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**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Charging management;
Charging Data Record (CDR) parameter description
(3GPP TS 32.298 version 16.6.1 Release 16)**

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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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:

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1 Scope

The present document is part of a series of Technical Specifications (TSs) that specify charging functionality and charging management in 3GPP networks. 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 and converged charging);
- the content of real-time charging events per domain/subsystem (online and converged charging);
- the functionality of online, offline and converged 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 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. 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 [52]. Further details with respect to internal functions of the operator's Billing Domain are out of scope of 3GPP standardisation.

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

- The common 3GPP charging architecture is specified in TS 32.240 [1].
- A transaction based mechanism for the transfer of CDRs within the network is specified in TS 32.295 [54].
- The file based mechanism used to transfer the CDRs from the network to the operator's billing domain (e.g. the billing system or a mediation device) is specified in TS 32.297 [52].
- The 3GPP Diameter applications used for offline and online charging are specified in TS 32.299 [50].
- The services, operations and procedures of charging, using Service Based Interface are specified in TS 32.290 [57].
- The charging service of 5G system is specified in TS 32.291 [58].

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 [100]. 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 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] Void.

[13] 3GPP TS 32.253: "Telecommunication management; Charging management; Control Plane (CP) data transfer domain charging".

[14] 3GPP TS 32.254: "Telecommunication management; Charging management; Exposure function Northbound Application Program Interfaces (APIs) charging ".

[15] 3GPP TS 32.255: "Telecommunication management; Charging management; 5G Data connectivity domain charging; stage 2".

[16] 3GPP TS 32.256: "Telecommunication management; Charging management; 5G connection and mobility domain charging; stage 2".

[17] - [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] 3GPP TS 32.274: "Telecommunication management; Charging management; Short Message Service (SMS) charging".

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

[36] Void.

[37] 3GPP TS 32.277: "Telecommunication management; Charging management; Proximity-based Services (ProSe) charging".

[38] 3GPP TS 32.278: "Telecommunication management; Charging management; Monitoring Event charging".

[39] void

[40] 3GPP TS 32.280: "Telecommunication management; Charging management; Advice of Charge (AoC) service".

[41] - [49] Void.

[50] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging application".

[51] Void.

[52] 3GPP TS 32.297: "Telecommunication management; Charging management; Charging Data Records (CDR) file format and transfer".

[53] - [56] Void.

[57] 3GPP TS 32.290: "Telecommunication management; Charging management; 5G system; Services, operations and procedures of charging using Service Based Interface (SBI)".

[58] 3GPP TS 32.291: "Telecommunication management; Charging management; 5G system; Charging service, stage 3".

[59]- [69] Void.

[70] 3GPP TS 28.201: "Charging management; Network slice performance and analytics charging in the 5G System (5GS); Stage 2".

[71] 3GPP TS 28.202: "Charging management; Network slice management charging in the 5G System (5GS); Stage 2".

[72]- [99] Void.

[100] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[101] 3GPP TS 22.115: "Service aspects; Charging and billing".

[102] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[103] 3GPP TS 22.004: "General on supplementary services".

[104] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[105] – [199] void

[200] 3GPP TS 23.003: "Numbering, Addressing and Identification".

[201] 3GPP TS 23.040: "Technical realization of Short Message Service (SMS)".

[202] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[203] 3GPP TS 23.203: "Policy and Charging control architecture".

[204] 3GPP TS 23.207: "End-to-end Quality of Service (QoS) concept and architecture".

[205] Void.

[206] 3GPP TS 23.140: "Multimedia Messaging Service (MMS); Functional description; Stage 2".

[207] 3GPP TS 23.172: "Technical realization of Circuit Switched (CS) multimedia service; UDI/RDI fallback and service modification; Stage 2".

[208] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[209] 3GPP TS 24.080: "Mobile radio Layer 3 supplementary service specification; Formats and coding".

[210] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[211] 3GPP TS 24.604: "Communication Diversion (CDIV) using IP Multimedia (IM); Protocol specification".

[212] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[213] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[214] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[215] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[216] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[217] 3GPP TS 29.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification".

[218] 3GPP TS 29.140: "Multimedia Messaging Service (MMS); MM10 interface Diameter based protocol; Stage 3".

[219] 3GPP TS 29.207: "Policy control over Go interface".

[220] 3GPP TS 29.212: "Policy and Charging control over Gx reference point".

[221] 3GPP TS 29.214: "Policy and Charging Control; Reference points".

[222] 3GPP TS 29.272: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[223] 3GPP TS 29.274: "Evolved GPRS Tunnelling Protocol for Control Plane (GTPv2-C); Stage 3".

[224] 3GPP TS 29.275: " Proxy Mobile IPv6 (PMIPv6) based Mobility and Tunnelling protocols; Stage 3".

[225] 3GPP TS 29.658: "SIP Transfer of IP Multimedia Service Tariff Information".

[226] 3GPP TS 36.413 "Evolved Universal Terrestrial Radio Access (E-UTRA); S1 Application Protocol (S1AP)".

[227] 3GPP TS 49.031: "Location Services (LCS); Base Station System Application Part LCS Extension (BSSAP-LE)".

[228] 3GPP TS 32.015: "Telecommunication management; Charging management; Charging data description for the Packet Switched (PS) domain".

[229] 3GPP TS 23.292: "IP Multimedia Subsystem (IMS) Centralized Services".

[230] 3GPP TS 29.338: "Diameter based protocols to support SMS capable MMEs".

[231] 3GPP TS 29.337: "Diameter-based T4 interface for communications with packet data networks and applications".

[232] 3GPP TS 29.229: "Cx and Dx Interfaces based on the Diameter protocol; Protocol Details".

[233] 3GPP TS 29.520: "5G System; Network Data Analytics Services;Stage 3".

[234] void

[235] 3GPP TS 23.303: "Proximity-based services (ProSe)".

[236] 3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects".

[237] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[238] - [240] Void.

[241] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[242] 3GPP TS 29.328: "IP Multimedia (IM) Subsystem Sh Interface; Signalling flows and message contents".

[243] 3GPP TS 23.682: "Architecture enhancements to facilitate communications with packet data networks and applications".

[244] 3GPP TS 29.128: "Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) interfaces for interworking with packet data networks and applications".

[245] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[246] 3GPP TS 23.503:"Policy and Charging Control Framework for the 5G System; Stage 2".

[247] 3GPP TS 23.501:"System Architecture for the 5G System".

[248] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[249] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[250] 3GPP TS 29.502: "5G System; Session Management Services; Stage 3".

[251] 3GPP TS 29.512: "5G System; Session Management Policy Control Service; Stage 3".

[252] - [253] Void

[254] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[255] - [299] Void

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

[301] 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)".

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

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

[304] ITU-T Recommendation X.711 CMIP:"Information technology – Open Systems Interconnection – Common Management Information Protocol".

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

[306] ITU-T Recommendation X.227 ACSE: " Information technology - Open Systems Interconnection – Connection-oriented protocol for the Association Control Service Element: Protocol specification ".

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

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

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

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

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

[312] ETSI GSM 05.01: "Digital Cellular Telecommunications System (Phase 2+); Physical Layer on the Radio Path; General Description".

[313] ETSI GSM 08.08: "European Digital Cellular Telecommunication System (Phase 2); Mobile-Services Switching Centre - Base Station System (MSC - BSS) Interface Layer 3 Specification".

[314] ETSI TS 283 034 v2.2.0: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol".

[315] ITU-T Recommendation X.121: " International numbering plan for public data networks ".

[316] – [399] void

[400] IETF RFC 822 (1982): "Standard for the format of arpa internet text messages".

[401] IETF RFC 3261(2002): "SIP: Session Initiation Protocol".

[402] IETF RFC 3966 (2004): "The tel URI for Telephone Numbers".

[403] IETF RFC 3265 (2002): "Session Initiation Protocol (SIP)-Specific Event Notification".

[404] IETF RFC 7315 (2014): "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)".

[405] IETF RFC 2486 (1999): "The Network Access Identifier".

[406] IETF RFC 4566 (2006): "SDP: Session Description Protocol".

[407] IETF RFC 5031 (2008): "A Uniform Resource Name (URN) for Emergency and Other Well-Known Services".

[408] IEEE Std 802.11-2012: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

[409] IETF RFC 4776 (2006): "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information".

[410] IETF RFC 4122 (200): "A Universally Unique IDentifier (UUID) URN Namespace".

[411] – [600] void

[601] Broadband Forum TR-134: "Broadband Policy Control Framework (BPCF)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [100], 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 is 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.

3.2 Symbols

For the purposes of the present document, the following symbols as specified in TR 21.905 [100], TS 32.240 [1], TS 32.297 [52], TS 23.060 [202] and the following apply:

Bx	The Interface between a Charging Gateway Function (CGF) and the Billing Domain (BD)
Bns	Reference point for the CDR file transfer from the Network slice CGF to the 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 abbreviations given in TR 21.905 [100] and the following apply.
An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [100].

5GS	5G System
3GPP	3rd Generation Partnership Project
ADC	Application Detection and Control
ATSSS	Access Traffic Steering, Switching, Splitting
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
CIoT	Cellular Internet of Things
CP	Control Plane
CPCN	Control Plane data transfer Charging Node (MME, SCEF, IWK-SCEF)
CSG	Closed Subscriber Group
CSG ID	Closed Subscriber Group Identity
CTF	Charging Trigger Function

FBC	Flow Based Charging
GPRS	General Packet Radio Service
ISC	IMS Service Control
IM	IP Multimedia
IMS	IM Subsystem
IMS-AGW	IMS Access Media Gateway
ISO	International Organisation for Standardisation
ITU	International Telecommunication Union
IP	Internet Protocol
IWK-SCEF	Interworking SCEF
LAN	Local Area Network
LCS	LoCation Service
MCC	Mobile Country Code
MME	Mobility Management Entity
MMS	Multimedia Messaging Service
MMTEL	MultiMedia Telephony
MNC	Mobile Network Code
NetLoc	Network provided Location information
NIDD	Non-IP Data Delivery
NNI	Network to Network Interface
PCN	Packet switched Core network Node (SGSN, S–GW, P–GW, TDF)
PER	Packed Encoding Rules
P-GW	PDN GateWay
PCC	Policy and Charging Control
PLMN	Public Land Mobile Network
PS	Packet Switched
QBC	QoS flow Based Charging
RG	Residential Gateway
RDI	Restricted Digital Information
S-GW	Serving GateWay
SCUDIF	Service Change and UDI/RDI Fallback
SMF	Session Management Function
SMS	Short Message Service
TDF	Traffic Detection Function
TrGW	Transition GateWay
UDI	Unrestricted Digital Information
TWAG	Trusted WLAN Access Gateway
TWAN	Trusted WLAN Access Network
UMTS	Universal Mobile Telecommunications System
UWAN	Untrusted Wireless Access Network
WLAN	Wireless LAN
XER	XML Encoding Rules
XML	eXtensible Mark-up Language

4 Architecture considerations

TS 32.240 [1] specifies the high level common 3GPP charging architecture as well as more detailed architectures,that are relevant for the present document:

- Figure 4.3.1.0.1: Logical ubiquitous offline charging architecture.
- Figure 4.3.3.0.1: Logical ubiquitous converged 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.

