1)
}

TrunkGroup              ::=  CHOICE
{
    tkgpNumber          [0] INTEGER,
    tkgpName            [1] GraphicString
}

TSChangeover            ::= SEQUENCE
{
    newActiveTS         [0] INTEGER,
    newStandbyTS        [1] INTEGER,
    changeoverTime      [2] GeneralizedTime OPTIONAL,
    authkey             [3] OCTET STRING OPTIONAL,
    checksum            [4] OCTET STRING OPTIONAL,
    versionNumber       [5] OCTET STRING OPTIONAL
    --
    -- Note that if the changeover time is not
    -- specified then the change is immediate.
    --
}

TSCheckError            ::= SEQUENCE
{
    errorId             [0] TSCheckErrorId,
    fail                [1] ANY DEFINED BY errorId OPTIONAL
}

TSCheckErrorId          ::= CHOICE
{
    globalForm          [0] OBJECT IDENTIFIER,
    localForm           [1] INTEGER
```

```
}

TSCheckResult           ::= CHOICE
{
    success             [0] NULL,
    fail                [1] SET OF TSCheckError
}

TSCopyTariffSystem      ::= SEQUENCE
{
    oldTS               [0] INTEGER,
    newTS               [1] INTEGER
}

TSNextChange            ::= CHOICE
{
    noChangeover        [0] NULL,
    tsChangeover        [1] TSChangeover
}

TypeOfSubscribers       ::= ENUMERATED
{
    home                (0),    -- HPLMN subscribers
    visiting            (1),    -- roaming subscribers
    all (2)
}

TypeOfTransaction       ::= ENUMERATED
{
    successful          (0),
    unsuccessful        (1),
    all                 (2)
}

Visited-Location-info           ::= SEQUENCE
{
    mscNumber           [1] MscNo,
    vlrNumber           [2] VlrNo
}

VlrNo                   ::= ISDN-AddressString
    --
    -- See TS 23.003 [68]
    --


END
```

5.2.2.2 PS domain CDRs

This subclause contains the abstract syntax definitions that are specific to the GPRS and EPC CDR types defined in TS 32.251 [11].

```
GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging (5)
gprsChargingDataTypes (2) asn1Module (0) version1 (0)}


DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS
CallDuration, CalledNumber, RecordType, CallingNumber, CallReferenceNumber, CellId, DefaultSMS-
Handling, Diagnostics, Ext-GeographicalInformation, IMSI, IMEI, IPAddress, ISDN-AddressString,
LCSCause, LCSClientExternalID, LCSClientIdentity, LCSClientInternalID, LCSClientType, LCS-Priority,
LCSQoSInfo, LevelOfCAMELService, LocalSequenceNumber, LocationAreaAndCell, LocationAreaCode,
LocationType, ManagementExtensions, MessageReference, MSISDN, NotificationToMSUser, PositioningData,
RecordingEntity, ServiceKey, ServiceSpecificInfo, SMSResult, SmsTpDestinationNumber, TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}

DefaultGPRS-Handling, RAIdentity
FROM MAP-MS-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)}
--
-- from TS 29.002 [60]

LocationMethod
FROM SS-DataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2)
modules (3) ss-DataTypes (2) version7 (7)}
--
-- from TS 24.080 [61]

MBMS2G3GIndicator, FileRepairSupported, MBMSServiceType, MBMSUserServiceType,
RequiredMBMSBearerCapabilities, MBMSSessionIdentity, TMGI, MBMSInformation
FROM MBMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) mbmsChargingDataTypes (8) asn1Module (0) version1 (0)}

Editor"s note:  consider moving the above 2 items also into the generic module in order to avoid
again copying from external sources.
;

-------------------------------------------------------------------------------
--
--  GPRS RECORDS
--
-------------------------------------------------------------------------------

GPRSRecord  ::= CHOICE
--
-- Record values 20, 22..27 are specific
-- Record values 76..77 are MBMS specific
-- Record values 78..79 are EPC specific
{
    sgsnPDPRecord           [20] SGSNPDPRecord,
    sgsnMMRecord            [22] SGSNMMRecord,
    sgsnSMORecord           [23] SGSNSMORecord,
    sgsnSMTRecord           [24] SGSNSMTRecord,
    sgsnLCTRecord           [25] SGSNLCTRecord,
    sgsnLCORecord           [26] SGSNLCORecord,
    sgsnLCNRecord           [27] SGSNLCNRecord,
--
--
    sgsnMBMSRecord          [76] SGSNMBMSRecord,
    ggsnMBMSRecord          [77] GGSNMBMSRecord
    sGWRecord               [78] SGWRecord,
    pGWRecord               [79] PGWRecord
}

SGWRecord   ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [3] IMSI,
```

```
    s-GWAddress                 [4] GSNAddress,
    chargingID                  [5] ChargingID,
    servingNodeAddress          [6] SEQUENCE OF GSNAddress OPTIONAL,
    accessPointNameNI           [7] AccessPointNameNI OPTIONAL,
    pdpPDNType                  [8] PDPType OPTIONAL,
    servedPDPPDNAddress         [9] PDPAddress OPTIONAL,
    dynamicAddressFlag          [11] DynamicAddressFlag OPTIONAL,
    listOfTrafficVolumes        [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
    recordOpeningTime           [13] TimeStamp,
    duration                    [14] CallDuration,
    causeForRecClosing          [15] CauseForRecClosing,
    diagnostics                 [16] Diagnostics OPTIONAL,
    recordSequenceNumber        [17] INTEGER OPTIONAL,
    nodeID                      [18] NodeID OPTIONAL,
    recordExtensions            [19] ManagementExtensions OPTIONAL,
    localSequenceNumber         [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode            [21] APNSelectionMode OPTIONAL,
    servedMSISDN                [22] MSISDN OPTIONAL,
    chargingCharacteristics     [23] ChargingCharacteristics,
    chChSelectionMode           [24] ChChSelectionMode OPTIONAL,
    iMSsignalingContext         [25] NULL OPTIONAL,
    servingNodePLMNIdentifier   [27] PLMN-Id OPTIONAL,
    servedIMEISV                [29] IMEI OPTIONAL,
    rATType                     [30] RATType OPTIONAL,
    mSTimeZone                  [31] MSTimeZone OPTIONAL,
    userLocationInformation     [32] OCTET STRING OPTIONAL,
    cAMELChargingInformation    [33] OCTET STRING OPTIONAL,
    sGWChange                   [34] SGWChange OPTIONAL,
    servingNodeType             [35] SEQUENCE OF ServingNodeType OPTIONAL,
    p-GWAddressUsed             [36] GSNAddress OPTIONAL

}

PGWRecord   ::= SET
{
    recordType                      [0] RecordType,
    servedIMSI                      [3] IMSI,
    p-GWAddress                     [4] GSNAddress,
    chargingID                      [5] ChargingID,
    servingNodeAddress              [6] SEQUENCE OF GSNAddress OPTIONAL,
    accessPointNameNI               [7] AccessPointNameNI OPTIONAL,
    pdpPDNType                      [8] PDPType OPTIONAL,
    servedPDPPDNAddress             [9] PDPAddress OPTIONAL,
    dynamicAddressFlag              [11] DynamicAddressFlag OPTIONAL,
    recordOpeningTime               [13] TimeStamp,
    duration                        [14] CallDuration,
    causeForRecClosing              [15] CauseForRecClosing,
    diagnostics                     [16] Diagnostics OPTIONAL,
    recordSequenceNumber            [17] INTEGER OPTIONAL,
    nodeID                          [18] NodeID OPTIONAL,
    recordExtensions                [19] ManagementExtensions OPTIONAL,
    localSequenceNumber             [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode                [21] APNSelectionMode OPTIONAL,
    servedMSISDN                    [22] MSISDN OPTIONAL,
    chargingCharacteristics         [23] ChargingCharacteristics,
    chChSelectionMode               [24] ChChSelectionMode OPTIONAL,
    iMSsignalingContext             [25] NULL OPTIONAL,
    externalChargingID              [26] OCTET STRING OPTIONAL,
    servinggNodePLMNIdentifier      [27] PLMN-Id OPTIONAL,
    pSFurnishChargingInformation    [28] PSFurnishChargingInformation OPTIONAL,
    servedIMEISV                    [29] IMEI OPTIONAL,
    rATType                         [30] RATType OPTIONAL,
    mSTimeZone                      [31] MSTimeZone OPTIONAL,
    userLocationInformation         [32] OCTET STRING OPTIONAL,
    cAMELChargingInformation        [33] OCTET STRING OPTIONAL,
    listOfServiceData               [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL,
    servingNodeType                 [35] SEQUENCE OF ServingNodeType OPTIONAL
}

SGSNMMRecord    ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI,
    servedIMEI                  [2] IMEI OPTIONAL,
    sgsnAddress                 [3] GSNAddress OPTIONAL,
    msNetworkCapability         [4] MSNetworkCapability OPTIONAL,
    routingArea                 [5] RoutingAreaCode OPTIONAL,
    locationAreaCode            [6] LocationAreaCode OPTIONAL,
```

```
    cellIdentifier              [7] CellId OPTIONAL,
    changeLocation              [8] SEQUENCE OF ChangeLocation OPTIONAL,
    recordOpeningTime           [9] TimeStamp,
    duration                    [10] CallDuration OPTIONAL,
    sgsnChange                  [11] SGSNChange OPTIONAL,
    causeForRecClosing          [12] CauseForRecClosing,
    diagnostics                 [13] Diagnostics OPTIONAL,
    recordSequenceNumber        [14] INTEGER OPTIONAL,
    nodeID                      [15] NodeID OPTIONAL,
    recordExtensions            [16] ManagementExtensions OPTIONAL,
    localSequenceNumber         [17] LocalSequenceNumber OPTIONAL,
    servedMSISDN                [18] MSISDN OPTIONAL,
    chargingCharacteristics     [19] ChargingCharacteristics,
    cAMELInformationMM          [20] CAMELInformationMM OPTIONAL,
    rATType                     [21] RATType OPTIONAL,
    chChSelectionMode           [22] ChChSelectionMode OPTIONAL,
    cellPLMNId                  [23] PLMN-Id OPTIONAL
}

SGSNPDPRecord   ::= SET
{
    recordType                  [0] RecordType,
    networkInitiation           [1] NetworkInitiatedPDPContext OPTIONAL,
    servedIMSI                  [3] IMSI,
    servedIMEI                  [4] IMEI OPTIONAL,
    sgsnAddress                 [5] GSNAddress OPTIONAL,
    msNetworkCapability         [6] MSNetworkCapability OPTIONAL,
    routingArea                 [7] RoutingAreaCode OPTIONAL,
    locationAreaCode            [8] LocationAreaCode OPTIONAL,
    cellIdentifier              [9] CellId OPTIONAL,
    chargingID                  [10] ChargingID,
    ggsnAddressUsed             [11] GSNAddress,
    accessPointNameNI           [12] AccessPointNameNI OPTIONAL,
    pdpType                     [13] PDPType OPTIONAL,
    servedPDPAddress            [14] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [15] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
    recordOpeningTime           [16] TimeStamp,
    duration                    [17] CallDuration,
    sgsnChange                  [18] SGSNChange OPTIONAL,
    causeForRecClosing          [19] CauseForRecClosing,
    diagnostics                 [20] Diagnostics OPTIONAL,
    recordSequenceNumber        [21] INTEGER OPTIONAL,
    nodeID                      [22] NodeID OPTIONAL,
    recordExtensions            [23] ManagementExtensions OPTIONAL,
    localSequenceNumber         [24] LocalSequenceNumber OPTIONAL,
    apnSelectionMode            [25] APNSelectionMode OPTIONAL,
    accessPointNameOI           [26] AccessPointNameOI OPTIONAL,
    servedMSISDN                [27] MSISDN OPTIONAL,
    chargingCharacteristics     [28] ChargingCharacteristics,
    rATType                     [29] RATType OPTIONAL,
    cAMELInformationPDP         [30] CAMELInformationPDP OPTIONAL,
    rNCUnsentDownlinkVolume    [31] DataVolumeGPRS OPTIONAL,
    chChSelectionMode           [32] ChChSelectionMode OPTIONAL,
    dynamicAddressFlag          [33] DynamicAddressFlag OPTIONAL
}

SGSNSMORecord   ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI,
    servedIMEI                  [2] IMEI OPTIONAL,
    servedMSISDN                [3] MSISDN OPTIONAL,
    msNetworkCapability         [4] MSNetworkCapability OPTIONAL,
    serviceCentre               [5] AddressString OPTIONAL,
    recordingEntity             [6] RecordingEntity OPTIONAL,
    locationArea                [7] LocationAreaCode OPTIONAL,
    routingArea                 [8] RoutingAreaCode OPTIONAL,
    cellIdentifier              [9] CellId OPTIONAL,
    messageReference            [10] MessageReference,
    eventTimeStamp              [11] TimeStamp,
    smsResult                   [12] SMSResult OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL,
    nodeID                      [14] NodeID OPTIONAL,
    localSequenceNumber         [15] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics     [16] ChargingCharacteristics,
    rATType                     [17] RATType OPTIONAL,
    destinationNumber           [18] SmsTpDestinationNumber OPTIONAL,
    cAMELInformationSMS         [19] CAMELInformationSMS OPTIONAL,
```

```
    chChSelectionMode           [20] ChChSelectionMode OPTIONAL
}

SGSNSMTRecord   ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] MSISDN OPTIONAL,
    msNetworkCapability     [4] MSNetworkCapability OPTIONAL,
    serviceCentre           [5] AddressString OPTIONAL,
    recordingEntity         [6] RecordingEntity OPTIONAL,
    locationArea            [7] LocationAreaCode OPTIONAL,
    routingArea             [8] RoutingAreaCode OPTIONAL,
    cellIdentifier          [9] CellId OPTIONAL,
    eventTimeStamp          [10] TimeStamp,
    smsResult               [11] SMSResult OPTIONAL,
    recordExtensions        [12] ManagementExtensions OPTIONAL,
    nodeID                  [13] NodeID OPTIONAL,
    localSequenceNumber     [14] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [15] ChargingCharacteristics,
    rATType                 [16] RATType OPTIONAL,
    chChSelectionMode       [17] ChChSelectionMode OPTIONAL,
    cAMELInformationSMS     [18] CAMELInformationSMS OPTIONAL
}