5 CDR parameters and abstract syntax

5.0 General

This clause specifies the parameters and the abstract syntax of the CDRs defined for 3GPP charging management in the set of domain TSs 32.25x (CS, PS, 5GS), subsystem TSs 32.26x (IMS) and service TSs 32.27x (MMS, LCS, PoC, MBMS, SMS, MMTel etc.). In doing this, the ASN.1 specified by X.680 [300] is utilized 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 clauses that contain generic, bearer level, service level, and subsystem level CDR parameters and abstract syntax definitions. The converged charging CHF-CDR is described under one clause encompassing NF specific parts. 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

5.1.1 Generic CDR parameters

5.1.1.0 Introduction

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.

5.1.1.1.0A 3GPP PS Data Off Status

This field holds the Status of UE’s 3GPP PS Data Off.

5.1.1.1.0B Data volume octets

This field includes the number of octet transmitted during the use of data services.

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 [215].

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 [50].

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] if applicable.

This field may hold the 5G Subscription Permanent Identifier (SUPI) of the served party (e.g., IMSI, NAI, GLI, GCI) as specified in TS 29.571 [249], if applicable.

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 or TDF only for pre-defined ADC 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.

5.1.1.7 Subscriber Equipment Number

The Subscriber Equipment Number field contains the identification of the mobile device that the subscriber is using.

5.1.2 Bearer level CDR parameters

5.1.2.0 General

This clause contains the description of the CDR parameters that are specific to the bearer level CDR types.
This comprizes 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]).

5.1.2.1 CS domain CDR parameters

5.1.2.1.0 Introduction

This clause 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 [104].

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 [214].

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.

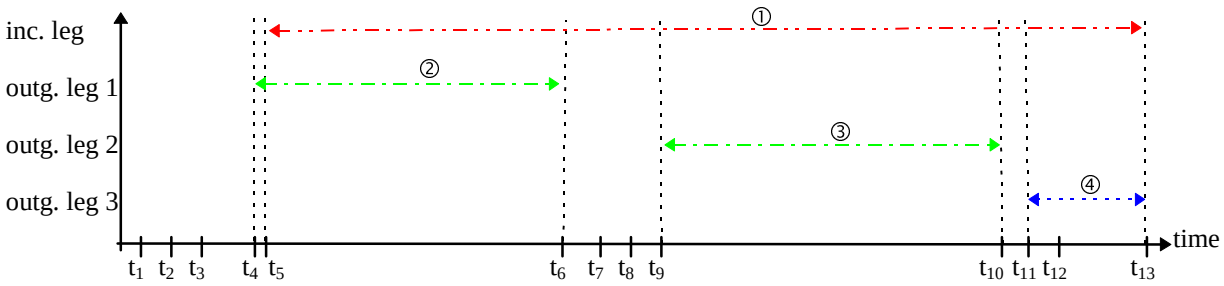
2) The same method of truncation/rounding shall be applied to both single and partial records.

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 5.1.2.1.4.1. 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 5.1.2.1.4.1: 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 [208]. 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 Recommendation E.164 [308] number but may also include other numbering plans e.g. ITU-T Recommendation X.121 [315]. Each of these fields includes the type of number and number plan as specified in detail in TS 24.008 [208]. Where appropriate, these fields may also contain the presentation and screening information also specified in TS 24.008 [208].

The called number is the number received from the mobile station on mobile originated call set-up as defined in TS 24.008 [208]. 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 [208]. 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.

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 [214];
- a Cause from TS 24.008 [208];
- a Cause from TS 29.078 [217];
- a Cause from ITU-T Recommendation Q.767 [309];
- a LCS diagnostics according TS 29.002 [214].

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 [214].

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 [214].

5.1.2.1.21 Entity number

This field contains the Recommendation E.164 [308] 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 [200].

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 [102]. In GSM, this parameter is part of the HSCSD connection parameters, see clause 5.1.2.1. 30.

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 [217]. 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 [213]. 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 TS 22.002 [102].

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 [214]).

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 [227].

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 [214].

5.1.2.1.41 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [227]

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 [227].

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 [208].

For SMS over SGs (defined in TS 36.413 [226]), the LAC field contains the Tracking Area Code and the Cell Identity contains the 16 least significant bits.

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 [214].

5.1.2.1.46 Location Extension

The Location Externsion field contains the 12 most significant bits from the Cell Identity field. This is used when SMS over SGs (defined in TS 36.413 [226]) is applied and the access is E-UTRAN.

5.1.2.1.47 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.

5.1.2.1.48 Location Type

This field contains the type of the location as defined in TS 29.002 [214].

5.1.2.1.49 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.

5.1.2.1.50 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.

5.1.2.1.51 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 [213]. 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 [102]. 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).

5.1.2.1.52 Measure Duration

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

5.1.2.1.53 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 [201].

5.1.2.1.54 MLC Number

This parameter refers to the ISDN (E.164[308]) number of an MLC.

5.1.2.1.55 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 [208] (see mobile station classmark 2, mobile station classmark 3). 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.

5.1.2.1.56 MOLR Type

The MOLR-Type identifier refers to the type of MO-LR that was invoked as defined in TS 24.080 [209].

5.1.2.1.57 MSC Address

This field contains the Recommendation E.164 [308] number assigned to the MSC that produced the record. For further details concerning the structure of MSC numbers see TS 23.003 [200].

5.1.2.1.58 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.

5.1.2.1.59 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.

5.1.2.1.60 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 [214].

5.1.2.1.61 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.

5.1.2.1.62 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 [214].

5.1.2.1.63 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 and MCC+MNC, with identity of the cell or the SAC for new location. In case of HLR location update the field contains the VMSC number and the VLR number.

5.1.2.1.64 Partial Record Type

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

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 [227].

5.1.2.1.66 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 [227].

5.1.2.1.67 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 [214].

5.1.2.1.68 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 via CR change to 45.001 [312]. 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.

5.1.2.1.69 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 [208].

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 [208];
- Bits 2-3: the Other Rate Adaptation field as defined in TS 24.008 [208];
- Bits 4-7: not used.

5.1.2.1.70 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 TS 23.172 [207].

5.1.2.1.71 Record extensions

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

5.1.2.1.72 Record type

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

5.1.2.1.73 Recording Entity

This field contains the E.164 [308] 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 [200].

5.1.2.1.74 Redial attempt

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

5.1.2.1.74A Related ICID

This field contains the related IMS Charging ID for the IMS call leg in case of SRVCC as received from IMS domain.

5.1.2.1.75 Roaming number

The roaming number field contains the mobile station roaming number as defined in TS 23.003 [200] and coded according to TS 29.002 [214].

5.1.2.1.76 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.

5.1.2.1.77 Sequence number

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

5.1.2.1.78 Served IMEI

This fields contains the international mobile equipment identity (IMEI) or IMEISV 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, IMEISV is specified in TS 23.003 [200] and the encoding defined in TS 29.274 [223].

5.1.2.1.79 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 [200].

5.1.2.1.80 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 [200].

5.1.2.1.81 Service centre address

This field contains a Recommendation E.164 [308] number identifying a particular service centre e.g. short message service centre (see TS 23.040 [201]).

5.1.2.1.82 Service Change Initiator

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

5.1.2.1.83 Service key

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

5.1.2.1.84 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 [214]). Note that this field is only provided if the attempted delivery was unsuccessful.

5.1.2.1.85 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 [313] 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.

5.1.2.1.86 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 [214].

5.1.2.1.87 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 [103].

5.1.2.1.88 Supplementary service action result

This field contains the result of an attempted supplementary service action (see TS 29.002 [214]). Note that this field is only provided if the SS-action was at least partially unsuccessful.

5.1.2.1.89 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.

5.1.2.1.90 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 [214].

5.1.2.1.91 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.

5.1.2.1.92 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.

5.1.2.1.93 Update result

This field contains the result of the location update request as defined in the MAP (TS 29.002 [214]). Note that this field is only provided if the attempted update was unsuccessful.

5.1.2.2 PS domain CDR parameters

5.1.2.2.A Introduction

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.B Void

5.1.2.2.0 3GPP2 User Location Information

This field holds the 3GPP2 User Location Information. It contains the 3GPP2-BSID as described in TS 29.212 [220].

The parameter is provided to the PGW/TDF during IP-CAN/TDF session establishment/modification, through PCC procedures for non-3GPP Accesses, as defined in the TS 23.203 [203].

5.1.2.2.0aA Access Availability Change Reason

This field indicates the reason why the availability of an access is changed by the PCEF, i.e. RAN rule indication or Access usable/unusable as defined in TS 29.212 [220].

5.1.2.2.0A Access Line Identifier

This field contains the Access line id (physical and logical circuit ID) serving the 3GPP UE or fixed user (i.e. Fixed device or RG).

This field contains the Access line id (physical and logical circuit ID):

- serving the 3GPP UE or fixed device, behind the RG when in bridge mode or in routed mode without NAT, or
- of the RG when in routed mode with NAT;
- of the access point to which the UE is attached, in trusted or untrusted WLAN.

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 [200], 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 [200]. 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 TS 23.003 [200] and TS 23.060 [202] for more information about APN format and access point decision rules.

5.1.2.2.1A APN Rate Control

This field contains the APN Rate Control as specified in TS 23.401 [245], which is used during the record for the PDN connection to the PGW.

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 TS 29.060 [215] for GTP case and in TS 29.274 [223] 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 TS 29.078 [217]. 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. In case of Rf interface is used, it is derived from Change-Condition AVP at PS-information AVP level defined in TS 32.299 [40], when received. The following is included:

- normal release: IP-CAN bearer release or detach, TDF session release, IP-CAN session release for IP-Edge; It corresponds to "Normal Release" in Change-Condition AVP.

- data volume limit; It corresponds to "Volume Limit" in Change-Condition AVP.

- time (duration) limit; It corresponds to "Time Limit" in Change-Condition AVP.

- maximum number of changes in charging conditions; It corresponds to "Max Number of Changes in Charging conditions " in Change-Condition AVP.

- For SGSN: intra SGSN intersystem change (change of radio interface from GSM to UMTS or vice versa);
- For P-GW, TDF and S-GW: Radio Access Technology (RAT) change; It corresponds to "RAT Change" in Change-Condition AVP.
- abnormal termination (IP-CAN bearer or MM context or TDF session, or IP-CAN session); It corresponds to "Abnormal Release" in Change-Condition AVP.
- For SGSN: SGSN change;
- For S-GW, ePDG, TWAG: S-GW change; It corresponds to "S-GW Change" in Change-Condition AVP and is used for inter serving node change of all types.
- Timezone change; It corresponds to "UE TimeZone Change" in Change-Condition AVP.
- SGSN or S-GW PLMN change; It corresponds to "Serving Node PLMN Change" in Change-Condition AVP.
- For P-GW: APN-AMBR change: It corresponds to "Qos Change" in Change-Condition AVP.
- For S-GW, P-GW: MO exception data counter receipt: It corresponds to " MO exception data counter receipt" in Change-Condition AVP.
- 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); It corresponds to "Management Intervention" in Change-Condition AVP;
- VoLTE bearer normal release: It corresponds to "VoLTE Bearer Normal Release" in Change-Condition AVP.
- VoLTE bearer abnormal release: It corresponds to "VoLTE Bearer Abnormal Release" in Change-Condition AVP.A more detailed reason may be found in the diagnostics field or Enhanced Diagnostics field.

5.1.2.2.6 Cell Identifier

For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008 [208], and for UMTS it is defined as the Service Area Code in TS 25.413 [212].

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 according to the rules specified in Annex A of TS 32.251 [11].

Charging Characteristics used by IP-Edge [PCEF] or TDF in Convergent Fixed-Mobile Operator scenario are always configured in IP-Edge [PCEF] or TDF respectively, as described in annex D of TS 32.251 [11].

This information can be used by the PCNs/ IP-Edge [PCEF] to activate charging generation and e.g. control the closure of the CDR or the traffic volume containers (see clause 5.1.2.2.25) 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 are further defined in normative Annex A of TS 32.251 [11], including an example for the definitions of the trigger profiles associated with each CDR type.

The format of charging characteristics field is depicted in Figure 4. Each Bx (x =0..15) refers to a specific behaviour defined on a per-Operator basis, indicated as active when set to "1" value. See Annex A of TS 32.251 [11] for guidance on how behaviours could be defined.

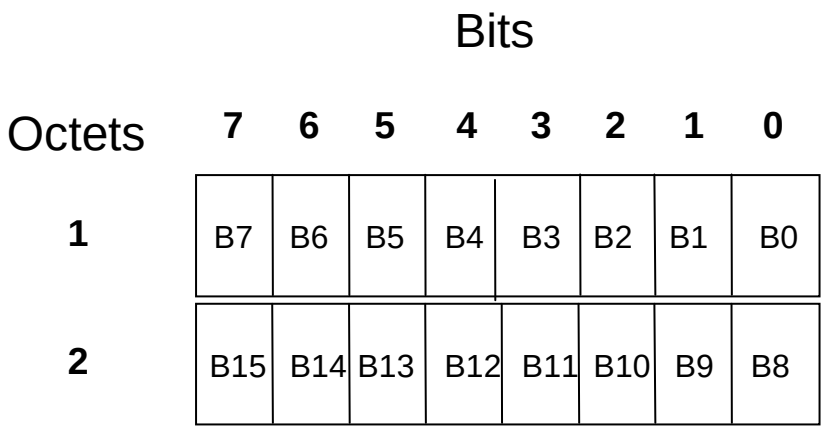


Figure 5.1.2.2.7.1: Charging Characteristics flags

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/TDF 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.

In the IP-Edge [PCEF] and TDF in Convergent Fixed-Mobile Operator scenario, the allowed values are:

- Home default;
- Visiting default;
- Fixed default;

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

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.

In case of PMIP-based connectivity, the Charging Id is generated per PDN connection.

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.

5.1.2.2.9A CN Operator Selection Entity

This field defines which entity (UE or Network) has selected the Serving Core Network in Network Sharing situations.

5.1.2.2.9Aa CP CIoT EPS Optimisation Indicator

This field contains the indication on whether Control Plane CIoT EPS optimisation is used by the PDN connection during data transfer with the UE (i.e. Control Plane NAS PDU viaS11-U between SGW andMME) or not (i.e. User Plane via S1-U between SGW and eNB).

5.1.2.2.9B Charging per IP-CAN Session Indicator

This field indicates whether charging per IP-CAN session is active or not.

5.1.2.2.10 Destination Number

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

5.1.2.2.11 Diagnostics

This field includes a more detailed technical reason for the releases of the connection.
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), IP-CAN session (IPE-CDR), and attachment (M-CDR). In case of TDF-CDR, this field contains the relevant duration in seconds for TDF session.

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.

5.1.2.2.13A Dynamic Address Flag Extension

This field indicates that the IPv4 address has been dynamically allocated for that particular IP-CAN bearer (PDN connection) of PDN type IPv4v6, and the dynamic IPv6 prefix is indicated in Dynamic Address Flag. This field is missing if IPv4 address is static. Dynamic address allocation might be relevant for charging e.g. as one resource offered and possible owned by network operator.

5.1.2.2.13Aa Enhanced Diagnostics

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

- RAN/NAS cause from TS 29.274 [223];

NOTE: The Enhanced Diagnostics is defined to allow extensions to other types of release causes in the future.

5.1.2.2.13B EPC QoS Information

This field contains the APN-AMBR for the IP-CAN session. It is used in the PGW-CDR only when charging per IP-CAN session is active.

5.1.2.2.13C ePDG Address Used

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

5.1.2.2.13D ePDG IPv6 Address

This field is the serving ePDG IPv6 Address for the Control Plane, when both IPv4 and IPv6 addresses of the ePDG are available.

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 Void

5.1.2.2.15A Fixed User Location Information

This field contains the UE location in a fixed broadband access network. The location of the subscriber may include Access line id (physical and logical circuit ID) defined in ETSI TS 283 034 [314], SSID and BSSID of the Access Point, defined in IEEE Std 802.11-2012 [408].

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.

5.1.2.2.16A Void

(Void)

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).

5.1.2.2.18 IMSI Unauthenticated Flag

This field indicates that provided "Served IMSI" is not authenticated, and relates to an emergency bearer established with IMSI as identifier (refer to TS 23.060 [202] and TS 29.274 [223]). This field is missing if IMSI is authenticated, or if IMSI is not provided as identifier.

5.1.2.2.18A IP-CAN session Type

This field defines the IP-CAN session type, e.g. IP, or PPP. PDP type format is used: See TS 29.060 [215].

5.1.2.2.18B IP-Edge Address IPv6

This field is the IP-Edge IPv6 Address used for the Control Plane, when both IPv4 and IPv6 addresses of the IP-Edge are available.

5.1.2.2.18C IP-Edge Address Used

This field is the IP-Edge IP Address used for the Control Plane. If both an IPv4 and an IPv6 addresses of the IP-Edge are available, the field shall include the IPv4 address.

5.1.2.2.18D IP-Edge Operator Identifier

This field is the PMLN Identifier (Mobile Country Code and Mobile Network Code) of the Convergent Fixed-Mobile Operator owning the IP-Edge located in Fixed Broadband Access.

The MCC and MNC are coded as described for "User Location Info" in TS 29.274 [223].

5.1.2.2.18E Last MS Time Zone

This field contains the "Time Zone" provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer deactivation. It is derived from 3GPP-MS-TimeZone AVP provided within PS-Information AVP, both defined in TS 32.299 [50], when received on Rf closure.

5.1.2.2.18F Last User Location Information

This field contains the User Location Information as described in clause in 5.1.2.2.75.

The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer deactivation. It is derived from 3GPP-User-Location-Info AVP provided at PS-Information AVP level, both defined in TS 32.299 [50], when received on Rf closure.

5.1.2.2.19 LCS Cause

The LCS Cause parameter provides the reason for an unsuccessful location request according TS 49.031 [227].

5.1.2.2.20 LCS Client Identity

This field contains further information on the LCS Client identity:

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

5.1.2.2.21 LCS Client Type

This field contains the type of the LCS Client as defined in TS 29.002 [214].

5.1.2.2.22 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [227].

5.1.2.2.23 LCS QoS

This information element defines the Quality of Service for a location request as defined in TS 49.031 [227].

5.1.2.2.23A List of RAN Secondary RAT Usage Reports

This list applicable in SGW-CDR and PGW-CDR, includes one or more containers reported from the RAN for a secondary RAT.

Each container includes the following fields:

- **Data Volume Uplink, Data Volume Downlink, Start Time, End Time and Secondary RAT Type.**
- **Data Volume Uplink** includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The counting and reporting from RAN of uplink data volumes is optional.
- **Data Volume Downlink** includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.
- **RAN Start Time** is a time stamp, which defines the moment when the volume container is opened by the RAN.
- **RAN End Time** is a time stamp, which defines the moment when the volume container is closed by the RAN.
- **Secondary RAT Type** This field contains the RAT type for the secondary RAT.
- **Charging ID** This field contains the Charging ID of the bearer corresponding to the reported usage. Only needed if IP-CAN session level charging is applied.

5.1.2.2.24 List of Service Data

This list includes one or more service data containers. Depending on the reporting level of PCC/ADC 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.
- ADC Rule Base Name.
- Data Volume Downlink.
- Data Volume Uplink.
- Event Based Charging Information.
- Local Sequence Number.
- PS Furnish Charging Information.
- EPC 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.
- 3GPP2 User Location Information.
- UWAN User Location Information.
- TWAN User Location Information.
- Sponsor Identity.
- Application Service Provider Identity.
- Presence Reporting Area Status.
- List of Presence Reporting Area Information.
- User CSG Information.
- RAT Type.
- Serving PLMN Rate Control.
- APN Rate Control.
- Related Change of Service Condition.
- Traffic Steering Policy Identifier Downlink.
- Traffic Steering Policy Identifier Uplink.
- VoLTE 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 [203].
- **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 [220]. In case multiple Charging Rule Base Names activate PCC rules, which usage is reported within this service data container, the P-GW/IPE-CDR shall include only one occurrence to the service data container.
- **ADC Rule Base Name** is the reference to group of ADC rules predefined at the TDF. This field is included if any of the ADC rules, which usage is reported within this service data container, was activated by using the ADC Rule Base Name as specified in TS 29.212 [220]. In case multiple ADC Rule Base Names activate ADC rules, which usage is reported within this service data container, the TDF 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/TDF session.

- **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 [50].