SGSNMTLCSRecord         ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType,
    lcsClientIdentity       [3] LCSClientIdentity,
    servedIMSI              [4] IMSI,
    servedMSISDN            [5] MSISDN OPTIONAL,
    sgsnAddress             [6] GSNAddress OPTIONAL,
    locationType            [7] LocationType,
    lcsQos                  [8] LCSQoSInfo OPTIONAL,
    lcsPriority             [9] LCS-Priority OPTIONAL,
    mlcNumber               [10] ISDN-AddressString,
    eventTimeStamp          [11] TimeStamp,
    measurementDuration     [12] CallDuration OPTIONAL,
    notificationToMSUser    [13] NotificationToMSUser OPTIONAL,
    privacyOverride         [14] NULL OPTIONAL,
    location                [15] LocationAreaAndCell OPTIONAL,
    routingArea             [16] RoutingAreaCode OPTIONAL,
    locationEstimate        [17] Ext-GeographicalInformation OPTIONAL,
    positioningData         [18] PositioningData OPTIONAL,
    lcsCause                [19] LCSCause OPTIONAL,
    diagnostics             [20] Diagnostics OPTIONAL,
    nodeID                  [21] NodeID OPTIONAL,
    localSequenceNumber     [22] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [23] ChargingCharacteristics,
    chChSelectionMode       [24] ChChSelectionMode OPTIONAL,
    rATType                 [25] RATType OPTIONAL,
    recordExtensions        [26] ManagementExtensions OPTIONAL,
    causeForRecClosing      [27] CauseForRecClosing
}

SGSNMOLCSRecord         ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType OPTIONAL,
    lcsClientIdentity       [3] LCSClientIdentity OPTIONAL,
    servedIMSI              [4] IMSI,
    servedMSISDN            [5] MSISDN OPTIONAL,
    sgsnAddress             [6] GSNAddress OPTIONAL,
    locationMethod          [7] LocationMethod,
    lcsQos                  [8] LCSQoSInfo OPTIONAL,
    lcsPriority             [9] LCS-Priority OPTIONAL,
    mlcNumber               [10] ISDN-AddressString OPTIONAL,
    eventTimeStamp          [11] TimeStamp,
    measurementDuration     [12] CallDuration OPTIONAL,
    location                [13] LocationAreaAndCell OPTIONAL,
    routingArea             [14] RoutingAreaCode OPTIONAL,
    locationEstimate        [15] Ext-GeographicalInformation OPTIONAL,
    positioningData         [16] PositioningData OPTIONAL,
    lcsCause                [17] LCSCause OPTIONAL,
```

```
    diagnostics             [18] Diagnostics OPTIONAL,
    nodeID                  [19] NodeID OPTIONAL,
    localSequenceNumber     [20] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [21] ChargingCharacteristics,
    chChSelectionMode       [22] ChChSelectionMode OPTIONAL,
    rATType                 [23] RATType OPTIONAL,
    recordExtensions        [24] ManagementExtensions OPTIONAL,
    causeForRecClosing      [25] CauseForRecClosing
}

SGSNNILCSRecord         ::= SET
{
    recordType              [0] RecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType OPTIONAL,
    lcsClientIdentity       [3] LCSClientIdentity OPTIONAL,
    servedIMSI              [4] IMSI OPTIONAL,
    servedMSISDN            [5] MSISDN OPTIONAL,
    sgsnAddress             [6] GSNAddress OPTIONAL,
    servedIMEI              [7] IMEI OPTIONAL,
    lcsQos                  [8] LCSQoSInfo OPTIONAL,
    lcsPriority             [9] LCS-Priority OPTIONAL,
    mlcNumber               [10] ISDN-AddressString OPTIONAL,
    eventTimeStamp          [11] TimeStamp,
    measurementDuration     [12] CallDuration OPTIONAL,
    location                [13] LocationAreaAndCell OPTIONAL,
    routingArea             [14] RoutingAreaCode OPTIONAL,
    locationEstimate        [15] Ext-GeographicalInformation OPTIONAL,
    positioningData         [16] PositioningData OPTIONAL,
    lcsCause                [17] LCSCause OPTIONAL,
    diagnostics             [18] Diagnostics OPTIONAL,
    nodeID                  [19] NodeID OPTIONAL,
    localSequenceNumber     [20] LocalSequenceNumber OPTIONAL,
    chargingCharacteristics [21] ChargingCharacteristics,
    chChSelectionMode       [22] ChChSelectionMode OPTIONAL,
    rATType                 [23] RATType OPTIONAL,
    recordExtensions        [24] ManagementExtensions OPTIONAL,
    causeForRecClosing      [25] CauseForRecClosing
}

SGSNMBMSRecord  ::= SET
{
    recordType                  [0] RecordType,
    ggsnAddress                 [1] GSNAddress,
    chargingID                  [2] ChargingID,
    listofRAs                   [3] SEQUENCE OF RAIdentity OPTIONAL,
    accessPointNameNI           [4] AccessPointNameNI OPTIONAL,
    servedPDPAddress            [5] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [6] SEQUENCE OF ChangeOfMBMSCondition OPTIONAL,
    recordOpeningTime           [7] TimeStamp,
    duration                    [8] CallDuration,
    causeForRecClosing          [9] CauseForRecClosing,
    diagnostics                 [10] Diagnostics OPTIONAL,
    recordSequenceNumber        [11] INTEGER OPTIONAL,
    nodeID                      [12] NodeID OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL,
    localSequenceNumber         [14] LocalSequenceNumber OPTIONAL,
    sgsnPLMNIdentifier          [15] PLMN-Id OPTIONAL,
    numberofReceivingUE         [16] Integer OPTIONAL,
    mbmsInformation             [17] MBMSInformation OPTIONAL
}

GGSNMBMSRecord  ::= SET
{
    recordType                  [0] RecordType,
    ggsnAddress                 [1] GSNAddress,
    chargingID                  [2] ChargingID,
    listofDownstreamNodes       [3] SEQUENCE OF GSNAddress,
    accessPointNameNI           [4] AccessPointNameNI OPTIONAL,
    servedPDPAddress            [5] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [6] SEQUENCE OF ChangeOfMBMSCondition OPTIONAL,
    recordOpeningTime           [7] TimeStamp,
    duration                    [8] CallDuration,
    causeForRecClosing          [9] CauseForRecClosing,
    diagnostics                 [10] Diagnostics OPTIONAL,
    recordSequenceNumber        [11] INTEGER OPTIONAL,
    nodeID                      [12] NodeID OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL,
```

```
    localSequenceNumber         [14] LocalSequenceNumber OPTIONAL,
    mbmsInformation             [15] MBMSInformation OPTIONAL
}

-------------------------------------------------------------------------------
--
--  PS DATA TYPES
--
-------------------------------------------------------------------------------

AccessPointNameNI   ::= IA5String (SIZE(1..63))
    --
    -- Network Identifier part of APN in  dot representation.
    -- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
    -- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR..
    --

AccessPointNameOI   ::= IA5String (SIZE(1..37))
    --
    -- Operator Identifier part of APN in dot representation.
    -- In the 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs' example, the OI portion is 'mnc022.mcc111.gprs'
    -- and is presented in this form in the CDR.
    --

AFChargingIdentifier ::= OCTECT STRING
    --
    -- see AF-Charging-Identifier AVP as defined in TS 29.214[89]
    --

AFRecordInformation ::= SEQUENCE
{
    aFChargingIdentifier        [1] AFChargingIdentifier,
    flows                       [2] Flows OPTIONAL
}

APNSelectionMode::= ENUMERATED
{
    --
    -- See Information Elements TS 29.060 [75], TS 29.274 [91] or TS 29.275 [92]
    --
    mSorNetworkProvidedSubscriptionVerified             (0),
    mSProvidedSubscriptionNotVerified                   (1),
    networkProvidedSubscriptionNotVerified              (2)
}

CAMELAccessPointNameNI  ::= AccessPointNameNI

CAMELAccessPointNameOI  ::= AccessPointNameOI

CAMELInformationMM      ::= SET
{
    sCFAddress                      [1] SCFAddress OPTIONAL,
    serviceKey                      [2] ServiceKey OPTIONAL,
    defaultTransactionHandling      [3] DefaultGPRS-Handling OPTIONAL,
    numberOfDPEncountered           [4] NumberOfDPEncountered OPTIONAL,
    levelOfCAMELService             [5] LevelOfCAMELService OPTIONAL,
    freeFormatData                  [6] FreeFormatData OPTIONAL,
    fFDAppendIndicator              [7] FFDAppendIndicator OPTIONAL
}

CAMELInformationPDP ::= SET
{
    sCFAddress                      [1] SCFAddress OPTIONAL,
    serviceKey                      [2] ServiceKey OPTIONAL,
    defaultTransactionHandling      [3] DefaultGPRS-Handling OPTIONAL,
    cAMELAccessPointNameNI          [4] CAMELAccessPointNameNI OPTIONAL,
    cAMELAccessPointNameOI          [5] CAMELAccessPointNameOI OPTIONAL,
    numberOfDPEncountered           [6] NumberOfDPEncountered OPTIONAL,
    levelOfCAMELService             [7] LevelOfCAMELService OPTIONAL,
    freeFormatData                  [8] FreeFormatData OPTIONAL,
    fFDAppendIndicator              [9] FFDAppendIndicator OPTIONAL
}

CAMELInformationSMS     ::= SET
{
    sCFAddress                          [1] SCFAddress OPTIONAL,
    serviceKey                          [2] ServiceKey OPTIONAL,
    defaultSMSHandling                  [3] DefaultSMS-Handling OPTIONAL,
```

```
    cAMELCallingPartyNumber                 [4] CallingNumber OPTIONAL,
    cAMELDestinationSubscriberNumber        [5] SmsTpDestinationNumber OPTIONAL,
    cAMELSMSCAddress                        [6] AddressString OPTIONAL,
    freeFormatData                          [7] FreeFormatData OPTIONAL,
    smsReferenceNumber                      [8] CallReferenceNumber OPTIONAL
}

CauseForRecClosing  ::= INTEGER
{
    --
    -- In PGW-CDR and SGW-CDR the value servingNodeChange is used for partial record
    -- generation due to Serving Node Address list Overflow
    -- In SGSN servingNodeChange indicates the SGSN change
    --
    -- LCS related causes belong to the MAP error causes acc. TS 29.002 [60]
    --
    -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
    --
    normalRelease                   (0),
    abnormalRelease                 (4),
    cAMELInitCallRelease            (5),
    volumeLimit                     (16),
    timeLimit                       (17),
    servingNodeChange               (18),
    maxChangeCond                   (19),
    managementIntervention          (20),
    intraSGSNIntersystemChange      (21),
    rATChange                       (22),
    mSTimeZoneChange                (23),
    sGSNPLMNIDChange                (24),
    unauthorizedRequestingNetwork   (52),
    unauthorizedLCSClient           (53),
    positionMethodFailure           (54),
    unknownOrUnreachableLCSClient   (58),
    listofDownstreamNodeChange      (59)
}

ChangeCondition ::= ENUMERATED
{
    qoSChange                               (0),
    tariffTime                              (1),
    recordClosure                           (2),
    cGI-SAICHange                           (6),
    rAIChange                               (7),
    dT-Establishment                        (8),
    dT-Removal                              (9)
}

ChangeOfCharCondition   ::= SEQUENCE
{
    qosRequested                [1] QoSInformation OPTIONAL,
    qosNegotiated               [2] QoSInformation OPTIONAL,
    dataVolumeGPRSUplink        [3] DataVolumeGPRS OPTIONAL,
    dataVolumeGPRSDownlink      [4] DataVolumeGPRS OPTIONAL,
    changeCondition             [5] ChangeCondition,
    changeTime                  [6] TimeStamp,
    userLocationInformation     [8] OCTET STRING OPTIONAL
}

ChangeOfMBMSCondition   ::= SEQUENCE
{
    --
    -- Used in MBMS record
    --
    qosRequested                [1] QoSInformation OPTIONAL,
    qosNegotiated               [2] QoSInformation OPTIONAL,
    dataVolumeMBMSUplink        [3] DataVolumeMBMS OPTIONAL,
    dataVolumeMBMSDownlink      [4] DataVolumeMBMS,
    changeCondition             [5] ChangeCondition,
    changeTime                  [6] TimeStamp,
    failureHandlingContinue     [7] FailureHandlingContinue OPTIONAL
}

ChangeOfServiceCondition    ::= SEQUENCE
{
    --
    -- Used for Flow based Charging service data container
    --
```

```
    ratingGroup                     [1] RatingGroupId,
    chargingRuleBaseName            [2] ChargingRuleBaseName OPTIONAL,
    resultCode                      [3] ResultCode OPTIONAL,
    localSequenceNumber             [4] LocalSequenceNumber OPTIONAL,
    timeOfFirstUsage                [5] TimeStamp OPTIONAL,
    timeOfLastUsage                 [6] TimeStamp OPTIONAL,
    timeUsage                       [7] CallDuration OPTIONAL,
    serviceConditionChange          [8] ServiceConditionChange,
    qoSInformationNeg               [9] QoSInformation OPTIONAL,
    servingNodeAddress              [10] GSNAddress OPTIONAL,
    datavolumeFBCUplink             [12] DataVolumeGPRS OPTIONAL,
    datavolumeFBCDownlink           [13] DataVolumeGPRS OPTIONAL,
    timeOfReport                    [14] TimeStamp,
    failureHandlingContinue         [16] FailureHandlingContinue OPTIONAL,
    serviceIdentifier               [17] ServiceIdentifier OPTIONAL,
    pSFurnishChargingInformation    [18] PSFurnishChargingInformation OPTIONAL,
    aFRecordInformation             [19] SEQUENCE OF AFRecordInformation OPTIONAL,
    userLocationInformation         [20] OCTER STRING OPTIONAL,
    eventBasedChargingInformation   [21] EventBasedChargingInformation OPTIONAL,
    timeQuotaMechanism              [22] TimeQuotaMechanism OPTIONAL,
    serviceSpecificInfo             [23] SEQUENCE OF ServiceSpecificInfo OPTIONAL
}

ChangeLocation  ::= SEQUENCE
{
    --
    -- used in SGSNMMRecord only
    --
    locationAreaCode        [0] LocationAreaCode,
    routingAreaCode         [1] RoutingAreaCode,
    cellId                  [2] CellId OPTIONAL,
    changeTime              [3] TimeStamp,
    mCC-MNC                 [4] PLMN-Id OPTIONAL
}

ChargingCharacteristics ::= OCTET STRING (SIZE(2))
    --
    --  Bit 0-3: Profile Index
    --  Bit 4-15: For Behavior
    --

ChargingID  ::= INTEGER (0..4294967295)
    --
    -- Generated in P-GW, part of IP CAN bearer -- 0..4294967295 is equivalent to 0..2**32-1
    --

ChargingRuleBaseName ::= IA5String (SIZE(1..16))
    --
    -- identifier for the group of charging rules
    -- see Charging-Rule-Base-Name AVP as desined in TS 29.212 [88]
    --

ChChSelectionMode       ::= ENUMERATED
{
    servingNodeSupplied         (0),    -- For S-GW/P-GW
    subscriptionSpecific        (1),    -- For SGSN only
    aPNSpecific                 (2),    -- For SGSN only
    homeDefault                 (3),    -- For SGSN, S-GW and P-GW
    roamingDefault              (4),    -- For SGSN, S-GW and P-GW
    visitingDefault             (5)     -- For SGSN, S-GW and P-GW
}

DataVolumeGPRS  ::= INTEGER
    --
    -- The volume of data transferred in octets.
    --

DynamicAddressFlag  ::= BOOLEAN

ETSIAddress ::= AddressString
    --
    -- First octet for nature of address, and numbering plan indicator (3 for X.121)
    -- Other octets TBCD
    -- See TS 29.002 [60]

    --
EventBasedChargingInformation  ::= SEQUENCE
{
```

```
    numberOfEvents      [1] INTEGER,
    eventTimeStamps     [2] SEQUENCE OF TimeStamp OPTIONAL
}

FailureHandlingContinue  ::= BOOLEAN
    --
    -- This parameter is included when the failure handling procedure has been executed and new
    -- containers are opened. This parameter shall be included in the first and subsequent
    -- containers opened after the failure handling execution.
    --

FFDAppendIndicator  ::= BOOLEAN

Flows  ::=  SEQUENCE
    --
    -- See Flows AVP as defined in TS 29.214 [89]
    --
{
    mediaComponentNumber    [1] INTEGER,
    flowNumber              [2] SEQUENCE OF INTEGER OPTIONAL
}

FreeFormatData  ::= OCTET STRING (SIZE(1..160))
    --
    -- Free formatted data as sent in the FurnishChargingInformationGPRS
    -- see TS 29.078 [66]
    --

GSNAddress  ::= IPAddress

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
    -- see TS 24.008 [64]

NetworkInitiatedPDPContext  ::= BOOLEAN
    --
    -- Set to true if PDP context was initiated from network side
    --

NodeID  ::= IA5String (SIZE(1..20))

NumberOfDPEncountered  ::= INTEGER

PDPAddress  ::= CHOICE
{
    iPAddress               [0] IPAddress,
    eTSIAddress            [1] ETSIAddress
}

PDPType     ::= OCTET STRING (SIZE(2))
    --
    -- OCTET 1: PDP Type Organization
    -- OCTET 2: PDP Type Number
    -- See TS 29.060 [75] for GTP, TS 29.274 [91] for eGTP and TS 29.275 [92] for PMIP
    --

PLMN-Id     ::= OCTET STRING (SIZE (3))
    --
    --  This is a 1:1 copy from the Routing Area Identity (RAI) IE specified in TS 29.060 [75]
    --  as follows:
    --  OCTET 1 of PLMN-Id = OCTET 2 of RAI
    --  OCTET 2 of PLMN-Id = OCTET 3 of RAI
    --  OCTET 3 of PLMN-Id = OCTET 4 of RAI
    --


PSFurnishChargingInformation  ::= SEQUENCE
{
    pSFreeFormatData        [1] FreeFormatData,
    pSFFDAppendIndicator    [2] FFDAppendIndicator OPTIONAL
}

QoSInformation  ::= OCTET STRING (SIZE (4..255))
    --
    -- This  octet string
    -- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Bearer Quality of
    -- Service" information element specified in TS 29.274 [92].
    --
```

```
RatingGroupId ::= INTEGER
    --
    -- IP service flow identity (DCCA), range of 4 byte (0...4294967259)
    -- see Rating-Group AVP as used in TS 32.299 [40]
    --

RATType ::= INTEGER (0..255)
    --
    -- Ihis integer is 1:1 copy of the RAT type value as defined in TS 29.060 [75] for GTP,
    -- TS 29.274 [91] for eGTP and TS 29.275 [92] for PMIP.
    --

ResultCode ::= INTEGER
     --
     -- charging protocol return value, range of 4 byte (0...4294967259)
     -- see Result-Code AVP as used in 3GPP 32.299 [40]
     --

RoutingAreaCode ::= OCTET STRING (SIZE(1))
    --
    -- See TS 24.008 [64]
    --

ServiceConditionChange  ::= BIT STRING
{
    qoSChange                                (0),   -- bearer modification
    sGSNChange                               (1),   -- bearer modification
    sGSNPLMNIDChange                         (2),   -- bearer modification
    tariffTimeSwitch                         (3),   -- tariff time change
    pDPContextRelease                        (4),   -- bearer release
    rATChange                                (5),   -- bearer modification
    serviceIdledOut                          (6),   -- IP flow idle out, DCCA QHT expiry
    reserved                                 (7),   -- old: QCTexpiry is no report event
    configurationChange                      (8),   -- configuration change
    serviceStop                              (9),   -- IP flow termination
    dCCATimeThresholdReached                (10),   -- DCCA quota reauthorization
    dCCAVolumeThresholdReached              (11),   -- DCCA quota reauthorization
    dCCAServiceSpecificUnitThresholdReached (12),   -- DCCA quota reauthorization
    dCCATimeExhausted                       (13),   -- DCCA quota reauthorization
    dCCAVolumeExhausted                     (14),   -- DCCA quota reauthorization
    dCCAValidityTimeout                     (15),   -- DCCA quota validity time (QVT expiry)
    reserved                                (16),   -- reserved due to no use case,
                                                    -- old: return Requested is covered by (17),(18)
    dCCAReauthorisationRequest              (17),   -- DCCA quota reauthorization request by OCS
    dCCAContinueOngoingSession              (18),   -- DCCA failure handling (CCFH),
                                                    -- continue IP flow
    dCCARetryAndTerminateOngoingSession     (19),   -- DCCA failure handling (CCFH),
                                                    -- terminate IP flow after DCCA retry
    dCCATerminateOngoingSession             (20),   -- DCCA failure handling,
                                                    -- terminate IP flow
    cGI-SAIChange                           (21),   -- bearer modification
    rAIChange                               (22),   -- bearer modification
    dCCAServiceSpecificUnitExhausted        (23),   -- DCCA quota reauthorization
    recordClosure                           (24),   -- PGW-CDR closure
    timeLimit                               (25),   -- intermediate recording
    volumeLimit                             (26),   -- intermediate recording
    serviceSpecificUnitLimit                (27),   -- intermediate recording
    envelopeClosure                         (28)
}
--
-- Trigger and cause values for IP flow level recording are defined for support of independent
-- online and offline charging and also for tight interworking between online and offline charging.
-- Unused bits will always be zero.
-- Some of the values are non-exclusive (e.g. bearer modification reasons).
    --

SCFAddress  ::= AddressString
    --
    -- See TS 29.002 [60]
    --

ServiceIdentifier   ::= INTEGER (0..4294967295)
    --
    -- The service identifier is used to identify the service or the service component
    -- the service data flow relates to. See Service-Identifier AVP as defined
    -- in TS 29.212 [88]
    --
```

```
ServingNodeType ::= ENUMERATED
{
        sGSN        (0),
        pMIPSGW     (1),
        gTPSGW      (2),
        ePDG        (3),
        hSGW        (4),
        mME         (5)
}

SGSNChange  ::= BOOLEAN
    --
    -- present if first record after inter SGSN routing area update
    -- in new SGSN
    --

SGWChange   ::= BOOLEAN
    --
    -- present if first record after inter S-GW change
    --

TimeQuotaMechanism  ::= SEQUENCE
{
    timeQuotaType                   [1] TimeQuotaType,
    baseTimeInterval                [2] Integer
}

TimeQuotaType   ::= ENUMERATED
{
    DISCRETE_TIME_PERIOD            (0),
    CONTINUOUS_TIME_PERIOD          (1)
}

END
```

5.2.2.3 WLAN CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.252 [12].

```
WLANChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
wlanChargingDataTypes (3) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS
…

FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}
;

-------------------------------------------------------------------------------
--
--  WLAN RECORDS
--
-------------------------------------------------------------------------------

-- …

-------------------------------------------------------------------------------
--
--  WLAN DATA TYPES
--
-------------------------------------------------------------------------------

-- …
```

5.2.3 Subsystem level CDR definitions

This subclause contains the syntax definitions of the CDRs on the subsystem level. At present, only the IM subsystem is defined in 3GPP, thus this subclause comprises the CDR types specified for the IMS in TS 32.260 [20].

5.2.3.1 IMS CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.260 [20].

```
IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
imsChargingDataTypes (4) asn1Module (0) version1 (0)}
DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

RecordType, IPAddress, ManagementExtensions, NodeAddress, LocalSequenceNumber, SubscriptionID,
TimeStamp, ServiceContextID
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}

;

--------------------------------------------------------------------------------
--
--  IMS RECORDS
--
--------------------------------------------------------------------------------

IMSRecord ::= CHOICE
--
-- Record values 63-69, 82 are IMS specific
--
{
    sCSCFRecord         [63] SCSCFRecord,
    pCSCFRecord         [64] PCSCFRecord,
    iCSCFRecord         [65] ICSCFRecord,
    mRFCRecord          [66] MRFCRecord,
    mGCFRecord          [67] MGCFRecord,
    bGCFRecord          [68] BGCFRecord,
    aSRecord            [69] ASRecord,
    iBCFRecord          [82] IBCFRecord
}


SCSCFRecord     ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties 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] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                         [22] NodeAddress OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
```

```
    expiresInformation                  [26] INTEGER OPTIONAL,
    list-Of-Associated-URI              [27] ListOfInvolvedParties OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-of-subscription-ID             [31] SEQUENCE OF SubscriptionID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    iMSCommunicationServiceIdentifier   [33] IMSCommunicationServiceIdentifier OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    applicationServersInformation       [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    requested-Party-Address             [41] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity    [42] ListOfInvolvedParties OPTIONAL
}

PCSCFRecord     ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                         [22] NodeAddress OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    list-Of-Associated-URI              [27] ListOfInvolvedParties OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-of-subscription-ID             [31] SEQUENCE OF SubscriptionID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    servedPartyIPAddress                [50] ServedPartyIPAddress OPTIONAL
}

ICSCFRecord     ::= SET
{
    recordType                      [0] RecordType,
    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,
    list-Of-Calling-Party-Address   [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address            [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp         [9] TimeStamp OPTIONAL,
    interOperatorIdentifiers        [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber       [15] LocalSequenceNumber OPTIONAL,
    causeForRecordClosing           [17] CauseForRecordClosing OPTIONAL,
    incomplete-CDR-Indication       [18] Incomplete-CDR-Indication OPTIONAL,
    iMS-Charging-Identifier         [19] IMS-Charging-Identifier OPTIONAL,
    serviceReasonReturnCode         [23] UTF8String OPTIONAL,
    recordExtensions                [25] ManagementExtensions OPTIONAL,
    expiresInformation              [26] INTEGER OPTIONAL,
    list-Of-Associated-URI          [27] ListOfInvolvedParties OPTIONAL,
    event                           [28] UTF8String OPTIONAL,
    accessNetworkInformation        [29] OCTET STRING OPTIONAL,
    serviceContextID                [30] ServiceContextID OPTIONAL,
    numberPortabilityRouting        [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting            [35] CarrierSelectRouting OPTIONAL,
```

```
    s-CSCF-Information              [61] S-CSCF-Information OPTIONAL
}

MRFCRecord  ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                         [22] NodeAddress OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-of-subscription-ID             [31] SEQUENCE OF SubscriptionID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    applicationServersInformation       [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    service-Id                          [70] Service-Id OPTIONAL,
    requested-Party-Address             [71] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity    [72] ListOfInvolvedParties OPTIONAL
}

MGCFRecord  ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    trunkGroupID                        [80] TrunkGroupID OPTIONAL,
    bearerService                       [81] TransmissionMedium OPTIONAL
}

BGCFRecord  ::= SET
```

```
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL
}

ASRecord    ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                         [22] NodeAddress OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-of-subscription-ID             [31] SEQUENCE OF SubscriptionID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    iMSCommunicationServiceIdentifier   [33] IMSCommunicationServiceIdentifier OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    serviceSpecificInfo                 [100] SEQUENCE OF ServiceSpecificInfo OPTIONAL,
    requested-Party-Address             [101] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity    [102] ListOfInvolvedParties OPTIONAL,
    alternateChargedPartyAddress        [103] UTF8string OPTIONAL
}

IBCFRecord  ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-Of-Early-SDP-Media-Components  [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
    iMSCommunicationServiceIdentifier   [33] IMSCommunicationServiceIdentifier OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL
}

-------------------------------------------------------------------------------
--
--  IMS DATA TYPES
--
-------------------------------------------------------------------------------
AccessCorrelationID ::= CHOICE
{
    gPRS-Charging-Id                [2] INTEGER OPTIONAL,
    accessNetworkChargingIdentifier [4] GraphicString OPTIONAL
}

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

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

CarrierSelectRouting ::= GraphicString

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
}

Early-Media-Components-List ::= SEQUENCE
{
    sDP-Offer-Timestamp     [0] TimeStamp OPTIONAL,
    sDP-Answer-Timestamp    [1] TimeStamp OPTIONAL,
    sDP-Media-Components    [2] SEQUENCE OF SDP-Media-Component OPTIONAL,
    mediaInitiatorFlag      [3] NULL OPTIONAL,
    sDP-Session-Description [4] SEQUENCE OF GraphicString OPTIONAL
}