- **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 [50] 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, user CSG information change), access change of service data flow, indirect service condition change, service usage thresholds, service idled out, termination or failure handling procedure. When one of the "CGI/SAI, ECGI or TAI or RAI Change" are reported as user location change, the dedicated value in service Condition Change is set instead of the generic "user location change" value. This field is specified as bitmask for support of multiple change trigger (e.g. S-GW and QoS change). This field is derived from Change-Condition AVP at Service-Data-Container AVP level defined in TS 32.299 [50] when received on Rf. Each value is mapped to the corresponding value in "ServiceConditionChange" field. When simultaneous change triggers are met, multiple Change-Condition values are set in field bitmask.When no Change-Condition AVP is provided, the "recordClosure" value is set for the service data container. 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.

- **EPC 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 EPC QoS information is present if previous change condition is "QoS change". The P-GW/TDF/IPE-CDR shall include only one EPC 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. The amount of data counted in P-GW shall be as specified in clauses 5.2.1.10.1, 5.3.1.1 and 5.3.1.6.1 of TS 32.251 [11]. The amount of data counted in TDF shall be based on full payload of the data transferred. The amount of data counted in IP-Edge shall be based on full payload of the data transferred.

- **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" or one of the "CGI/SAI, ECGI or TAI or RAI Change". Note the user location information in PGW-CDR/TDF-CDR main level contains the location where the UE was when PGW-CDR/TDF-CDR was opened, and the "Last user location information" in PGW-CDR main level contains the location where the UE was when PGW-CDR is closed.

- **Presence Reporting Area Status** contains the status of the UE presence (i.e. indication on whether the UE is inside or outside) in the Presence Reporting Area(s) identified by "Presence Reporting Area identifier(s)" contained in PGW-CDR main level. This is included in the service data container when the initial status is reported after opening of PGW-CDR, or if previous container’s change condition is "Presence in Presence Reporting Area Change". This field is not applicable in multiple PRA(s).

- **List of Presence Reporting Area Information** contains the list of Presence Reporting Area Information. Each Presence Reporting Area Information includes the "Presence Reporting Area identifier", the status of the UE

presence (i.e. indication on whether the UE is inside or outside the Presence Reporting Area or Presence Reporting Area(s) inactive), and the Node (PCRF, OCS) which subscribed-to the PRA.

- **3GPP2 User Location Information** contains the 3GPP2 user location (i.e. 3GPP2-BSID: Cell-Id, SID, NID) 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 "3GPP2 user location information" in PGW-CDR/TDF-CDR main level contains the location where the UE was when PGW-CDR/TDF-CDR was opened.

- **UWAN User Location Information** contains the Untrusted Wireless Access Network (UWAN) user location 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.

- **TWAN User Location Information** contains the user location in a Trusted WLAN Access Network 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/TDF-CDR main level contains the location where the UE was when PGW-CDR/TDF-CDR was opened.

- **User CSG information** contains the status of the user accessing a CSG cell (CSG ID within the PLMN, Access mode and indication on CSG membership) during the service data container recording interval. This is included in the service data container only if previous container's change condition is "user CSG information change". Note the "user CSG information" in PGW-CDR main level contains the "user CSG information" 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 [220]. In case usage of PCC rules, which usage is reported within the container, has different AF-Record-Information then the P-GW shall include all occurrences 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 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 or a predefined ADC rule that is used for enhanced packet filtering.

- **Sponsor Identity** identifies the sponsor willing to pay for the operator's charge for connectivity.

- **Application Service Provider Identity** identifies application service provider that is delivering a service to an end user.

- **RAT Type** contains the RAT type for the IP-CAN bearer that is first reported for the Rating Group or Rating Group / Service Identifier in the container. If traffic from multiple bearers is included in the report for the container, only one field is included.

NOTE: Sponsor Identity and Application Service Provider Identity are not used together with Service Identification reporting. Furthermore, neither the Sponsor Identity nor Application Service Provider Identity is applicable to the TDF.

- **Related Change of Service Condition** indicates the reason a related container was closed when the current container is indirectly closed and the supplemental information for the event. This information is applicable when charging per IP-CAN session is active for a multi-access PDN connection.

- **Serving PLMN Rate Control** This field contains the Serving PLMN Rate Control applied by MME during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is included in the service data container only if previous container's change condition is "Serving PLMN Rate Control change ".

Note the Serving PLMN Rate Control field in PGW-CDR main level contains the Serving PLMN Rate Control when PGW-CDR was opened.

- **APN Rate Control** This field contains the APN Rate Control applied by PGW during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is included in the service data container only if previous container's change condition is "APN Rate Control change ". Note the APN Rate Control field in PGW-CDR main level contains the APN Rate Control when PGW-CDR was opened.

- **Traffic Steering Policy Identifier Downlink** This field contains the Traffic Steering Policy Identifier Downlink applied by PGW/ TDF during the service data container recording interval.

- **Traffic Steering Policy Identifier Uplink** This field contains the Traffic Steering Policy Identifier Uplink applied by PGW/TDF during the service data container recording interval.

- **VoLTE Information** This field contains the caller and callee Information of VoLTE. Caller Information of VoLTE is described in clause 5.1.3.1.24. Callee Information contains:

  - Called Party Address (described in clause 5.1.3.1.9).

  - Requested Party Address (described in clause 5.1.3.1.43).

- List of Called Asserted Identity (described in clause 5.1.3.1.23).

5.1.2.2.25 List of Traffic Data Volumes

This list applicable in S-CDR, SGW-CDR, IPE-CDR, ePDG-CDR and TWAG-CDR, includes one or more containers.

This list applicable in PGW-CDR when charging per IP-CAN session is active and IP-CAN bearer charging is being performed for the session.

In SGW-CDR, PGW-CDR, IPE-CDR, ePDG-CDR and TWAG-CDR, containers are per QCI/ARP pair. This means that if QoS control within one IP-CAN bearer is applicable in S-GW, P-GW, ePDG and TWAG, there can be several containers open at same time one per each applied QCI/ARP pair.

Each container 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. This field is derived from Change-Condition AVP Traffic-Data-Volumes AVP level defined in TS 32.299 [40] when received on Rf. Each value is mapped to the corresponding value in "ChangeCondition" field. When no Change-Condition AVP is provided, the "recordClosure" value is set for the container. For User Location Change, when one of the "CGI/SAI, ECGI or TAI or RAI Change" are reported as user location change, the dedicated value in service Condition Change is set instead of the generic "user location change" value.

- **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 SGW-CDR was opened, and the "Last user location information" in SGW-CDR main level contains the location where the UE was when SGW-CDR is closed.

- **UWAN User Location Information** contains the Untrusted Wireless Access Network (UWAN) user location during the transfer of the data volume captured by the container. 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 ePDG-CDR main level contains the location where the UE was when ePDG-CDR was opened.

- **TWAN User Location Information** contains the user location in a Trusted WLAN Access Network during the transfer of the data volume captured by the container. 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 TWAG-CDR main level contains the location where the UE was when TWAG-CDR was opened.

- **Presence Reporting Area Status** contains the status of the UE presence (i.e. indication on whether the UE is inside or outside) in the Presence Reporting Area(s) identified by "Presence Reporting Area identifier(s)" contained in SGW-CDR main level. This is included in the Traffic data container when the initial status is reported after opening of SGW-CDR, or if previous container's change condition is "Presence in Presence Reporting Area Change". This field is not applicable in multiple PRA(s).

- **List of Presence Reporting Area Information** contains the list of Presence Reporting Area Information. Each Presence Reporting Area Information includes the "Presence Reporting Area identifier", the status of the UE presence (i.e. indication on whether the UE is inside or outside the Presence Reporting Area or Presence Reporting Area(s) inactive). In the PGW it contains the Node (PCRF, OCS) which subscribed-to the PRA.

- **User CSG information** contains the status of the user accessing a CSG cell (CSG ID within the PLMN, Access mode and indication on CSG membership) during the transfer of the data volume captured by the container. This is included in the Traffic data container only if previous container's change condition is "user CSG information change". Note the "user CSG information" in S-CDR/SGW-CDR main level contains the "user CSG information" when S-CDR/SGW-CDR was opened.

- **EPC QoS Information** In case of IP-CAN bearer specific container this contains authorized QoS for the IP-CAN bearer. First container for each QCI/ARP pair includes this field. In following containers this field is present if previous change condition is "QoS change". This field is applicable only in SGW-CDR, PGW-CDR, IPE-CDR, ePDG-CDR, and TWAG-CDR.

In S-CDR first container includes following optional fields: QoS Requested 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 5.1.2.2.25.1 illustrates an example for S-CDR but same principles are applicable also for SGW-CDR, PGW-CDR, IPE-CDR, ePDG-CDR and TWAG-CDR. There are 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 5.1.2.2.25.1: Example list of traffic data volumes

QoS Requested = QoS1 QoS Negotiated = QoS1	QoS Requested = QoS2 (if requested by the MS) QoS Negotiated = QoS2	
Data Volume Uplink = 1 Data Volume Downlink = 2	Data Volume Uplink = 5 Data Volume Downlink = 6	Data Volume Uplink = 10 Data Volume Downlink = 3
Change Condition = QoS change Time Stamp = TIME1	Change Condition = Tariff change Time Stamp = TIME2	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 5.1.2.2.25.2 (tariff1 is used before and tariff2 after the tariff time change):

Table 5.1.2.2.25.2: Itemised list of total volume count corresponding to table 5.1.2.2.25.1

		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.

The following additional fields are applicable in the P-GW CDR when charging per IP-CAN session is active and IP-CAN bearer charging is being performed for the session:

- **Charging Id** In case of IP-CAN bearer specific container this contains the charging Id assigned to the bearer.
- **RAT Type** This field contains the RAT type for the current IP-CAN bearer.

- **Access Availability Change Reason** indicates the reason why the availability of an access is changed by the PCEF, i.e. RAN rule indication or Access usable/unusable as defined in TS 29.212 [220].

- **Related Change of Charging Condition** indicates the reason a related container was closed when the current container is indirectly closed and the supplemental information for the event. This information is applicable when charging per IP-CAN session is active for a multi-access PDN connection.

- **Diagnostics** In case of IP-CAN bearer specific container this contains the Diagnostics as per clause 5.1.2.2.11 associated to the bearer.

- **Enhanced Diagnostics** In case of IP-CAN bearer specific container this contains the Enhanced Diagnostics as per clause 5.1.2.2.13Aa associated to the bearer.

- **CP CIoT EPS optimisation indicator** This field contains the indication on whether Control Plane CIoT EPS optimisation is used for the transfer of the data volume captured by the container. This is included in the Traffic data container only if previous container's change condition is "change in user plane to UE". Note the CP CIoT EPS Optimisation indicator field in SGW-CDR main level contains the CP CIoT EPS optimisation indicator value when SGW-CDR was opened.