IMS-Charging-Identifier ::= OCTET STRING

IMSCommunicationServiceIdentifier   ::= 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
}

InterOperatorIdentifierlist ::= SEQUENCE OF InterOperatorIdentifiers

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

InvolvedParty ::= CHOICE
{
    sIP-URI[0] GraphicString, -- refer to rfc3261
    tEL-URI[1] GraphicString  -- refer to rfc3966
}

Editor"s note:  the constructs below are imported from the generic module

ListOfInvolvedParties ::= SEQUENCE OF InvolvedParty

Media-Components-List ::= SEQUENCE
{
    sIP-Request-Timestamp   [0] TimeStamp OPTIONAL,
    sIP-Response-Timestamp  [1] TimeStamp OPTIONAL,
    sDP-Media-Components    [2] SEQUENCE OF SDP-Media-Component OPTIONAL,
    mediaInitiatorFlag      [3] NULL OPTIONAL,
    sDP-Session-Description [4] SEQUENCE OF GraphicString OPTIONAL,
    mediaInitiatorParty     [5] InvolvedParty OPTIONAL

--- MediaInitiatorParty is used to identify the initiator of the media
--- multi-participants session e.g. in AS PoC Server
}

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

NumberPortabilityRouting ::= GraphicString

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

S-CSCF-Information ::=  SEQUENCE
{
      mandatoryCapabilities [0] SEQUENCE OF GraphicString OPTIONAL,
      optionalCapabilities  [1] SEQUENCE OF GraphicString OPTIONAL,
      serverName            [2] GraphicString OPTIONAL
}

SDP-Media-Component ::=  SEQUENCE
{
    sDP-Media-Name          [0] GraphicString OPTIONAL,
    sDP-Media-Descriptions  [1] SDP-Media-Description OPTIONAL,
    accessCorrelationID         AccessCorrelationID OPTIONAL,       -- not used in MGCF and BGCF
                                    -- [2] is used by gPRS-Charging-Id
                                    -- [4] is used by accessNetworkChargingIdentifier
    authorized-QoS          [3] GraphicString OPTIONAL,
    sDP-Type                [4] SDP-Type OPTIONAL
}

SDP-Media-Description ::= SEQUENCE OF GraphicString

ServedPartyIPAddress  ::=  IPAddress

Service-Id ::= GraphicString

Session-Id ::= GraphicString
```

```
--
-- rfc3261 [110]: example for SIP Call-ID: f81d4fae-7dec-11d0-a765-00a0c91e6bf6@foo.bar.com
--

SIP-Method ::= GraphicString

SDP-Type ::= ENUMERATED
{
    SDP-offer (0),
    SDP-answer (1)
}

TransmissionMedium ::= SEQUENCE
{
    tMR [0] OCTET STRING (SIZE (1)) OPTIONAL, -- required TM, refer to ITU-T Q.763
    tMU [1] OCTET STRING (SIZE (1)) OPTIONAL  -- used TM, refer to ITU-T Q.763
}

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

END
```

5.2.4 Service level CDR definitions

This subclause contains the syntax definitions of the CDRs on the service level. This comprises the CDR types from the MMS (TS 32.270 [30]), the LCS (TS 32.271 [31]), PoC (TS 32.272 [32]), MBMS (TS 32.273 [33]), and MMTel (TS 32.275 [35]) services.

5.2.4.1 MMS CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.270 [30].

```
MMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
mmsChargingDataTypes (5) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS


CallDuration, RecordType, CallReference, ChargeIndicator, IPAddress, LocalSequenceNumber,
ManagementExtensions, MscNo, MSISDN, TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}


ChargingID, GSNAddress, PLMN-Id, RATType
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version1 (0)}

;

--------------------------------------------------------------------------------
--
--  MMS RECORDS
--
--------------------------------------------------------------------------------

MMSRecordType   ::= CHOICE
--
-- Record values 30..62 are MMS specific
--
{
    mMO1SRecord             [30] MMO1SRecord,
    mMO4FRqRecord           [31] MMO4FRqRecord,
    mMO4FRsRecord           [32] MMO4FRsRecord,
    mMO4DRecord             [33] MMO4DRecord,
    mMO1DRecord             [34] MMO1DRecord,
    mMO4RRecord             [35] MMO4RRecord,
    mMO1RRecord             [36] MMO1RRecord,
    mMOMDRecord             [37] MMOMDRecord,
    mMR4FRecord             [38] MMR4FRecord,
    mMR1NRqRecord           [39] MMR1NRqRecord,
    mMR1NRsRecord           [40] MMR1NRsRecord,
    mMR1RtRqRecord          [41] MMR1RtRecord,
    mMR1ARecord             [42] MMR1ARecord,
    mMR4DRqRecord           [43] MMR4DRqRecord,
    mMR4DRsRecord           [44] MMR4DRsRecord,
    mMR1RRRecord            [45] MMR1RRRecord,
    mMR4RRqRecord           [46] MMR4RRqRecord,
    mMR4RRsRecord           [47] MMR4RRsRecord,
    mMRMDRecord             [48] MMRMDRecord,
    mMFRecord               [49] MMFRecord,
    mMBx1SRecord            [50] MMBx1SRecord,
    mMBx1VRecord            [51] MMBx1VRecord,
    mMBx1URecord            [52] MMBx1URecord,
    mMBx1DRecord            [53] MMBx1DRecord,
    mM7SRecord              [54] MM7SRecord,
    mM7DRqRecord            [55] MM7DRqRecord,
    mM7DRsRecord            [56] MM7DRsRecord,
    mM7CRecord              [57] MM7CRecord,
    mM7RRecord              [58] MM7RRecord,
    mM7DRRqRecord           [59] MM7DRRqRecord,
```

```
    mM7DRRsRecord           [60] MM7DRRsRecord,
    mM7RRqRecord            [61] MM7RRqRecord,
    mM7RRsRecord            [62] MM7RRsRecord
}

MMO1SRecord ::= SET
{
    recordType                  [0] RecordType,
    originatorMmsRSAddress      [1] MMSRSAddress,
    messageID                   [2] OCTET STRING,
    replyChargingID             [3] OCTET STRING OPTIONAL,
    originatorAddress           [4] MMSAgentAddress,
    recipientAddresses          [5] MMSAgentAddresses,
    accessCorrelation           [6] AccessCorrelation OPTIONAL,
    contentType                 [7] ContentType,
    mmComponentType             [8] MMComponentType OPTIONAL,
    messageSize                 [9] DataVolume,
    messageClass                [10] MessageClass OPTIONAL,
    chargeInformation           [11] ChargeInformation OPTIONAL,
    submissionTime              [12] TimeStamp OPTIONAL,
    timeOfExpiry                [13] WaitTime OPTIONAL,
    earliestTimeOfDelivery      [14] WaitTime OPTIONAL,
    durationOfTransmission      [15] INTEGER OPTIONAL,
    requestStatusCode           [16] RequestStatusCodeType OPTIONAL,
    deliveryReportRequested     [17] BOOLEAN OPTIONAL,
    replyCharging               [18] BOOLEAN OPTIONAL,
    replyDeadline               [19] WaitTime OPTIONAL,
    replyChargingSize           [20] DataVolume OPTIONAL,
    priority                    [21] PriorityType OPTIONAL,
    senderVisibility            [22] BOOLEAN OPTIONAL,
    readReplyRequested          [23] BOOLEAN OPTIONAL,
    statusText                  [24] StatusTextType,
    recordTimeStamp             [25] TimeStamp,
    localSequenceNumber         [26] LocalSequenceNumber OPTIONAL,
    recordExtensions            [27] ManagementExtensions OPTIONAL,
    mMBoxstorageInformation     [28] MMBoxStorageInformation OPTIONAL,
    mscfInformation             [29] MSCFInformation OPTIONAL,
    sGSNPLMNIdentifier          [30] PLMN-Id OPTIONAL,
    rATType                     [31] RATType OPTIONAL
}

MMO4FRqRecord       ::= SET
{
    recordType                  [0]  RecordType,
    originatorMmsRSAddress      [1]  MMSRSAddress,
    recipientMmsRSAddress       [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5]  MMSAgentAddress,
    recipientAddresses          [6]  MMSAgentAddresses,
    contentType                 [7]  ContentType,
    mmComponentType             [8]  MMComponentType OPTIONAL,
    messageSize                 [9]  DataVolume,
    messageClass                [10] MessageClass OPTIONAL,
    submissionTime              [11] TimeStamp,
    timeOfExpiry                [12] WaitTime OPTIONAL,
    deliveryReportRequested     [13] BOOLEAN,
    priority                    [14] PriorityType OPTIONAL,
    senderVisibility            [15] BOOLEAN,
    readReplyRequested          [16] BOOLEAN,
    acknowledgementRequest      [17] BOOLEAN,
    forwardCounter              [18] INTEGER OPTIONAL,
    forwardingAddress           [19] MMSAgentAddresses OPTIONAL,
    recordTimeStamp             [20] TimeStamp,
    localSequenceNumber         [21] LocalSequenceNumber OPTIONAL,
    recordExtensions            [22] ManagementExtensions OPTIONAL
}

MMO4FRsRecord       ::= SET
{
    recordType                  [0]  RecordType,
    originatorMmsRSAddress      [1]  MMSRSAddress OPTIONAL,
    recipientMmsRSAddress       [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    requestStatusCode           [5] RequestStatusCodeType OPTIONAL,
    statusText                  [6] StatusTextType OPTIONAL,
    recordTimeStamp             [7] TimeStamp OPTIONAL,
```

```
    localSequenceNumber         [8] LocalSequenceNumber OPTIONAL,
    recordExtensions            [9] ManagementExtensions OPTIONAL
}

MMO4DRecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress OPTIONAL,
    originatorMmsRSAddress      [2]  MMSRSAddress OPTIONAL,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5]  MMSAgentAddress OPTIONAL,
    recipientAddress            [6]  MMSAgentAddress,
    mmDateAndTime               [7] TimeStamp,
    acknowledgementRequest      [8] BOOLEAN,
    mmStatusCode                [9] MMStatusCodeType,
    statusText                  [10] StatusTextType OPTIONAL,
    recordTimeStamp             [11] TimeStamp OPTIONAL,
    localSequenceNumber         [12] LocalSequenceNumber OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL
}

MMO1DRecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress OPTIONAL,
    originatorMmsRSAddress      [2]  MMSRSAddress OPTIONAL,
    accessCorrelation           [3] AccessCorrelation OPTIONAL,
    messageID                   [4]  OCTET STRING,
    mms3GPPVersion              [5]  OCTET STRING OPTIONAL,
    originatorAddress           [6]  MMSAgentAddress OPTIONAL,
    recipientAddress            [7]  MMSAgentAddress,
    mmStatusCode                [8] MMStatusCodeType OPTIONAL,
    recordTimeStamp             [9] TimeStamp OPTIONAL,
    localSequenceNumber         [10] LocalSequenceNumber OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [12] PLMN-Id OPTIONAL,
    rATType                     [13] RATType OPTIONAL
}

MMO4RRecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress OPTIONAL,
    originatorMmsRSAddress      [2]  MMSRSAddress OPTIONAL,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5]  MMSAgentAddress OPTIONAL,
    recipientAddresses          [6]  MMSAgentAddresses OPTIONAL,
    mmDateAndTime               [7] TimeStamp OPTIONAL,
    acknowledgementRequest      [8] BOOLEAN,
    readStatus                  [9] MMStatusCodeType OPTIONAL,
    statusText                  [10] StatusTextType OPTIONAL,
    recordTimeStamp             [11] TimeStamp OPTIONAL,
    localSequenceNumber         [12] LocalSequenceNumber OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL
}

MMO1RRecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress OPTIONAL,
    originatorMmsRSAddress      [2]  MMSRSAddress OPTIONAL,
    accessCorrelation           [3] AccessCorrelation OPTIONAL,
    messageID                   [4]  OCTET STRING,
    mms3GPPVersion              [5]  OCTET STRING OPTIONAL,
    originatorAddress           [6]  MMSAgentAddress OPTIONAL,
    recipientAddress            [7]  MMSAgentAddress OPTIONAL,
    readStatus                  [8] MMStatusCodeType OPTIONAL,
    recordTimeStamp             [9] TimeStamp OPTIONAL,
    localSequenceNumber         [10] LocalSequenceNumber OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [12] PLMN-Id OPTIONAL,
    rATType                     [13] RATType OPTIONAL
}

MMOMDRecord     ::= SET
{
```

```
    recordType                  [0]  RecordType,
    originatorMmsRSAddress      [1]  MMSRSAddress OPTIONAL,
    recipientMmsRSAddress       [2]  MMSRSAddress OPTIONAL,
    messageID                   [3]  OCTET STRING,
    messageSize                 [4] DataVolume OPTIONAL,
    mmStatusCode                [5] MMStatusCodeType OPTIONAL,
    statusText                  [6] StatusTextType OPTIONAL,
    recordTimeStamp             [7] TimeStamp OPTIONAL,
    localSequenceNumber         [8] LocalSequenceNumber OPTIONAL,
    recordExtensions            [9] ManagementExtensions OPTIONAL
}

MMR4FRecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    originatorMmsRSAddress      [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5]  MMSAgentAddress,
    recipientAddresses          [6]  MMSAgentAddresses,
    contentType                 [7]  ContentType,
    mmComponentType             [8]  MMComponentType OPTIONAL,
    messageSize                 [9]  DataVolume,
    messageClass                [10] MessageClass OPTIONAL,
    submissionTime              [11] TimeStamp,
    timeOfExpiry                [12] WaitTime OPTIONAL,
    deliveryReportRequested     [13] BOOLEAN,
    priority                    [14] PriorityType OPTIONAL,
    senderVisibility            [15] BOOLEAN,
    readReplyRequested          [16] BOOLEAN,
    requestStatusCode           [17] RequestStatusCodeType,
    statusText                  [18] StatusTextType,
    acknowledgementRequest      [19] BOOLEAN,
    forwardCounter              [20] INTEGER OPTIONAL,
    forwardingAddress           [21] MMSAgentAddresses OPTIONAL,
    recordTimeStamp             [22] TimeStamp,
    localSequenceNumber         [23] LocalSequenceNumber OPTIONAL,
    recordExtensions            [24] ManagementExtensions OPTIONAL
}

MMR1NRqRecord       ::= SET
{
    recordType                  [0] RecordType,
    recipientMmsRSAddress       [1] MMSRSAddress,
    messageID                   [2] OCTET STRING,
    replyChargingID             [3] OCTET STRING OPTIONAL,
    senderAddress               [4] MMSAgentAddress,
    recipientAddress            [5] MMSAgentAddress,
    accessCorrelation           [6] AccessCorrelation OPTIONAL,
    messageClass                [7] MessageClass OPTIONAL,
    mmComponentType             [8] MMComponentType OPTIONAL,
    messageSize                 [9] DataVolume,
    timeOfExpiry                [10] WaitTime OPTIONAL,
    messageReference            [11] OCTET STRING,
    deliveryReportRequested     [12] BOOLEAN OPTIONAL,
    replyCharging               [13] BOOLEAN OPTIONAL,
    replyDeadline               [14] WaitTime OPTIONAL,
    replyChargingSize           [15] DataVolume OPTIONAL,
    mmStatusCode                [16] MMStatusCodeType OPTIONAL,
    statusText                  [17] StatusTextType OPTIONAL,
    recordTimeStamp             [18] TimeStamp OPTIONAL,
    localSequenceNumber         [19] LocalSequenceNumber OPTIONAL,
    recordExtensions            [20] ManagementExtensions OPTIONAL,
    mscfInformation             [21] MSCFInformation OPTIONAL,
    vaspID                      [22] OCTET STRING OPTIONAL,
    vasID                       [23] OCTET STRING OPTIONAL,
    sGSNPLMNIdentifier          [24] PLMN-Id OPTIONAL,
    rATType                     [25] RATType OPTIONAL
}

MMR1NRsRecord       ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    messageID                   [2]  OCTET STRING,
    recipientAddress            [3] MMSAgentAddress,
    accessCorrelation           [4] AccessCorrelation OPTIONAL,
```

```
    reportAllowed               [5] BOOLEAN OPTIONAL,
    mmStatusCode                [6] MMStatusCodeType OPTIONAL,
    statusText                  [7] StatusTextType OPTIONAL,
    recordTimeStamp             [8] TimeStamp OPTIONAL,
    localSequenceNumber         [9] LocalSequenceNumber OPTIONAL,
    recordExtensions            [10] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [11] PLMN-Id OPTIONAL,
    rATType                     [12] RATType OPTIONAL
}

MMR1RtRecord        ::= SET
{
    recordType                  [0] RecordType,
    recipientMmsRSAddress       [1] MMSRSAddress,
    messageID                   [2] OCTET STRING,
    replyChargingID             [3] OCTET STRING OPTIONAL,
    senderAddress               [4] MMSAgentAddress OPTIONAL,
    recipientAddress            [5] MMSAgentAddress,
    accessCorrelation           [6] AccessCorrelation OPTIONAL,
    contentType                 [7] ContentType,
    mmComponentType             [8] MMComponentType OPTIONAL,
    messageClass                [9] MessageClass OPTIONAL,
    submissionTime              [10] TimeStamp,
    messageSize                 [11] DataVolume OPTIONAL,
    deliveryReportRequested     [12] BOOLEAN OPTIONAL,
    priority                    [13] PriorityType OPTIONAL,
    readReplyRequested          [14] BOOLEAN OPTIONAL,
    mmStatusCode                [15] MMStatusCodeType OPTIONAL,
    statusText                  [16] StatusTextType OPTIONAL,
    replyDeadline               [17] WaitTime OPTIONAL,
    replyChargingSize           [18] DataVolume OPTIONAL,
    durationOfTransmission      [19] INTEGER OPTIONAL,
    timeOfExpiry                [20] WaitTime OPTIONAL,
    recordTimeStamp             [21] TimeStamp OPTIONAL,
    localSequenceNumber         [22] LocalSequenceNumber OPTIONAL,
    recordExtensions            [23] ManagementExtensions OPTIONAL,
    messageReference            [24] OCTET STRING,
    vaspID                      [25] OCTET STRING OPTIONAL,
    vasID                       [26] OCTET STRING OPTIONAL,
    sGSNPLMNIdentifier          [27] PLMN-Id OPTIONAL,
    rATType                     [28] RATType OPTIONAL
}

MMR1ARecord     ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    messageID                   [2]  OCTET STRING,
    recipientAddress            [3] MMSAgentAddress,
    accessCorrelation           [4] AccessCorrelation OPTIONAL,
    reportAllowed               [5] BOOLEAN OPTIONAL,
    mmStatusCode                [6] MMStatusCodeType OPTIONAL,
    statusText                  [7] StatusTextType OPTIONAL,
    recordTimeStamp             [8] TimeStamp OPTIONAL,
    localSequenceNumber         [9] LocalSequenceNumber OPTIONAL,
    recordExtensions            [10] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [11] PLMN-Id OPTIONAL,
    rATType                     [12] RATType OPTIONAL
}

MMR4DRqRecord       ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    originatorMmsRSAddress      [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5] MMSAgentAddress,
    recipientAddress            [6] MMSAgentAddress,
    mmDateAndTime               [7] TimeStamp OPTIONAL,
    acknowledgementRequest      [8] BOOLEAN,
    mmStatusCode                [9] MMStatusCodeType OPTIONAL,
    statusText                  [10] StatusTextType OPTIONAL,
    recordTimeStamp             [11] TimeStamp OPTIONAL,
    localSequenceNumber         [12] LocalSequenceNumber OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL
}
```

```
MMR4DRsRecord       ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    originatorMmsRSAddress      [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    requestStatusCode           [5] RequestStatusCodeType OPTIONAL,
    statusText                  [6] StatusTextType OPTIONAL,
    recordTimeStamp             [7] TimeStamp OPTIONAL,
    localSequenceNumber         [8] LocalSequenceNumber OPTIONAL,
    recordExtensions            [9] ManagementExtensions OPTIONAL
}

MMR1RRRecord        ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    messageID                   [2]  OCTET STRING,
    recipientAddress            [3] MMSAgentAddress,
    originatorAddress           [4] MMSAgentAddress,
    accessCorrelation           [5] AccessCorrelation OPTIONAL,
    mmStatusCode                [6] MMStatusCodeType OPTIONAL,
    statusText                  [7] StatusTextType OPTIONAL,
    recordTimeStamp             [8] TimeStamp OPTIONAL,
    localSequenceNumber         [9] LocalSequenceNumber OPTIONAL,
    recordExtensions            [10] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [11] PLMN-Id OPTIONAL,
    rATType                     [12] RATType OPTIONAL
}

MMR4RRqRecord       ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    originatorMmsRSAddress      [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    originatorAddress           [5] MMSAgentAddress,
    recipientAddress            [6] MMSAgentAddress,
    mmDateAndTime               [7] TimeStamp OPTIONAL,
    acknowledgementRequest      [8] BOOLEAN,
    mmStatusCode                [9] MMStatusCodeType OPTIONAL,
    statusText                  [10] StatusTextType OPTIONAL,
    recordTimeStamp             [11] TimeStamp OPTIONAL,
    localSequenceNumber         [12] LocalSequenceNumber OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL
}

MMR4RRsRecord       ::= SET
{
    recordType                  [0]  RecordType,
    recipientMmsRSAddress       [1]  MMSRSAddress,
    originatorMmsRSAddress      [2]  MMSRSAddress,
    messageID                   [3]  OCTET STRING,
    mms3GPPVersion              [4]  OCTET STRING OPTIONAL,
    requestStatusCode           [5] RequestStatusCodeType OPTIONAL,
    statusText                  [6] StatusTextType OPTIONAL,
    recordTimeStamp             [7] TimeStamp OPTIONAL,
    localSequenceNumber         [8] LocalSequenceNumber OPTIONAL,
    recordExtensions            [9] ManagementExtensions OPTIONAL
}

MMRMDRecord     ::= SET
{
    recordType                  [0]  RecordType,
    originatorMmsRSAddress      [1]  MMSRSAddress,
    recipientMmsRSAddress       [2]  MMSRSAddress OPTIONAL,
    messageID                   [3]  OCTET STRING,
    messageSize                 [4] DataVolume,
    mmStatusCode                [5] MMStatusCodeType OPTIONAL,
    statusText                  [6] StatusTextType OPTIONAL,
    recordTimeStamp             [7] TimeStamp OPTIONAL,
    localSequenceNumber         [8] LocalSequenceNumber OPTIONAL,
    recordExtensions            [9] ManagementExtensions OPTIONAL
}

MMFRecord       ::= SET
```

```
{
    recordType                  [0]  RecordType,
    forwardingMmsRSAddress      [1]  MMSRSAddress,
    messageID                   [2]  OCTET STRING,
    forwardingAddress           [3]  MMSAgentAddress,
    recipientAddresses          [4]  MMSAgentAddresses,
    chargeInformation           [5]  ChargeInformation OPTIONAL,
    timeOfExpiry                [6]  WaitTime OPTIONAL,
    earliestTimeOfDelivery      [7]  WaitTime OPTIONAL,
    deliveryReportRequested     [8]  BOOLEAN OPTIONAL,
    readReplyRequested          [9]  BOOLEAN OPTIONAL,
    messageReference            [10] OCTET STRING,
    mmStatusCode                [11] MMStatusCodeType OPTIONAL,
    statusText                  [12] StatusTextType OPTIONAL,
    recordTimeStamp             [13] TimeStamp OPTIONAL,
    localSequenceNumber         [14] LocalSequenceNumber OPTIONAL,
    recordExtensions            [15] ManagementExtensions OPTIONAL,
    mMBoxstorageInformation     [16] MMBoxStorageInformation OPTIONAL
}

MMBx1SRecord    ::= SET
{
    recordType              [0]  RecordType,
    mmsRelayAddress         [1]  IPAddress,
    managingAddress         [2]  MMSAgentAddress,
    accessCorrelation       [3]  AccessCorrelation OPTIONAL,
    contentType             [4]  ContentType OPTIONAL,
    messageSize             [5]  DataVolume OPTIONAL,
    messageReference        [6]  OCTET STRING OPTIONAL,
    mmState                 [7]  OCTET STRING OPTIONAL,
    mmFlags                 [8]  OCTET STRING OPTIONAL,
    storeStatus             [9]  StoreStatus OPTIONAL,
    storeStatusText         [10] StatusTextType OPTIONAL,
    sequenceNumber          [11] INTEGER OPTIONAL,
    timeStamp               [12] TimeStamp OPTIONAL,
    recordExtensions        [13] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier      [14] PLMN-Id OPTIONAL,
    rATType                 [15] RATType OPTIONAL
}

MMBx1VRecord    ::= SET
{
    recordType                  [0]  RecordType,
    mmsRelayAddress             [1]  IPAddress,
    managingAddress             [2]  MMSAgentAddress,
    accessCorrelation           [3]  AccessCorrelation OPTIONAL,
    attributesList              [4]  AttributesList OPTIONAL,
    messageSelection            [5]  MessageSelection OPTIONAL,
    start                       [6]  INTEGER OPTIONAL,
    limit                       [7]  INTEGER OPTIONAL,
    totalsRequested             [8]  BOOLEAN OPTIONAL,
    quotasRequested             [9]  BOOLEAN OPTIONAL,
    mmListing                   [10] AttributesList OPTIONAL,
    requestStatusCode           [11] RequestStatusCodeType OPTIONAL,
    statusText                  [12] StatusTextType OPTIONAL,
    totals                      [13] Totals OPTIONAL,
    quotas                      [14] Quotas OPTIONAL,
    sequenceNumber              [15] INTEGER OPTIONAL,
    timeStamp                   [16] TimeStamp OPTIONAL,
    recordExtensions            [17] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [18] PLMN-Id OPTIONAL,
    rATType                     [19] RATType OPTIONAL
}

MMBx1URecord    ::= SET
{
    recordType                  [0] RecordType,
    mmsRelayAddress             [1]  IPAddress,
    managingAddress             [2]  MMSAgentAddress,
    accessCorrelation           [3]  AccessCorrelation OPTIONAL,
    recipientsAddressList       [4]  MMSAgentAddresses,
    messageClass                [5]  MessageClass OPTIONAL,
    uploadTime                  [6]  TimeStamp OPTIONAL,
    timeOfExpiry                [7]  WaitTime OPTIONAL,
    earliestTimeOfDelivery      [8]  WaitTime OPTIONAL,
    priority                    [9]  Priority OPTIONAL,
    mmState                     [10] OCTET STRING OPTIONAL,
    mmFlags                     [11] OCTET STRING OPTIONAL,
```

```
    contentType                 [12] ContentType OPTIONAL,
    messageSize                 [13] DataVolume OPTIONAL,
    messageReference            [14] OCTET STRING OPTIONAL,
    requestStatusCode           [15] RequestStatusCodeType OPTIONAL,
    statusText                  [16] StatusTextType OPTIONAL,
    sequenceNumber              [17] INTEGER OPTIONAL,
    timeStamp                   [18] TimeStamp OPTIONAL,
    recordExtensions            [19] ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [20] PLMN-Id OPTIONAL,
    rATType                     [21] RATType OPTIONAL
}

MMBx1DRecord    ::= SET
{
    recordType                  [0]  RecordType,
    mmsRelayAddress             [1]  IPAddress,
    managingAddress             [2]  MMSAgentAddress,
    accessCorrelation           [3]  AccessCorrelation OPTIONAL,
    messageReference            [4]  OCTET STRING OPTIONAL,
    requestStatusCode           [5]  RequestStatusCodeType OPTIONAL,
    statusText                  [6]  StatusTextType OPTIONAL,
    sequenceNumber              [7]  INTEGER OPTIONAL,
    timeStamp                   [8]  TimeStamp OPTIONAL,
    recordExtensions            [9]  ManagementExtensions OPTIONAL,
    sGSNPLMNIdentifier          [20] PLMN-Id OPTIONAL,
    rATType                     [21] RATType OPTIONAL
}