- **Serving PLMN Rate Control** This field contains the Serving PLMN Rate Control applied by MME during the transfer of the data volume captured by the container (applicable to the SGW-CDR and PGW-CDR). For the SGW-CDR this is included in the Traffic data container only if previous container's change condition is " Serving PLMN Rate Control change ". Note the Serving PLMN Rate Control field in SGW-CDR main level contains the Serving PLMN Rate Control when SGW-CDR was opened. For the PGW-CDR this is included when List of Traffic Data Volumes is present, charging per IP-CAN session is active and IP-CAN bearer charging is being performed for the session.

- **APN Rate Control** This field contains the APN Rate Control applied by PGW during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is included in the Traffic data container only if previous container's change condition is "APN Rate Control change ". Note the APN Rate Control field in PGW-CDR main level contains the APN Rate Control when PGW-CDR was opened.

5.1.2.2.26 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, TDF address, IP-Edge Address, Recording Entity).

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

5.1.2.2.27 Location Estimate

The Location Estimate field is providing an estimate of a geographic location of a target MS according to TS 29.002 [214].

5.1.2.2.28 Location Method

The Location Method identifier refers to the argument of LCS-MOLR that was invoked as defined in TS 24.080 [209].

5.1.2.2.29 Location Type

This field contains the type of the location as defined in TS 29.002 [214].

5.1.2.2.29A Low Priority Indicator

This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.

5.1.2.2.29B NBIFOM Mode

This field indicates the NBIFOM mode selected by PCRF for a multi-access PDN connection, i.e. UE initiated or Network initiated as defined in TS 29.212 [220].

5.1.2.2.29C NBIFOM Support

This field indicates that NBIFOM was requested by the UE, supported and accepted by the network for the IP-CAN session or if NBIFOM is not supported for the IP-CAN session as defined in TS 29.212 [220].

5.1.2.2.30 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.

5.1.2.2.31 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 TS 23.040 [201].

5.1.2.2.32 MLC Number

This parameter refers to the ISDN (ITU-T Rec. E.164 [308]) number of a GMLC.

5.1.2.2.32A MME Name

This field contains the Diameter Identity of the serving MME.

5.1.2.2.32B MME Realm

This field contains the Diameter Realm Identity of the serving MME.

5.1.2.2.33 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 TS 24.008 [208].

5.1.2.2.34 MS Time Zone

This field contains the 'Time Zone' IE provided by the SGSN/MME and transferred to the S-GW/P-GW/TDF during the IP-CAN bearer activation/modification procedure as specified in TS 29.060 [215] and in TS 29.212 [220].

5.1.2.2.35 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.

5.1.2.2.36 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.

5.1.2.2.37 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 [214].

5.1.2.2.37A Originating Address

This field is the Originating Address of the SME as defined in TS 23.040 [201].

5.1.2.2.37B P-GW Address IPv6

This field is the P-GW IPv6 Address used for the Control Plane, when both IPv4 and IPv6 addresses of the P-GW are available.

5.1.2.2.38 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.

5.1.2.2.39 P-GW PLMN Identifier

This field is the P-GW PMLN Identifier (Mobile Country Code and Mobile Network Code).

The MCC and MNC are coded as described for "User Location Info" in TS 29.274 [223].

5.1.2.2.40 PDN Connection Charging ID

This field defines the PDN connection (IP-CAN session) Charging identifier to identify different records belonging to same PDN connection. For a PDN connection that is limited to use one single access at a time this field includes Charging Id of first IP-CAN bearer activated. Together with P-GW address this uniquely identifies the PDN connection.

For application based charging by the TDF:

- In case of GTP based connectivity, an "EPS default bearer Charging Identifier"
- In case of PMIP based connectivity, an "unique Charging Id"

is assigned by the P-GW and transferred to the TDF via the PCRF for the TDF session.

5.1.2.2.41 PDP Type

This field defines the PDP type, e.g. IP, or PPP as per TS 29.060 [215] .

5.1.2.2.42 PDP/PDN Type

This field defines the bearer type, e.g. IP, or PPP as per TS 29.060 [215] .

5.1.2.2.42A PDP/PDN Type Extension

This field defines the PDN type as per TS 29.061 [216] for Non-IP PDN Type.

5.1.2.2.43 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 [227].

5.1.2.2.43A Presence Reporting Area Information

This field contains the Presence Reporting Area Information: Presence Reporting Area identifier(s) and the indication on whether the UE is inside or outside the Presence Reporting Area(s), as described in TS 29.274 [223].

5.1.2.2.44 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 [214].

5.1.2.2.45 PS Furnish Charging Information

This field includes following information elements for IP-CAN bearer (PGW-CDR) , for TDF session (TDF-CDR) , or for the IP-CAN session (IPE-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.

5.1.2.2.46 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 [228].

In all other cases, the applicable QoS attributes are defined in the "Quality of Service profile" in TS 23.060 [202], and their encoding in the CDR corresponds to the "Quality of Service profile" specified in TS 29.060 [215].

5.1.2.2.46A RAN End Time

This field contains the time when the RAN closes the volume container, and is available in the CDR for the secondary RAT.

5.1.2.2.46B RAN Start Time

This field contains the time when the RAN opens the volume container, and is available in the CDR for the secondary RAT.

5.1.2.2.47 RAT Type

Holds the value of RAT Type, as provided to S-GW and P-GW, specified in TS 29.061 [216] and also provided to the TDF as specified in TS 29.212 [220].

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

5.1.2.2.48 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 X.721 [305].
This is conditioned upon the existence of an extension.

5.1.2.2.49 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 TDF session is established, or IP-CAN session is established (IPE-CDR), or record opening time on subsequent partial records (see TS 32.250 [4] for exact format).

Record opening reason does not have a separate field. For SGW/PGW/TDF/IPE -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) or TDF session establishment (TDF-CDR) , or IP-CAN session establishment (IPE-CDR). For the S-CDR the field "SGSN change" also needs to be taken into account.

5.1.2.2.50 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, or IP-CAN session, or TDF session (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/TDF/IP-Edge (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).

5.1.2.2.51 Record Type

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

5.1.2.2.52 Recording Entity Number

This field contains the E.164 number assigned to the entity that produced the record. For further details see TS 23.003 [200].

5.1.2.2.52A Retransmission

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

5.1.2.2.53 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.

5.1.2.2.54 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 [208] and the SAC according TS 25.413 [212].

5.1.2.2.54A S-GW Address IPv6

This field is the S-GW IPv6 Address used for the Control Plane, when both IPv4 and IPv6 addresses of the S-GW are available.

5.1.2.2.55 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.

5.1.2.2.56 S-GW Change

This field is present only in the SGW-CDR ,ePDG-CDR or TWAG-CDR to indicate that this is the first record after an inter serving node change (change from SGW, ePDG, TWAG, HSGW).

5.1.2.2.56A Secondary RAT Type

Holds the value of Secondary RAT Type, as provided by the RAN.

The field is provided by the RAN and transferred to the S-GW/P-GW in the RAN Traffic Volume element.

5.1.2.2.57 Served 3GPP2 MEID

This field contains the Mobile Equipment Identity of the user's terminal in 3GPP2 access, and the content is defined in TS 29.272 [222].

5.1.2.2.57A Served Fixed Subscriber Id

This field contains the subscriber identity, as defined in Broadband Forum TR 134 [601], used by the Fixed User (i.e. Fixed Device or RG) for Subscriber IP session in fixed broadband access network.

5.1.2.2.58 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 specified in TS 23.003 [200] and the encoding defined in TS 29.274 [223].

5.1.2.2.58A SCS/AS Address

This field contains the Address of SCS/AS.

5.1.2.2.59 void

5.1.2.2.60 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 TS 23.003 [200].

5.1.2.2.60A Served IP-CAN session Address

This field contains the IP address for the IP-CAN session. This is a network layer address i.e. of type IPv4 address or IPv6 prefix. The address for each IP-CAN session type is allocated either temporarily or permanently (see "Dynamic Address Flag"). This parameter shall be present except when both the IP-CAN session type is PPP and dynamic address assignment is used.

5.1.2.2.60B Served IP-CAN session Address Extension

This field contains the IPv4 address for the IP-CAN session when dual-stack IPv4 IPv6 is used, and the IPv6 prefix is included in Served IP-CAN session Address or Served IP-CAN Address.

5.1.2.2.61 Served MN NAI

This field contains the Mobile identifier of the served user, in NAI format based on IMSI, as defined TS 23.003 [200].

5.1.2.2.62 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 TS 23.003 [200].

5.1.2.2.63 Served PDP Address

This field contains the PDP address of the served IMSI. This is a network layer address i.e. of type IPv4 address or IPv6 prefix. 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.

5.1.2.2.64 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 IPv4 address or IPv6 prefix. 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.

5.1.2.2.64A Served PDP/PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4 IPv6 is used, and the IPv6 prefix is included in Served PDP Address or Served PDP/PDN Address.

5.1.2.2.64B Served PDP/PDN Address prefix length

This field contains the prefix length of an IPv6 typed Served PDP/PDN Address. The field needs not available for prefix length of 64 bits, as in this case the 64 bit prefix length default shall be assumed.

5.1.2.2.65 Service Centre Address

This field contains a E.164 number identifying a particular service centre e.g. Short Message Service (SMS) centre (see TS 23.040 [201]).

5.1.2.2.66 Serving Node Address

These fields contain one or several control plane IP addresses of SGSN, MME, ePDG, HSGW, TWAG 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/TWAG are available, the S-GW/P-GW/TDF shall include the IPv4 address in the CDR.

5.1.2.2.66A Serving Node IPv6 Address

These fields contain one or several control plane IPv6 addresses, in case of IPv4v6 dual stack, of SGSN, MME, ePDG, HSGW, TWAG or S-GW, which have been connected during the record, when both IPv4 and IPv6 addresses of the node are available.

5.1.2.2.67 Serving Node PLMN Identifier

This field contains the PLMN Identifier (Mobile Country Code and Mobile Network Code) serving the UE.

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

5.1.2.2.68 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.

For Originated and Terminated SMS CDRs, this field contains the Node Type which generates the CDRs, i.e SGSN or MME.

5.1.2.2.68A Serving PLMN Rate Control

This field contains the Serving PLMN Rate Control as specified in TS 23.401 [245], which is used during the record for the PDN connection to the PGW.

5.1.2.2.68B SGi PtP Tunnelling Method

This field indicates whether SGi PtP tunnelling method is based on UDP/IP or other methods for a non-IP PDN type PDN connection.

5.1.2.2.69 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.

5.1.2.2.69A Void

(Void).