MM7SRecord  ::= SET
{
    recordType                      [0]  RecordType,
    originatorMmsRSAddress          [1]  MMSRSAddress,
    linkedID                        [2]  OCTET STRING OPTIONAL,
    vaspID                          [3]  OCTET STRING,
    vasID                           [4]  OCTET STRING,
    messageID                       [5]  OCTET STRING,
    originatorAddress               [6]  MMSAgentAddress,
    recipientAddresses              [7]  MMSAgentAddresses,
    serviceCode                     [8]  OCTET STRING OPTIONAL,
    contentType                     [9]  ContentType,
    mmComponentType                 [10] MMComponentType OPTIONAL,
    messageSize                     [11] DataVolume,
    messageClass                    [12] MessageClass OPTIONAL,
    chargeInformation               [13] ChargeInformation OPTIONAL,
    submissionTime                  [14] TimeStamp OPTIONAL,
    timeOfExpiry                    [15] WaitTime OPTIONAL,
    earliestTimeOfDelivery          [16] WaitTime OPTIONAL,
    deliveryReportRequested         [17] BOOLEAN OPTIONAL,
    readReplyRequested              [18] BOOLEAN OPTIONAL,
    replyCharging                   [19] BOOLEAN OPTIONAL,
    replyDeadline                   [20] WaitTime OPTIONAL,
    replyChargingSize               [21] DataVolume OPTIONAL,
    priority                        [22] PriorityType OPTIONAL,
    messageDistributionIndicator    [23] BOOLEAN OPTIONAL,
    requestStatusCode               [24] RequestStatusCodeType OPTIONAL,
    statusText                      [25] StatusTextType OPTIONAL,
    recordTimeStamp                 [26] TimeStamp,
    localSequenceNumber             [27] LocalSequenceNumber OPTIONAL,
    recordExtensions                [28] ManagementExtensions OPTIONAL,
    mscfInformation                 [29] MSCFInformation OPTIONAL
}

MM7DRqRecord        ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress,
    linkedID                [2]  OCTET STRING OPTIONAL,
    replyChargingID         [3]  OCTET STRING OPTIONAL,
    originatorAddress       [4]  MMSAgentAddress,
    recipientAddress        [5]  MMSAgentAddress,
    mmComponentType         [6]  MMComponentType OPTIONAL,
    messageSize             [7]  DataVolume,
    contentType             [8]  ContentType,
    priority                [9]  PriorityType OPTIONAL,
    recordTimeStamp         [10] TimeStamp OPTIONAL,
    localSequenceNumber     [11] LocalSequenceNumber OPTIONAL,
    recordExtensions        [12] ManagementExtensions OPTIONAL
}
```

```
MM7DRsRecord        ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress,
    messageID               [2]  OCTET STRING,
    recipientAddress        [3]  MMSAgentAddress,
    serviceCode             [4]  OCTET STRING OPTIONAL,
    requestStatusCode       [5]  RequestStatusCodeType OPTIONAL,
    statusText              [6]  StatusTextType OPTIONAL,
    recordTimeStamp         [7]  TimeStamp OPTIONAL,
    localSequenceNumber     [8]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [9]  ManagementExtensions OPTIONAL
}

MM7CRecord      ::= SET
{
    recordType              [0]  RecordType,
    originatorMmsRSAddress  [1]  MMSRSAddress,
    vaspID                  [2]  OCTET STRING,
    vasID                   [3]  OCTET STRING,
    messageID               [4]   OCTET STRING,
    originatorAddress       [5]  MMSAgentAddress,
    serviceCode             [6]  OCTET STRING OPTIONAL,
    requestStatusCode       [7]  RequestStatusCodeType OPTIONAL,
    statusText              [8]  StatusTextType OPTIONAL,
    recordTimeStamp         [9]  TimeStamp OPTIONAL,
    localSequenceNumber     [10]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [11]  ManagementExtensions OPTIONAL
}

MM7RRecord      ::= SET
{
    recordType              [0]  RecordType,
    originatorMmsRSAddress  [1]  MMSRSAddress,
    vaspID                  [2]  OCTET STRING,
    vasID                   [3]  OCTET STRING,
    messageID               [4]   OCTET STRING,
    originatorAddress       [5]  MMSAgentAddress,
    serviceCode             [6]  OCTET STRING OPTIONAL,
    contentType             [7]  ContentType,
    submissionTime          [8]  TimeStamp OPTIONAL,
    timeOfExpiry            [9]  WaitTime OPTIONAL,
    earliestTimeOfDelivery  [10] WaitTime OPTIONAL,
    requestStatusCode       [11] RequestStatusCodeType OPTIONAL,
    statusText              [12] StatusTextType OPTIONAL,
    recordTimeStamp         [13] TimeStamp OPTIONAL,
    localSequenceNumber     [14] LocalSequenceNumber OPTIONAL,
    recordExtensions        [15] ManagementExtensions OPTIONAL
}

MM7DRRqRecord       ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress OPTIONAL,
    messageID               [2]  OCTET STRING,
    originatorAddress       [3]  MMSAgentAddress OPTIONAL,
    recipientAddress        [4]  MMSAgentAddress,
    mmDateAndTime           [5]  TimeStamp OPTIONAL,
    mmStatusCode            [6]  MMStatusCodeTypeL,
    mmStatusText            [7]  StatusTextType OPTIONAL,
    recordTimeStamp         [8]  TimeStamp OPTIONAL,
    localSequenceNumber     [9]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [10] ManagementExtensions OPTIONAL
}

MM7DRRsRecord       ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress OPTIONAL,
    messageID               [2]  OCTET STRING,
    originatorAddress       [3]  MMSAgentAddress OPTIONAL,
    recipientAddress        [4]  MMSAgentAddress,
    requestStatusCode       [5]  RequestStatusCodeType OPTIONAL,
    statusText              [6]  StatusTextType OPTIONAL,
    recordTimeStamp         [7]  TimeStamp OPTIONAL,
    localSequenceNumber     [8]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [9]  ManagementExtensions OPTIONAL
```

```
}

MM7RRqRecord        ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress OPTIONAL,
    messageID               [2]  OCTET STRING,
    originatorAddress       [3]  MMSAgentAddress OPTIONAL,
    recipientAddress        [4]  MMSAgentAddress,
    mmDateAndTime           [5]  TimeStamp OPTIONAL,
    readStatus              [6]  MMStatusCodeType,
    mmStatusText            [7]  StatusTextType OPTIONAL,
    recordTimeStamp         [8]  TimeStamp OPTIONAL,
    localSequenceNumber     [9]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [10] ManagementExtensions OPTIONAL
}

MM7RRsRecord        ::= SET
{
    recordType              [0]  RecordType,
    recipientMmsRSAddress   [1]  MMSRSAddress OPTIONAL,
    messageID               [2]  OCTET STRING,
    originatorAddress       [3]  MMSAgentAddress OPTIONAL,
    recipientAddress        [4]  MMSAgentAddress,
    requestStatusCode       [5]  RequestStatusCodeType OPTIONAL,
    statusText              [6]  StatusTextType OPTIONAL,
    recordTimeStamp         [7]  TimeStamp OPTIONAL,
    localSequenceNumber     [8]  LocalSequenceNumber OPTIONAL,
    recordExtensions        [9]  ManagementExtensions OPTIONAL
}

-------------------------------------------------------------------------------
--
--  MMS DATA TYPES
--
-------------------------------------------------------------------------------

AccessCorrelation ::= CHOICE
{
    circuitSwitched         [0] CircuitSwitchedAccess,
    packetSwitched          [1] PacketSwitchedAccess
}

AttributesList          ::= SEQUENCE
--
-- Note: the values below are subject to WAP Forum ongoing standardization
--
{
    messageID       [0]  OCTET STRING,
    DateAndTime     [1]  TimeStamp,
    senderAddress   [2]  MMSRSAddress,
    subject         [3]  OCTET STRING,
    messageSize     [4]  DataVolume ,
    mmFlags         [5]  OCTET STRING,
    mmState         [6]  MMState
}

ChargeInformation   ::= SEQUENCE
{   ---
    --- one of the two following parameters must be present
    ---
    chargedparty        [0]  ChargedParty OPTIONAL,
    chargetype          [1]  ChargeType OPTIONAL
}

ChargedParty    ::= ENUMERATED
{
    sender              (0),
    recipient           (1),
    both                (2),
    neither             (3),
    notspecifiedbyVASP  (99)
}

ChargeType          ::= ENUMERATED
{
    postpaid                (0),
    pre-paid                (1)
```

```
}

CircuitSwitchedAccess ::= SEQUENCE
{
    mSCIdentifier           [0]  MscNo,
    callReferenceNumber     [1]  CallReference
}

ContentType         ::= OCTET STRING

Editor"s note:  the construct below should be aligned with other domains / generic module

DataVolume          ::= INTEGER
    --
    -- The volume of data transfered in octets.
    --

DeltaSeconds        ::= OCTET STRING (SIZE(8))

Editor"s note:  the construct below should be aligned with other domains / generic module

MediaComponent  ::= SEQUENCE
{
    mediaType       [0]  OCTET STRING,
    mediaSize       [1]  DataVolume
}

MediaComponents = SET OF MediaComponent

MessageClass        ::= ENUMERATED
{
    personal            (0),
    advertisement       (1),
    information-service (2),
    auto                (3)
}

MMBoxStorageInformation     ::= SET
{
    mmState                 [0]  MMState,
    mmFlag                  [1]  OCTET STRING,
    storeStatus             [2]  StoreStatus,
    storeStatusText         [3]  StatusTextType,
    storedMessageReference  [4]  OCTET STRING
}

MMComponentType     ::= SEQUENCE
{
    subject     [0]  SubjectComponent,
    media       [1]  MediaComponents
}

MMSAgentAddress     ::= SEQUENCE
{
    mMSAgentAddressData [0]  MMSAgentAddressData,
    mMSRecipientType    [1]  SEQUENCE OF MMSRecipientType OPTIONAL
--
-- mMSRecipeintType is only included when this datatype is used to identify recipients.
--
}

MMSAgentAddresses   ::= SET OF MMSAgentAddress

MMSAgentAddressData ::= CHOICE
{
    eMail-address   [0]  OCTET STRING,
    mSISDN          [1]  MSISDN,
    shortCode       [2]  OCTET STRING
}

MMSRecipientType    ::= ENUMERATED
(
    tO              (0),
    cC              (1),
    bCC             (2)
}
```

```
MMSRSAddress        ::= SEQUENCE
--
-- usage of SEQUENCE instead of CHOICE allows both address types to be present at the same time
--
{
    domainName      [0]  OCTET STRING OPTIONAL,
    iPAddress       [2]  IPAddress OPTIONAL
}

MMState     ::= ENUMERATED
--
-- Note: the values below are subject to WAP Forum ongoing standardization
--
{
    draft           (0),
    sent            (1),
    new             (2),
    retrieved       (3),
    forwarded       (4)
}

MMStatusCodeType        ::= ENUMERATED
{
    retrieved                   (0),
    forwarded                   (1),
    expired                     (2),
    rejected                    (3),
    deferred                    (4),
    unrecognised                (5),
    read                        (6),
    deletedWithoutBeingRead     (7)
}

MSCFInformation     ::= SET
{
    billingInformation      [0]  OCTET STRING OPTIONAL,
    routeingAddressList     [1]  RouteingAddressList OPTIONAL
}

PacketSwitchedAccess ::= SEQUENCE
{
    gSNAddress      [0]  GSNAddress,
    chargingID      [1] ChargingID
}

PriorityType    ::= ENUMERATED
{
    low         (0),
    normal      (1),
    high        (2)
}

Quotas  ::= SEQUENCE
{
    numberOfMessages    [0] INTEGER OPTIONAL,
    numberOfOctets      [1] INTEGER OPTIONAL
}

RequestStatusCodeType   ::= INTEGER
{
    --
    -- cause codes 0 to 15 are used as defined for 'CauseForTerm'
    -- (cause for termination) and 16 to 20 are as defined for
    -- "CauseForRecClosing"
    --
    normalRelease               (0),    -- ok
    abnormalRelease             (4),    -- error unspecified
    serviceDenied               (30),
    messageFormatCorrupt        (31),
    sendingAddressUnresolved    (32),
    messageNotFound             (33),
    networkProblem              (34),
    contentNotAccepted          (35),
    unsupportedMessage          (36)
}

RouteingAddress         ::= SEQUENCE
{
```

```
    --
    -- usage of SEQUENCE instead of CHOICE allows several address types
    -- to be present at the same time
    --
    eMail-address       [0] OCTET STRING,
    mSISDN              [1] MSISDN OPTIONAL,
    shortCode           [2] OCTET STRING OPTIONAL
}

RouteingAddressList ::= SET OF MMSAgentAddress

StatusTextType      ::= OCTET STRING

StoreStatus ::= INTEGER
--
-- Note: the values below are subject to WAP Forum ongoing standardization
--
{
    stored                          (0),
    errorTransientFailure           (1),
    errorTransientMailboxFull       (2),
    errorTransientNetworkProblems   (3),
    errorPermanentFailure           (4),
    errorPermanentPermissionDenied  (5),
    errorPermanentMessageFormat     (6),
    errorPermanentMessageNotFound   (7)
}

SubjectComponent    ::= SEQUENCE
{
    subjectType     [0] OCTET STRING,
    subjectSize     [1] DataVolume
}

Totals  ::= SEQUENCE
{
    numberOfMessages        [0] INTEGER OPTIONAL,
    numberOfOctets          [1] INTEGER OPTIONAL
}

WaitTime        ::= CHOICE
{
    http-date       [0] TimeStamp,
    delta-seconds   [1] DeltaSeconds
}

END
```

5.2.4.2 LCS CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.271 [31].