5.1.2.2.70 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.

5.1.2.2.71 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 TS 29.002 [214]). Note that this field is only provided if the attempted delivery was unsuccessful.

5.1.2.2.72 Start Time

This field contains the time when the IP-CAN session starts at the S-GW/P-GW/IP-Edge or TDF session starts at TDF, available in the CDR for the first bearer in an IP-CAN session in case of S-GW/P-GW/IP-Edge or, alternatively, available in the CDR for the TDF session start.

5.1.2.2.73 Stop Time

This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW/IP-Edge or TDF session terminated at the TDF, available in the CDR for the last bearer in an IP-CAN session in case of S-GW/P-GW/IP-Edge or, alternatively, available in the CDR for the TDF session stop.

5.1.2.2.73aA TDF Address Used

This field is the serving TDF IP Address for the Control Plane. If both an IPv4 and an IPv6 addresses of the TDF are available, the TDF shall include the IPv4 address in the CDR. It contains the TDF-IP-Address as described in TS 29.212 [220].

5.1.2.2.73bA TDF IPv6 Address Used

This field is the serving TDF IPv6 Address for the Control Plane, when both IPv4 and IPv6 addresses of the TDF are available.

5.1.2.2.73cA TDF PLMN Identifier

This field is the TDF PMLN Identifier (Mobile Country Code and Mobile Network Code).

5.1.2.2.73cAa Traffic Steering Policy Identifier Uplink

This field contains traffic steering policy identifier in the uplink direction as specified in TS 23.203[203].

5.1.2.2.73cAb Traffic Steering Policy Identifier Downlink

This field contains traffic steering policy identifier in the downlink direction as specified in TS 23.203[203].

5.1.2.2.73dA TWAG Address Used

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

5.1.2.2.73eA TWAG IPv6 Address

This field is the serving TWAG IPv6 Address for the Control Plane, when both IPv4 and IPv6 addresses of the TWAG are available.

5.1.2.2.73A TWAN User Location Information

This field holds the UE location in a Trusted WLAN Access Network (defined as TWAN Identifier in TS 29.274 [223]).

5.1.2.2.73B UNI PDU CP Only Flag

This field contains an indication on whether this PDN connection is applied with "Control Plane Only flag", i.e. transfer using Control Plane NAS PDUs only, when Control Plane CIoT EPS Optimisation is enabled. This field is missing if both, user plane and control plane UNI for PDU transfer (i.e. S1-U and S11-U from S-GW) are allowed, when Control Plane CIoT EPS Optimisation is enabled.

5.1.2.2.74 User CSG Information

This field contains the "User CSG Information" status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies, as defined in TS 29.060 [215] for GPRS case, and in TS 29.274 [223] for EPC case.

5.1.2.2.75 User Location Information

This field contains the User Location Information as described in

- TS 29.060 [215] for GTP case (e.g. CGI, SAI, RAI),
- TS 29.274 [223] for eGTP case (e.g. CGI, SAI, RAI TAI and ECGI) and
- TS 29.275 [224] for PMIP case.

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

5.1.2.2.75A User Location Information Time

This field contains the time at which the UE was last known to be in the location which is reported during bearer deactivation or UE detach procedure.

5.1.2.2.76 Void

5.1.2.2.77 UWAN User Location Information

This field contains the UE location in an Untrusted Wireless Access Network (UWAN) which includes the UE local IP address and optionally either UDP source port number (if NAT is detected) or TCP source port number. It may also include WLAN location information the ePDG may have received from the 3GPP AAA server about the UE, as TWAN Identifier defined in TS 29.274 [223].

5.1.2.3 Void

5.1.2.4 CP data transfer domain CDR parameters

5.1.2.4.1 Introduction

This subclause contains the description of the CDR parameters that are specific to the CP data transfer domain CDR types as specified in TS 32.253 [13].

5.1.2.4.2 Access Point Name (APN) Network Identifier

These fields contain the actual connected Access Point Name Network Identifier. APN selection by the MME for SCEF based delivery mechanism selection for non-IP data delivery is specified in TS 23.682 [243]

The APN Network Identifier (NI portion) is part of APN, which format is specified in TS 23.003 [200]. To represent the APN NI in the CPCN CDRs, the "dot" notation shall be used.

5.1.2.4.3 APN Rate Control

This field contains the APN Rate Control as specified in TS 29.128 [244], which is used during the record for the PDN connection to the SCEF.

5.1.2.4.4 Cause for Record Closing

This field contains a reason for the release of the CDR. In case of Rf interface is used, it is derived, when received, from Change-Condition AVP at PS-information AVP level defined in TS 32.299 [50] used for CP data transfer. The following is included:

- normal release: PDN connection to SCEF release; It corresponds to "Normal Release" in Change-Condition AVP.
- abnormal termination (PDN connection to SCEF); It corresponds to "Abnormal Release" in Change-Condition AVP.
- data volume limit; It corresponds to "Volume Limit" in Change-Condition AVP.
- time (duration) limit; It corresponds to "Time Limit" in Change-Condition AVP.
- maximum number of NIDD submissions. It corresponds to "Maximum number of NIDD submissions" in Change-Condition AVP.
- Serving Node change; It corresponds to "Serving Node Change" in Change-Condition AVP and is used for MME change.

- For SCEF, PLMN change; It corresponds to "PLMN Change" in Change-Condition AVP.
- For SCEF: APN Rate Control Change: It corresponds to "APN Rate Control Change" in Change-Condition AVP.
- Serving PLMN Rate Control Change: It corresponds to "Serving PLMN Rate Control Change" in Change-Condition AVP.
- RAT type Change: It corresponds to "RAT Change " in Change-Condition AVP.
- management intervention (request due to O&M reasons); It corresponds to "Management Intervention" in Change-Condition AVP.

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

5.1.2.4.5 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 HSS and selected according to the rules specified in Annex X of TS 32.253 [13].

This information can be used by the CPCNs (SCEF, IWK-SCEF, MME) to activate charging generation and e.g. control the closure of the CDR or the traffic volume containers, and applied charging characteristics is included in CDRs transmitted via the Ga/Rf 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 format of charging characteristics field is depicted in Figure 5.1.2.4.5.1. Each Bx (x =0..15) refers to a specific behaviour defined on a per-Operator basis, indicated as active when set to "1" value. See Annex X of TS 32.253 [13]. for guidance on how behaviours could be defined.

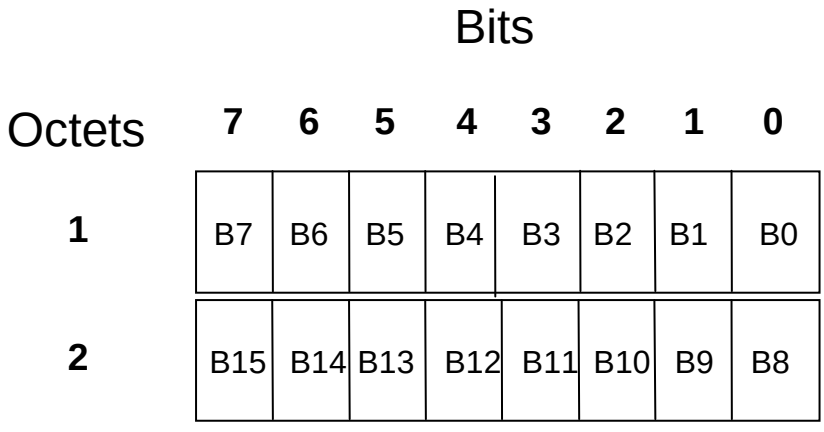


Figure 5.1.2.4.5.1: Charging Characteristics flags

5.1.2.4.6 Charging Characteristics selection mode

This field indicates the charging characteristic type that the CPCNs (SCEF, IWK-SCEF, MME) applied to the CDR. In the MME the allowed values are:

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

In the IWK-SCEF/SCEF the allowed values are:

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

Further details are provided in TS 32.253 [13] Annex X.

5.1.2.4.7 Charging ID

This field is a charging identifier, which can be used together with SCEF Identity to identify all records produced in CPCN Nodes involved in a single PDN connection to a SCEF. Charging ID is generated by SCEF at PDN connection establishment and transferred to IWK-SCEF/MME., The charging ID is transferred to the new MME, at MME change during the lifetime of the PDN connection.

Different SCEFs 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 SCEFs address and optionally (if still ambiguous) with the record opening time stamp.

5.1.2.4.8 Diagnostics

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

5.1.2.4.9 Duration

This field contains the relevant duration in seconds for PDN connection to SCEF in CPCN Node CDRs.

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.

5.1.2.4.10 External-Identifier

This field contains the external identifier of the UE, which identifies a subscription associated to an IMSI, as specified in TS 23.003 [200].

5.1.2.4.11 List of NIDD Submissions

This list applicable in CPDT-SCE-CDR and CPDT-SNN-CDR, includes one or more containers.

Each container includes the following fields:

- Submission Timestamp;
- Event Timestamp;
- Data Volume Uplink.
- Data Volume Downlink.

- Service Change Condition.
- Submission Result Code.

SubmissionTimestamp is a time stamp, which defines the moment when the data transfer request NIDD submission was submitted to the CPCN Node.

Event Timestamp is a time stamp, which defines the moment when the event triggered the generation of charging information from the CPCN Node, for the NIDD submission.

Data Volume Uplink and **Downlink** includes the number of octets transmitted during the NIDD submission.

Service Change Condition contains the reason for the NIDD submission container, e.g. NIDD submission response receipt, NIDD submission response sending, NIDD delivery to the UE, NIDD submission timeout, NIDD delivery from the UE error.

Submission Result Code defines the result of NIDD submission.

5.1.2.4.12 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 identities (SCEF F, MME Identity).

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

5.1.2.4.13 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.

5.1.2.4.14 RAT Type

This field contains the Radio Access Technology (RAT) type used for the NIDD submissions.

5.1.2.4.15 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 X.721 [305].
This is conditioned upon the existence of an extension.

5.1.2.4.16 Record Opening Time

This field contains the time stamp when the PDN connection to SCEF is activated in CPDT-SCE-CDR, CPDT-IWK-CDR, CPDT-MME-CDR, or record opening time on subsequent partial records.

Record opening reason does not have a separate field. For CPDT-SCE-CDR, CPDT-IWK-CDR and CPDT-MME-CDR, it can be derived from the field "Sequence number"; i.e. either a missing field or a value one (1) means activation of PDN connection to SCEF.

5.1.2.4.17 Record Sequence Number

This field contains a running sequence number employed to link the partial records generated in the SCEF/IWK-SCEF/MME for a particular PDN connection to SCEF (characterised with the same Charging ID and SCEF ID pair). The Record Sequence Number starts from one (1). The Record Sequence Number is missing if the record is the only one produced in the SCEF/IWK-SCEF/MME.

5.1.2.4.18 Record Type

The field identifies the type of the record i.e. CPCN-SCE-CDR and CPCN-SNN-CDR.

5.1.2.4.19 Retransmission

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

5.1.2.4.20 SCEF ID

This field contains the Diameter Identity of the SCEF serving the PDN connection.

5.1.2.4.21 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.

The structure of the IMSI is defined in TS 23.003 [200].

5.1.2.4.22 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.

The structure of the MSISDN is defined in TS 23.003 [200].

5.1.2.4.23 Serving Node Identity

This field contains the Diameter Identity of the serving node (i.e. MME) connected during the record for the PDN connection to the SCEF.

5.1.2.4.24 Serving Node PLMN Identifier

This field contains the PLMN Identifier (Mobile Country Code and Mobile Network Code) serving the UE.

5.1.2.4.25 Serving PLMN Rate Control

This field contains the Serving PLMN Rate Control as specified in TS 29.128 [244], which is used during the record for the PDN connection to the SCEF.

5.1.2.5 Exposure Function API CDR parameters

5.1.2.5.1 Introduction

This clause contains the description of each field of the Exposure Function API CDRs specified in TS 32.254 [14].

5.1.2.5.2 API Content

This field holds the API content (e.g. location, Monitoring Type) used in the T8 transaction for the API invocation request,if available.

5.1.2.5.3 API Direction

This field holds the direction to indicate the API invocation or API notification.

5.1.2.5.4 API Identifier

This field holds the identity of API for each API invocation.

5.1.2.5.5 API Invocation Timestamp

This field holds the time stamp when the API invocation request is submitted to the SCEF.

5.1.2.5.6 API Network Service Node

This field holds the identifier of the network element as defined in TS 23.682[243] that triggers the API notification.

5.1.2.5.7 API Result Code

This field holds the result of API Invocation.

5.1.2.5.8 API Size

This field holds the size of API payload.

5.1.2.5.9 Event Timestamp

This field holds the time stamp of the event reported for the generation of charging information from the SCEF, for the northband exposure function API.

5.1.2.5.10 External Identifier

This field holds the external Identifier identifying the served party associated to the IMSI or MSISDN or External Group ID, if available.

5.1.2.5.11 Local Record Sequence Number

Consecutive record number created by this node. The number is allocated sequentially including all CDR types.

5.1.2.5.12 Node Id

Name of the recording entity.

5.1.2.5.13 Record Extensions

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

5.1.2.5.14 Record Type

SCEF exposure function API record.

5.1.2.5.15 Retransmission

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

5.1.2.5.16 SCEF Address

This parameter holds the IP address of SCEF.

5.1.2.5.17 SCEF ID

This parameter holds the Diameter identity of the SCEF used for this API invocation.

5.1.2.5.18 SCS AS Address

This field holds the IP address of SCS/AS

5.1.2.5.19 TLTRI

This field holds the T8 Long Term Transaction Reference ID.

5.1.2.5.20 Void

5.1.3 Subsystem level CDR parameters

5.1.3.0 General

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

5.1.3.1.0 Introduction

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

5.1.3.1.1 Access Correlation ID

This field holds the charging identifier of the access network.

It includes the following fields:

- **GPRS Charging ID** defined in clause 5.1.3.1.18
- **Access Network Charging Identifier**:Includes the charging ID for other access networks.

5.1.3.1.2 Access Network Information

Holds the content of one of the SIP P-header "P-Access-Network-Info". In SIP, as per RFC 7315 [404], the content of the "P-Access-Network-Info" header is known as the access-net-spec. When multiple access-net-spec values are transported in a single P-Access-Network-Info header in comma-separated format, then only one access-net-spec value is included.

For access types and access classes associated to 3GPP accesses:

- For GERAN access, the cgi-3gpp field contains the CGI;
- For UTRAN access, the utran-cell-id-3gpp field contains the LAI and CI, and the utran-sai-3gpp field contains the SAI;
- For E-UTRAN access, the utran-cell-id-3gpp field contains the TAI and ECGI;
- For NR access, the utran-cell-id-3gpp field contains the TAI and NCI.

The SIP "P-Access-Network-Info" header syntax is specified in TS 24.229 [210] clause 7.2A.4.

For access types and access classes associated to trusted WLAN access: the i-wlan-node-id field contains the BSSID, and when available, the operator-specific-GI field contains the Geographical Identifier.

For access types and access classes associated to untrusted WLAN access, the i-wlan-node-id field contains the BSSID, and UE local IP address, ePDG IP Address, and TCP source port, UDP source port are contained in corresponding dedicated fields.

5.1.3.1.2aA Access Transfer Type

This field indicates the type of access transfer performed for IMS service continuity, for instance PS-to-PS in case of SRVCC.

5.1.3.1.2A Additional Access Network Information

Holds the content of an additional SIP P-header "P-Access-Network-Info" when it is available. In SIP, as per RFC 7315 [404], the content of the "P-Access-Network-Info" header is known as the access-net-spec. When multiple access-net-spec values are transported in a single P-Access-Network-Info header in comma-separated format, then only one access-net-spec value is included.

5.1.3.1.3 Alternate Charged Party Address

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

5.1.3.1.3A AoC Information

AoC information is the AoC related Charging information transfered to the CDF, as defined in TS 32.280 [21].

5.1.3.1.4 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…).

5.1.3.1.5 Application Servers Information

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

5.1.3.1.6 Application Servers Involved

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

5.1.3.1.7 Void

5.1.3.1.8 Bearer Service

Holds the used bearer service for the PSTN leg.

5.1.3.1.9 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 RFC3261 [401]) or Tel URI (according to RFC3966 [402]) contained in the outgoing Request-URI of the request (e.g. after ENUM query or after AS interaction). Called Party Address could also be populated with an URN (according to RFC5031 [407]) for an emergency SIP session.

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.

5.1.3.1.10 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.

5.1.3.1.11 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, Access Transfer);
- 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.

5.1.3.1.11A Cellular Network Information

Holds the content of one SIP header "Cellular-Network-Info". As per TS 24.299 [210], a User Agent (UA) supporting one or more cellular radio access technology (e.g. E-UTRAN) but using a non-cellular IP-CAN to access the IM CN subsystem can use this header field to relay information to its service provider about the radio cell identity of the cellular radio access network on which the UE most recently camped.

5.1.3.1.12 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.

5.1.3.1.13 Content Length

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

5.1.3.1.14 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.

5.1.3.1.15 Event

The *Event* parameter holds the content of the "Event" header defined in RFC 3265 [403],

5.1.3.1.16 Expires

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

5.1.3.1.16aA FE Identifier List

This parameter holds the FE Identifier List of the P-Charging-Vector header, as received in the FE-Identifier-List AVP as defined in TS 32.299 [50].

5.1.3.1.16A From Address

This field holds the information from the SIP From Header.

5.1.3.1.17 GGSN Address

This parameter holds the control plane IP address of the GGSN, PGW or SMF 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 32.240 [1].

5.1.3.1.18 GPRS Charging ID

This parameter holds the charging identifier of GPRS, EPS and 5GS access network:

- 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.

- Charging Id which is generated by the PGW for a bearer, as specified in TS 32.251 [11].
- Charging Id which is generated by the SMF for a PDU session, as specified in TS 32.255 [15].

For further information regarding the composition of the charging correlation vector refer to the appropriate clause in TS 32.240 [1].

5.1.3.1.18A Void

5.1.3.1.19 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 [210]. 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 [210] and RFC 7315 [404].

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 SIP 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., SIP 200 OK, SIP (RE-)INVITE, SIP BYE etc.) until the session is terminated.

5.1.3.1.20 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 [210].

5.1.3.1.20A IMS Emergency Indicator

This field indicates the IMS session or registration is an IMS emergency session or emergency registration.This field is missing if IMS session/registration is not detected as an IMS emergency session/registration.

5.1.3.1.20B IMS Visited Network Identifier

Holds the SIP P-header "P-Visited-Network-ID". with the value according to 3GPP TS 24.229 [210].

- For the roaming architecture for voice over IMS with local breakout, the value of IMS visited network identifier is a pre-provisioned string that identifies the network of the P-CSCF at the home network.
- For the roaming architecture for voice over IMS with home routed traffic, IMS visited network identifier is a string that identifies the visited network of the UE including an indication that the P-CSCF is located in the home network.

5.1.3.1.21 Incomplete CDR Indication

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

5.1.3.1.21A Initial IMS Charging Identifier

This parameter holds the Initial IMS charging identifier (ICID) as generated by the IMS node for the initial SIP session created for IMS service continuity.

5.1.3.1.21Aa Instance Id

An Instance Id is defined as a URN generated by the device that uniquely identifies a specific device amongst all other devices. The Instance Id is transported in the sip.instance feature tag in the Contact header of a SIP request associated with the served user.

5.1.3.1.21Aaa Inter-UE Transfer

This field indicates that Inter-UE transfer has been performed for IMS service continuity and present only in that case.

5.1.3.1.21B IP Realm Default Indication

This field indicates whether the IP realm used for the SDP media component is the Default IP realm or not.

5.1.3.1.21C ISUP Cause

When session is released via ISUP, this field indicates the reason the call was released.

5.1.3.1.21Ca List of Access Network Info Change

This group field may occur several times in the CDR and each occurrence holds information on subsequent changes in one or two SIP P-header(s) "P-Access-Network-Info" together with the time the location was acquired.

Each element of the list may include the following fields:

- Access Network Information;
- Additional Access Network Information;
- Access ChangeTime.

5.1.3.1.21D List of Access Transfer Information

This grouped field may occur several times in the CDR and each occurrence holds information on a particular access transfer. The field is present only if access transfer procedure has been performed for IMS service continuity.

Each element of the list represents an access transfer and may include the following fields:

- Access Transfer Type;
- Inter-UE Transfer;
- Access Network Information;
- Additional Access Network Information;
- Subscriber Equipment Number;
- Instance Id;
- Related IMS Charging Identifier;
- Related IMS Charging Identifier Generation Node;
- Access Transfer Time.

5.1.3.1.22 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 SIP 200 OK response to a SIP REGISTER request.

5.1.3.1.23 List of Called Asserted Identity

This field holds the address or addresses (SIP URI and/or Tel URI according to RFC 3261 [401] and RFC 3966 [402] 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. In case no P-Asserted-Identity is known, this list shall include one item (of type SIP URI) with the value "unknown".

5.1.3.1.23A List of Called Identity Changes

This field holds the set of terminating identity address changes after IMS session establishment and the associated time stamp for each.