```
LCSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
lcsChargingDataTypes (6) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

RecordType, Ext-GeographicalInformation, IMSI, IPAddress, LCSClientExternalID, LCSClientIdentity,
LCSClientInternalID, LCSClientType, LCS-Priority, LocalSequenceNumber, LocationType,
ManagementExtensions, MSISDN, PositioningData, RecordingEntity, TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}

UserError
FROM MAP-ER-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-ER-DataTypes (17) version9 (9)}

-- from TS 29.002 [60]


ProviderError
```

```
FROM TCAPMessages { itu-t recommendation q 773 modules (2) messages (1) version2 (2) }

-- from ITU-T Q.773 [108]

;

--------------------------------------------------------------------------------
--
--  LCS RECORDS
--
--------------------------------------------------------------------------------
LCSRecord   ::= CHOICE
{
--
-- Record values 71..75 are LCS specific
--
    lCSGMORecord        [71] LCSGMORecord,
    lCSRGMTRecord       [72] LCSRGMTRecord,
    lCSHGMTRecord       [73] LCSHGMTRecord,
    lCSVGMTRecord       [74] LCSVGMTRecord,
    lCSGNIRecord        [75] LCSGNIRecord
}

LCSGMORecord    ::= SET
{
    recordType                  [0] RecordType,
    recordingEntity             [1] RecordingEntity,
    lcsClientType               [2] LCSClientType OPTIONAL,
    lcsClientIdentity           [3] LCSClientIdentity OPTIONAL,
    servedIMSI                  [4] IMSI,
    servedMSISDN                [5] MSISDN OPTIONAL,
    servingEntity               [6] ServingEntity OPTIONAL,
    locationEstimate            [7] Ext-GeographicalInformation OPTIONAL,
    positioningData             [8] PositioningData OPTIONAL,
    userError                   [9] UserError OPTIONAL,
    providerError               [10] ProviderError OPTIONAL,
    recordTimeStamp             [11] TimeStamp,
    localSequenceNumber         [12] LocalSequenceNumber OPTIONAL,
    recordExtensions            [13] ManagementExtensions OPTIONAL
}

LCSRGMTRecord   ::= SET
{
    recordType                  [0] RecordType,
    recordingEntity             [1] RecordingEntity,
    lcsClientType               [2] LCSClientType OPTIONAL,
    lcsClientIdentity           [3] LCSClientIdentity OPTIONAL,
    targetIMSI                  [4] IMSI,
    targetMSISDN                [5] MSISDN OPTIONAL,
    locationType                [6] LocationType,
    lCSPriority                 [7] LCS-Priority OPTIONAL,
    resultCode                  [8] ResultCodeType OPTIONAL,
    recordTimeStamp             [9] TimeStamp,
    localSequenceNumber         [10] LocalSequenceNumber OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    homeGMLCIdentity            [12] IPAddress OPTIONAL
}

LCSHGMTRecord   ::= SET
{
    recordType                  [0] RecordType,
    recordingEntity             [1] RecordingEntity,
    lcsClientType               [2] LCSClientType OPTIONAL,
    lcsClientIdentity           [3] LCSClientIdentity OPTIONAL,
    targetIMSI                  [4] IMSI,
    targetMSISDN                [5] MSISDN OPTIONAL,
    locationType                [6] LocationType,
    lCSPriority                 [7] LCSPriority OPTIONAL,
    resultCode                  [8] ResultCodeType OPTIONAL,
    recordTimeStamp             [9] TimeStamp,
    localSequenceNumber         [10] LocalSequenceNumber OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    requestingGMLCIdentity      [12] IPAddress OPTIONAL,
    visitedGMLCIdentity         [13] IPAddress OPTIONAL,
    servingNetworkIdentity      [14] PLMN-Id OPTIONAL
}

LCSVGMTRecord   ::= SET
```

```
{
    recordType                  [0] RecordType,
    recordingEntity             [1] RecordingEntity,
    lcsClientType               [2] LCSClientType OPTIONAL,
    lcsClientIdentity           [3] LCSClientIdentity OPTIONAL,
    targetIMSI                  [4] IMSI,
    targetMSISDN                [5] MSISDN OPTIONAL,
    locationType                [6] LocationType,
    lCSPriority                 [7] LCS-Priority OPTIONAL,
    resultCode                  [8] ResultCodeType OPTIONAL,
    recordTimeStamp             [9] TimeStamp,
    localSequenceNumber         [10] LocalSequenceNumber OPTIONAL,
    recordExtensions            [11] ManagementExtensions OPTIONAL,
    homeGMLCIdentity            [12] IPAddress OPTIONAL
}

LCSGNIRecord    ::= SET
{
    recordType                  [0] RecordType,
    recordingEntity             [1] RecordingEntity,
    lcsClientType               [2] LCSClientType OPTIONAL,
    lcsClientIdentity           [3] LCSClientIdentity OPTIONAL,
    servedIMSI                  [4] IMSI,
    servedMSISDN                [5] MSISDN OPTIONAL,
    servingEntity               [6] ServingEntity OPTIONAL,
    resultCode                  [7] ResultCodeType OPTIONAL,
    recordTimeStamp             [8] TimeStamp,
    localSequenceNumber         [9] LocalSequenceNumber OPTIONAL,
    recordExtensions            [10] ManagementExtensions OPTIONAL
}

ResultCodeType          ::= INTEGER (0..MAX)
--
-- Result codes as defined in OMA-MLP Specifications [82]
--
```

5.2.4.3 PoC CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.272 [32].

```
POCChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
pocChargingDataTypes (7) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration, RecordType, Diagnostics, IMSI, IMEI, IPAddress, ISDN-AddressString,
LocalSequenceNumber, ManagementExtensions, MSISDN, NodeAddress, RecordingEntity, ServiceKey,
TimeStamp, ServiceContextID
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}


GSNAddress, NodeID, SGSNPLMNIdentifier
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) genericChargingDataTypes (2) asn1Module (0) version1 (0)}


IMS-Charging-Identifier, Incomplete-CDR-Indication, InterOperatorIdentifiers, InvolvedParty,
MessageBody, Media-Components-List, Session-Id, SIP-Method
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version1 (0)}

;

--------------------------------------------------------------------------------
--
--  POC RECORDS
--
--------------------------------------------------------------------------------

POCRecord   ::= CHOICE
```

```
{
--
-- Record values 80..81 are PoC specific
--
    pPFRecord           [80] PPFRecord,
    cPFRecord           [81] CPFRecord
}

PPFRecord   ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    sIP-Method                      [2] SIP-Method OPTIONAL,
    nodeAddress                     [3] NodeAddress OPTIONAL,
    session-Id                      [4] Session-Id OPTIONAL,
    calling-Party-Address           [5] InvolvedParty OPTIONAL,
    called-Party-Address            [6] InvolvedParty OPTIONAL,
    servedParty                     [7] GraphicString OPTIONAL,
    serviceRequestTimeStamp         [8] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp   [9] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp     [10] TimeStamp OPTIONAL,
    recordOpeningTime               [11] TimeStamp OPTIONAL,
    recordClosureTime               [12] TimeStamp OPTIONAL,
    interOperatorIdentifiers        [13] InterOperatorIdentifiers OPTIONAL,
    localRecordSequenceNumber       [14] LocalSequenceNumber OPTIONAL,
    recordSequenceNumber            [15] INTEGER OPTIONAL,
    causeForRecordClosing           [16] CauseForRecordClosing OPTIONAL,
    incomplete-CDR-Indication       [17] Incomplete-CDR-Indication OPTIONAL,
    iMS-Charging-Identifier         [18] IMS-Charging-Identifier OPTIONAL,
    list-Of-SDP-Media-Components    [19] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                     [20] NodeAddress OPTIONAL,
    serviceReasonReturnCode         [21] UTF8String OPTIONAL,
    list-Of-Message-Bodies          [22] SEQUENCE OF MessageBody OPTIONAL,
    userLocationInfo                [23] OctetString OPTIONAl,
    poCInformation                  [24] POCInformation OPTIONAL,
    recordExtensions                [25] RecordExtensions OPTIONAL,
    serviceContextID                [26] ServiceContextID OPTIONAL
}

CPFRecord       ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    sIP-Method                      [2] SIP-Method OPTIONAL,
    nodeAddress                     [3] NodeAddress OPTIONAL,
    session-Id                      [4] Session-Id OPTIONAL,
    calling-Party-Address           [5] InvolvedParty OPTIONAL,
    called-Party-Address            [6] InvolvedParty OPTIONAL,
    servedParty                     [7] GraphicString OPTIONAL,
    serviceRequestTimeStamp         [8] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp   [9] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp     [10] TimeStamp OPTIONAL,
    recordOpeningTime               [11] TimeStamp OPTIONAL,
    recordClosureTime               [12] TimeStamp OPTIONAL,
    interOperatorIdentifiers        [13] InterOperatorIdentifiers OPTIONAL,
    localRecordSequenceNumber       [14] LocalSequenceNumber OPTIONAL,
    recordSequenceNumber            [15] INTEGER OPTIONAL,
    causeForRecordClosing           [16] CauseForRecordClosing OPTIONAL,
    incomplete-CDR-Indication       [17] Incomplete-CDR-Indication OPTIONAL,
    iMS-Charging-Identifier         [18] IMS-Charging-Identifier OPTIONAL,
    list-Of-SDP-Media-Components    [19] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                     [20] NodeAddress OPTIONAL,
    serviceReasonReturnCode         [21] UTF8String OPTIONAL,
    list-Of-Message-Bodies          [22] SEQUENCE OF MessageBody PTIONAL,
    userLocationInfo                [23] OctetString OPTIONAl,
    poCInformation                  [24] POCInformation OPTIONAL,
    recordExtensions                [25] RecordExtensions OPTIONAL,
    serviceContextID                [26] ServiceContextID OPTIONAL
}


-------------------------------------------------------------------------------
--
--  PoC DATA TYPES
--
-------------------------------------------------------------------------------

AccessPriority          ::= ENUMERATED
```

```
{
    pre-emptive            (0),
    high                   (1),
    normal                 (2),
    low                    (3)
}

CauseForRecordClosing   ::= ENUMERATED
{
    normalRelease                   (0),
    abnormalRelease                 (1),
    serviceChange                   (2), -- e.g. change in media due to Re-Invite
    volumeLimit                     (3),
    timeLimit                       (4),
    numberofTalkBurstLimit          (5),
    maxChangeCond                   (6),
    sessionTypeChange               (7),
    managementIntervention          (8)
}

ChangeCondition         ::= ENUMERATED
{
    serviceChange                   (0), -- e.g. change in media due to Re-Invite
    volumeLimit                     (1),
    timeLimit                       (2),
    numberofTalkBurstLimit          (3),
    numberofActiveParticipants      (4),
    tariffTime                      (5)
}

ListofTalkBurstExchange         ::= SET
{
    number-Of-Talk-Bursts               [1] INTEGER OPTIONAL,
    talk-Burst-Volume                   [2] INTEGER OPTIONAL,      -- measured in octets
    talk-Bursts-Time                    [3] CallDuration OPTIONAL,
    number-Of-Received-Talk-Bursts      [4] INTEGER OPTIONAL,
    received-Talk-Burst-Volume          [5] INTEGER OPTIONAL,      -- measured in octets
    received-Talk-Burst-Time            [6] CallDuration OPTIONAL,
    changeCondition                     [7] ChangeCondition OPTIONAL,
    changeTime                          [8] TimeStamp,
    numberofParticipants                [9] INTEGER OPTIONAL
}

ParticipatingType               ::=  ENUMERATED
{
    Normal              (0),
    nW-PoC-Box          (1),
    uE-PoC-Box          (2)
}


POCEventType                    ::=  ENUMERATED
{
    normal                          (0),
    instantPersonalAlert            (1),
    pOCGroupAdvertisement           (2),
    earlySessionSettingup           (3),
    pOCTalkBurst                    (4)
}

POCInformation          ::= SET
{
    pOCSessionType                   [1] POCSessionType OPTIONAL,
    numberofParticipants             [2] INTEGER OPTIONAL,
    listofParticipants               [3] SEQUENCE OF POCParticipant OPTIONAL,
    listofTalkBurstExchange          [4] SEQUENCE OF ListofTalkBurstExchange OPTIONAL,
    pOCControllingAddress            [5] UTF8String OPTIONAL,
    pOCGroupName                     [6] UTF8String OPTIONAL,
    pOCSessionId                     [7] UTF8String OPTIONAL,
    pOCSessionInitiationType         [8] POCSessionInitType OPTIONAL,
    pOCEventType                      [9] POCEventType OPTIONAL
}

POCParticipant          ::= SET
{
    called-party-address            [1] InvolvedParty,
    participant-access-priority     [2] AccessPriority  OPTIONAL,
    user-participating-type         [3] ParticipatingType   OPTIONAL
```

```
}

POCSessionInitType      ::= ENUMERATED
{
    pre-established            (0),
    on-demand                  (1)
}

POCSessionType          ::= ENUMERATED
{
    1-to-1session              (0),
    chat-group-session         (1),
    pre-arranged-group-session (2),
    ad-hoc-group-session       (3)
}
```

5.2.4.4 MBMS CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.273 [33].

```
MBMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
mbmsChargingDataTypes (8) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration, CalledNumber, RecordType, Diagnostics, IMSI, IMEI, IPAddress, ISDN-AddressString,
LocalSequenceNumber, ManagementExtensions, MessageReference, MSISDN, RecordingEntity, ServiceKey,
TimeStamp, ServiceContextID
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}


DefaultGPRS-Handling
FROM MAP-MS-DataTypes    { itu-t identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)  }
--
-- from TS 29.002 [60]


AccessPointNameNI, ChangeCondition, ChangeOfMBMSCondition, DataVolumeGPRS, GSNAddress, NodeID,
PDPAddress, QoSInformation, RatingGroupID, RoutingAreaCode, ServiceChangeCause, SGSNPLMNIdentifier
FROM GPRSChargingDataTypes { itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
charging (5) gprsChargingDataTypes (2) asn1Module (0) version1 (0)}


Media-Components-List, SDP-Media-Components, SDP-Media-Description
From IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (0) asn1Module (0) version1 (0)}

;

--------------------------------------------------------------------------------
--
--  MBMS RECORDS
--
--------------------------------------------------------------------------------

MBMSRecord  ::= CHOICE
{
--
-- Record values 78..79 are MBMS specific
--
    sUBBMSCRecord           [78] SUBBMSCRecord,
    cONTENTBMSCRecord       [79] CONTENTBMSCRecord
}

SUBBMSCRecord   ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI,
    ggsnAddress                 [2] GSNAddress OPTIONAL,
    accessPointNameNI           [3] AccessPointNameNI OPTIONAL,
    servedPDPAddress            [4] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [5] SEQUENCE OF ChangeOfMBMSCondition OPTIONAL,
    recordOpeningTime           [6] TimeStamp,
    duration                    [7] CallDuration,
    causeForRecClosing          [8] CauseForRecClosing,
    diagnostics                 [9] Diagnostics OPTIONAL,
    recordSequenceNumber        [10] INTEGER OPTIONAL,
    nodeID                      [11] NodeID OPTIONAL,
    recordExtensions            [12] ManagementExtensions OPTIONAL,
    localSequenceNumber         [13] LocalSequenceNumber OPTIONAL,
    servedMSISDN                [14] MSISDN OPTIONAL,
    bearerServiceDescription    [15] Media-Components-List OPTIONAL,
    mbmsInformation             [16] MBMSInformation OPTIONAL,
    serviceContextID            [17] ServiceContextID OPTIONAL
}
```

```
CONTENTBMSCRecord   ::= SET
{
    recordType                  [0] RecordType,
    contentProviderId           [1] GraphicString,
    listofDownstreamNodes       [2] SEQUENCE OF GSNAddress,
    accessPointNameNI           [3] AccessPointNameNI OPTIONAL,
    servedPDPAddress            [4] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [5] SEQUENCE OF ChangeOfMBMSCondition OPTIONAL,
    recordOpeningTime           [6] TimeStamp,
    duration                    [7] CallDuration,
    causeForRecClosing          [8] CauseForRecClosing,
    diagnostics                 [9] Diagnostics OPTIONAL,
    recordSequenceNumber        [10] INTEGER OPTIONAL,
    nodeID                      [11] NodeID OPTIONAL,
    recordExtensions            [12] ManagementExtensions OPTIONAL,
    localSequenceNumber         [13] LocalSequenceNumber OPTIONAL,
    recipientAddressList        [14] SEQUENCE OF MSISDN,
    bearerServiceDescription    [15] Media-Components-List OPTIONAL,
    mbmsInformation             [16] MBMSInformation OPTIONAL,
    serviceContextID            [17] ServiceContextID OPTIONAL
}

-------------------------------------------------------------------------------
--
--  MBMS DATA TYPES
--
-------------------------------------------------------------------------------

CauseForRecClosing  ::= INTEGER
{
    --
    -- cause codes 0 to 15 are defined as used in 'CauseForTerm' (cause for termination)
    --
    normalRelease                   (0),
    abnormalRelease                 (4),
    volumeLimit                     (16),
    timeLimit                       (17),
    maxChangeCond                   (19),
    managementIntervention          (20),
    listofDownstreamNodeChange      (59)
}

MBMSInformation         ::= SET
{
    tMGI                        [1] TMGI OPTIONAL,
    mBMSSessionIdentity         [2] MBMSSessionIdentity OPTIONAL,
    mBMSServiceType             [3] MBMSServiceType OPTIONAL,
    mBMSUserServiceType         [4] MBMSUserServiceType OPTIONAL, -- only supported in the BM-SC
    mBMS2G3GIndicator           [5] MBMS2G3GIndicator OPTIONAL,
    fileRepairSupported         [6] BOOLEAN OPTIONAL,             -- only supported in the BM-SC
    rAI                         [7] RoutingAreaCode OPTIONAL,     -- only supported in the BM-SC
    mBMSServiceArea             [8] MBMSServiceArea OPTIONAL,
    requiredMBMSBearerCaps      [9] RequiredMBMSBearerCapabilities OPTIONAL
}

{
MBMS2G3GIndicator       ::= ENUMERATED
{
    2G              (0),    -- For GERAN access only
    3G              (1),    -- For UTRAN access only
    2G-AND-3G       (2)     -- For both UTRAN and GERAN access
}


MBMSServiceType     ::= ENUMERATED
{
    mULTICAST       (0),
    bROADCAST       (1)
}

MBMSUserServiceType     ::= ENUMERATED
{
    dOWNLOAD        (0),
    sTREAMING       (1)
}

RequiredMBMSBearerCapabilities      ::= OCTET STRING (SIZE (3..14))
```

```
    --
    -- This  octet string
    -- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Quality of
    -- service Profile" information element specified in 3GPP TS 29.060 [75].
    --


MBMSSessionIdentity     ::= OCTET STRING (SIZE (1))

    --
    -- This octet string is a 1:1 copy of the contents of the MBMS-Session-Identity
    -- AVP specified in 3GPP TS 29.061 [82]
    --

TMGI        ::= OCTET STRING
    --
    -- This  octet string
    -- is a 1:1 copy of the contents (i.e. starting with octet 4) of the "TMGI"
    -- information element specified in 3GPP TS 29.060 [75].
    --

MBMSServiceArea     ::= OCTET STRING
    --
    -- Editor's Note: The structure of this octet string is subject to discussions
    -- in other working groups.

END
```

5.2.4.5 MMTel CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.275 [35].

```
MMTelChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
mMTelChargingDataTypes (9) asn1Module (0) version1 (0)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

RecordType, IMSI, IMEI, IPAddress, LocalSequenceNumber, ManagementExtensions, MSISDN, NodeAddress,
SubscriptionID, TimeStamp, ServiceContextID
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version1 (0)}


CarrierSelectRouting, CauseForRecordClosing,IMS-Charging-Identifier,
IMSCommunicationServiceIdentifier, Incomplete-CDR-Indication, InterOperatorIdentifiers,
InterOperatorIdentifierlist, InvolvedParty, ListOfInvolvedParties, MessageBody,
Media-Components-List, NumberPortabilityRouting, Service-Id, Session-Id, SIP-Method
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version1 (0)}

;

--------------------------------------------------------------------------------
--
--  MMTel RECORDS
--
--------------------------------------------------------------------------------


MMTelRecord     ::= SET
{
    recordType                          [0] RecordType,
    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,
    list-Of-Calling-Party-Address       [6] ListOfInvolvedParties OPTIONAL,
    called-Party-Address                [7] InvolvedParty OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
```

```
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers            [14] InterOperatorIdentifierlist OPTIONAL,
    localRecordSequenceNumber           [15] LocalSequenceNumber 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,
    list-Of-SDP-Media-Components        [21] SEQUENCE OF Media-Components-List OPTIONAL,
    gGSNaddress                         [22] NodeAddress OPTIONAL,
    serviceReasonReturnCode             [23] UTF8String OPTIONAL,
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody OPTIONAL,
    recordExtensions                    [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation            [29] OCTET STRING OPTIONAL,
    serviceContextID                    [30] ServiceContextID OPTIONAL,
    list-of-subscription-ID             [31] SEQUENCE OF SubscriptionID OPTIONAL,
    iMSCommunicationServiceIdentifier   [33] IMSCommunicationServiceIdentifier OPTIONAL,
    numberPortabilityRouting            [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                [35] CarrierSelectRouting OPTIONAL,
    requested-Party-Address             [101] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity    [102] ListOfInvolvedParties OPTIONAL,
    mMTelInformation                    [110] MMTelInformation  OPTIONAL

}


--------------------------------------------------------------------------------
--
--  MMTel DATA TYPES
--
--------------------------------------------------------------------------------



MMTelInformation            ::= SET
{
    ListOfSupplServices     [0] SEQUENCE OF SupplService OPTIONAL,
    subscriberRole          [1] SubscriberRole OPTIONAL

}


ParticipantActionType ::= ENUMERATED
{
    CREATE_CONF         (0),
    JOIN_CONF           (1),
    INVITED_INTO_CONF   (2),
    QUIT_CONF           (3)
}


SupplService := SET
{
    serviceType                 [0] ServiceType,
    serviceMode                 [1] ServiceMode OPTIONAL,
    numberOfDiversions          [2] INTEGER OPTIONAL,
    associated-Party-Address    [3] InvolvedParty OPTIONAL,
    serviceId                   [4] Service-Id OPTIONAL,
    changeTime                  [5] TimeStamp,
    numberOfParticipants        [6] INTEGER OPTIONAL,
    participantActionType       [7] ParticipantActionType OPTIONAL


}

ServiceType ::= INTEGER
{--
    --
    -- Values  ≥ 1024 are reserved for specific Network/Manufacturer variants
    --

    oIPresentation      (0),
    oIRestriction       (1),
    tIPresentation      (2),
```

```
    tIRestriction       (3),
    hOLD                (4),
    cBarring            (5),
    cDIVersion          (6),
    cDIVersionNotif     (7),
    cWaiting            (8),
    mWaitingIndic       (9),
    cONF                (10)

}


ServiceMode ::= INTEGER
{--
    --
    -- Values  ≥ 1024 are reserved for specific Network/Manufacturer variants
    --


    cFunCond            (0),
    cFbusy              (1),
    cFnoReply           (2),
    cFnotLogged         (3),
    deflection          (4),
    notReach            (5),
    iCBarring           (6),
    oCBarring           (7),
    aCRejection         (8),
    eCTBlind            (9),
    eCTConsultative     (10)
}



SubscriberRole ::= ENUMERATED
{
    originating         (0),
    terminating         (1)
}

END
```

6 CDR encoding rules

TS 32.297 [42] specifies the file based protocol for the "Bx" interface between the CDR generating node, i.e. the Charging Gateway Functionality, and the operator"s Billing Domain (BD) (refer to TS 32.240 [1] for details on the charging architecture). The following subclauses define

- the various CDR encodings that are standardised within 3GPP,
- a method how to indicate the encoding applied to the CDRs,
- a version indication of the encoded CDRs.

The latter two items can be used by the system(s) in the BD to easily detect the encoding version used. See TS 32.297 [42] for a detailed description on how this information is used on the Bx interface.

6.1 3GPP standardised encodings

The contents of the CDRs sent on the Bx interface are defined by the ASN.1 language clause 5. A number of transfer syntaxes, or encodings, is specified for use in 3GPP systems as follows. For the CDR transfer via the Bx interface, as defined in TS 32.297 [42], the Basic Encoding Rules (ITU-T X.690 [102]) encoding must be supported by all 3GPP systems. Optionally, other additional CDR encodings, i.e. Packed Encoding Rules (ITU-T Recommendation X.691 [103]) and XML Encoding Rules (ITU-T Recommendation on XER [104]) may also be offered.

The encoding applied to the CDRs is indicated by means of the "Data Record Format" parameter. The following "Data Record Format" values are used:

- "1" signifies the use of Basic Encoding Rules (BER);
- "2" signifies the use of unaligned basic Packed Encoding Rules (PER);
- "3" signifies the use of aligned basic Packed Encoding Rules (PER);
- "4" signifies the use of XML Encoding Rules (XER).

6.2 Encoding version indication

An indication of the version of the CDR definition and encoding must be included in the CDR files transferred via the Bx interface specified in TS 32.297 [42]. This version indication consists of a Release Identifier and a Version Identifier.

For CDRs specified in references [10] to[31], applying the syntax as described in clause 5 of the present document, the version indicator "6", signifying 3GPP Rel-6, shall be applied. The Version Identifier shall carry the value of the middle digit of the version number of the present document, i.e. "0" for the first version under change control, and values "1" and following for any subsequent, modified version as appropriate.

Annex A (normative): CDR abstract syntax – machine processable

This annex replicates the contents of subclause 5.2, which is optimised for human readability, in a format that is machine readable and –processable. Technically, the contents of clause 5 and this annex are completely identical. In case of deviations between this annex and clause 5 due to errors in the present document, this annex shall prevail.

Editor"s Note: to be completed

Annex B (informative): Bibliography

a) **The 3GPP charging specifications**

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b) **Common 3GPP specifications**

- 3GPP TS 22.101: "Service aspects; Service Principles".

- 3GPP TS 22.115 "Service aspects; Charging and Billing".

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

-

c) **Network Management related specifications**

-

Editor"s Note: to be completed, also more service charging TSs might need to be added.

Annex C (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
Sep 2007	SP-37	SP-070605	0080	--	Correction of IMS Charging Identifier (ICID) definition - Align with 32.260	A	7.3.0	7.4.0
Sep 2007	SP-37	SP-070619	0077	--	Add Service-Specific-Info AVP to be used for extended packet inspection beyond 5 tuple - Align with 23.203	C	7.4.0	8.0.0
Mar 2008	SP-39	SP-080059	0081	1	Add CDR fields for IBCF	B	8.0.0	8.1.0
Mar 2008	SP-39	SP-080074	0082	--	Add on Number Portability and Carrier Select routing information	B	8.0.0	8.1.0
Jun 2008	SP-40	SP-080330	0083	--	Add PoC Event Type into PoC CDR	B	8.1.0	8.2.0
Dec 2008	SP-42	SP-080841	0087	-	Correction on QoS IE length	A	8.2.0	8.3.0
Dec 2008	SP-42	SP-080706	0088	-	Correction on ASN.1	F	8.2.0	8.3.0
Dec 2008	SP-42	SP-080852	0084	-	CDR definitions for EPC Charging	B	8.2.0	8.3.0
Dec 2008	SP-42	SP-080706	0089	-	Addition of SDP offer and answer and clarification on media initiator	B	8.2.0	8.3.0
Dec 2008	SP-42	SP-080852	0085	-	CDR definitions for EPC Charging	B	8.2.0	8.3.0
Dec 2008	SP-42	SP-080707	0090	-	Service level CDR parameters for MMTel	B	8.4.0	8.3.0
Dec 2008	SP-42	SP-080706	0091	-	Clarification on EPC Charging	B	8.2.0	8.3.0
Mar 2009	SP-43	SP-090206	0092	-	TS 32.298 Correction on Record type values	F	8.3.0	8.4.0
Mar 2009	SP-43	SP-090203	0093	-	TS 32.298 MMTel CDR description	B	8.3.0	8.4.0
Mar 2009	SP-43	SP-090206	0094	-	Alignment of CDR fields with TS 32251 for EPC Charging	C	8.3.0	8.4.0

History

Document history		
V8.3.0	January 2009	Publication
V8.4.0	April 2009	Publication