These addresses are obtained from the From SIP header field of a SIP UPDATE request or SIP RE-INVITE request.

5.1.3.1.24 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 RFC 3261 [401]), the Tel URI (according to RFC 3966 402]) 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.

5.1.3.1.25 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.

5.1.3.1.26 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 [210].

5.1.3.1.27 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.

5.1.3.1.27A List of NNI Information

This grouped field comprising several sub-fields holds information about the NNI used for interconnection and roaming. This field may occur more than once in a CDR if more NNI are involved e.g. when support of transit routing is collocated with the IBCF.

The List of NNI Information contains the following elements:

- Session Direction;
- NNI Type;
- Relationship Mode;
- Neighbour Node Address.

These field elements are described in the appropriate subclause.

5.1.3.1.28 List of SDP Media Components

This is a grouped field which may occur several times in one CDR and the content should be filled as described in TS 32.260 [20] clause 5.1.3.

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.

5.1.3.1.28A List of Reason Header

This parameter contains the content of the Reason-header in the SIP BYE and SIP CANCEL, and may contain multiple entries if there are multiple Reason-headers within a SIP BYE or SIP CANCEL

5.1.3.1.28B Local GW Inserted Indication

This field indicates if the local GW (TrGW, IMS-AGW) is inserted or not for the SDP media component.

5.1.3.1.29 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.

5.1.3.1.30 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.

5.1.3.1.31 Media Initiator Party

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

5.1.3.1.31a MS Time Zone

This field contains the 'Time Zone' IE provided as part of the NetLoc enhancement for an ICS user as specified in TS 23.292 [229].

5.1.3.1.31aA MSC Address

This field contains the Recommendation E.164 [308] number assigned to the MSC that produced the record. For further details concerning the structure of MSC numbers see TS 23.003 [200].

5.1.3.1.31A Neighbour Node Address

This field holds the control plane IP address of the neighbouring network contact point that handles the service request in case of interconnection and roaming.

5.1.3.1.31B NNI Type

This field indicates whether the type of used NNI is non-roaming, roaming with loopback routing, or roaming without loopback routing. The loopback indication is either sent by the S-CSCF in forward direction within the initial SIP request or sent by TRF in backward direction and received by the ATCF, AS and P-CSCF in the final SIP response.

5.1.3.1.31C Void

5.1.3.1.32 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.

5.1.3.1.33 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.

5.1.3.1.33A Void

5.1.3.1.34 Online Charging Flag

This field indicates the Online Charging Request was sent based on the provided ECF address from the SIP P-header "P-Charging-Function-Addresses". The parameter corresponds to the Online-Charging-Flag AVP.

NOTE: No proof that online charging action has been taken

5.1.3.1.35 Originator

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

5.1.3.1.35A Outgoing Session ID

For a SIP session the Session-ID contains the SIP CALL ID as defined in the Session Initiation Protocol RFC 3261 [401]. When the AS acts as B2BUA, the outgoing session is identified by the Outgoing Session ID which contains the SIP CALL ID.

5.1.3.1.36 Private User ID

Holds the used Network Access Identifier of the served party according to RFC 2486 [405]. This parameter corresponds to the *User-Name* AVP.

5.1.3.1.37 Real Time Tariff Information

This is a field containing the real time tariff information that may be exchanged in the SIP transaction, encoded in a XML body as described in the TS 29.658 [225]. The RTTI information may be captured in the charging information and it is operator configurable as whether it is used in its original XML format or mapped on a detailed structure of parameters. The RTTI information XML schema in XML format is given in the TS 29.658 [225]. The Tariff Information structure of parameters is provided in the TS 32.280 [40].

The Real Time Tariff Information contains one of the following elements:

- Tariff XML;
- Tariff Information.

These field elements are described in the appropriate subclause.

5.1.3.1.38 Record Closure Time

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

5.1.3.1.39 Record Extensions

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

5.1.3.1.40 Record Opening Time

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

5.1.3.1.41 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).

5.1.3.1.42 Record Type

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

5.1.3.1.42A Related IMS Charging Identifier

This field holds the Related IMS Charging Identifier when the session is the target access leg in an SRVCC handover. The Related IMS Charging Identifier contains the IMS charging identifier generated for the source access leg.

5.1.3.1.42B Related IMS Charging Identifier Generation Node

This field holds the identifier of the node that generated the Related IMS charging identifier.

5.1.3.1.42A Relationship Mode

This field indicates whether the other functional entity (e.g. contact point of the neighbouring network) is regarded as part of the same trust domain.

5.1.3.1.43 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 [401] and RFC 3966 [402] respectively) contained in the incoming Request-URI of the request. Requested Party Address could also be populated with an URN (according to RFC5031 [407]) for an emergency SIP session.

This field is only present if different from the Called Party Address parameter.

5.1.3.1.44 Retransmission

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

5.1.3.1.45 Role of Node

The field indicates whether the IMS node (except MRFC) is serving the Originating or the Terminating party. The role can be:

- Originating (IMS node serving the calling party);
- Terminating (IMS node serving the called party).

5.1.3.1.45A Route header received

This field contains the information in the topmost route header in a received initial SIP INVITE and non-session related SIP MESSAGE request.

5.1.3.1.45B Route header transmitted

This field contains the information in the route header representing the destination in a transmitted initial SIP INVITE and non-session SIP MESSAGE request.

5.1.3.1.46 SDP Answer Timestamp

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

5.1.3.1.47 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;
- Access Correlation ID;
- Local GW Inserted indication;

- IP Realm Default indication;
- Transcoder Inserted indication.

These field elements are described in the appropriate subclause.

5.1.3.1.48 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.

Example: "c=IN IP4 134.134.157.81"

For further information on SDP please refer to RFC4566 [406].

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

5.1.3.1.49 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.

Example: "m=video 51372 RTP/AVP 31"

For further information on SDP please refer to RFC 4566 [406].

5.1.3.1.50 SDP Offer Timestamp

This parameter contains the time of the SDP Offer.

5.1.3.1.51 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.

5.1.3.1.52 SDP Type

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

5.1.3.1.53 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.

5.1.3.1.54 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.

5.1.3.1.54A Service Delivery End Time Stamp Fraction

This parameter contains the milliseconds fraction in relation to Service Delivery End Time Stamp.

5.1.3.1.55 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.

For partial CDRs this field remains unchanged.

5.1.3.1.55A Service Delivery Start Time Stamp Fraction

This parameter contains the milliseconds fraction in relation to Service Delivery Start Time Stamp.

5.1.3.1.56 Service ID

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

5.1.3.1.57 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.

5.1.3.1.58 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. 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.

5.1.3.1.58A Service Request Timestamp Fraction

This parameter contains the milliseconds fraction in relation to Service Request Timestamp.

5.1.3.1.58B Session Direction

This field indicates whether the NNI is used for an inbound or outbound service request on the control plane in case of interconnection and roaming.

5.1.3.1.59 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 3261 [401]. When the AS acts as B2BUA, the incoming Session-ID leg is covered.

5.1.3.1.60 Session Priority

This field contains the priority level of the session. The value of the parameter is derived from Resource-Priority header field and the rules for the translation depend on operator policy described in TS 24.229[210].

5.1.3.1.61 SIP Method

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

5.1.3.1.62 SIP Request Timestamp

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

5.1.3.1.63 SIP Request Timestamp Fraction

This parameter contains the milliseconds fraction in relation to the SIP Request Timestamp.

5.1.3.1.64 SIP Response Timestamp

This parameter contains the time of the response to the SIP request. If an SDP is exchanged via SIP messages, then this parameter contains appropriately the time of SIP 200 OK acknowledging an SIP INVITE or of SIP ACK including a SDP ANSWER.

5.1.3.1.65 SIP Response Timestamp Fraction

This parameter contains the milliseconds fraction in relation to the SIP Response Timestamp.

5.1.3.1.66 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.

5.1.3.1.66A Status

Holds the abnormal status information of specific ASs (if any) when AS(s) respond 4xx/5xx or time out to S-CSCF during an IMS session.

5.1.3.1.66B TAD Identifier

This field indicates the type of access network (CS or PS) through which the session shall be terminated.

5.1.3.1.67 Tariff Information

This field holds the tariff mapped in the Tariff Information structure. The corresponding structure of the Tariff Information can be found in the TS 32.299 [50]. The formatting from real time tariff information to Tariff Information structure is described in TS 32 280 [40].

5.1.3.1.68 Tariff XML

This field holds the tariff formatted in the XML schema as specified in the TS 29.658 [225].

5.1.3.1.68A Transcoder Inserted Indication

This field indicates if a transcoder is inserted or not for the SDP media component.

5.1.3.1.68B Transit IOI List

This parameter holds the Transit-IOI List of the P-Charging-Vector header, as recorded in the Transit-IOI-List AVP as defined in TS 32.299 [50]. Multiple occurrences of this field, shall be in chronological order, i.e. the value in the SIP request is listed first. If only a value for the SIP response is available, the Transit IOI List for the SIP request shall be included with the value "unknown". For further information on the Transit IOI exchange via SIP signalling please refer to TS 24.229 [210].

5.1.3.1.69 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.

5.1.3.1.69A User Location Information

This field contains the User Location Information using PCC mechanisms as specified in TS 23.203 [203] and TS 23.503 [246] or the location retrieval via Sh interface by AS as specified in TS 29.328 [242].

5.1.3.1.70 VLR Number

This field contains the Recommendation E.164 [308] number assigned to the VLR that produced the record. For further details concerning the structure of VLR numbers see TS 23.003 [200].

5.1.4 Service level CDR parameters

5.1.4.1 MMS CDR parameters

5.1.4.1.0 Introduction

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 [206].

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 [218]. 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 [206].

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 [206].

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 [400]), MSISDN (E.164[308]) 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) [400], MSISDN (E.164[308]) 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 [206].

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 [206]. 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 [206], 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 [206].

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.).

5.1.4.1.28A MS Time Zone

This field contains the 'Time Zone' IE provided for the MMS User Agent as specified in TS 29.060 [215].

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 [400]) or MSISDN (E.164 [308]).

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 [206].

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 [206]: 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 [400]), MSISDN (E.164 [308]) 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 [206].

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 [218].

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 [206].

5.1.4.1.62 VASP ID

This field specifies the identification of the originating application as defined in TS 23.140 [206].

5.1.4.2 LCS CDR parameters

5.1.4.2.0 Introduction

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 TS 29.002 [214].

5.1.4.2.3 LCS Client Type

This field contains the type of the LCS Client as defined in TS 29.002 [214].

5.1.4.2.4 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [227].

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 TS 29.002 [214].

5.1.4.2.6 Location Type

This field contains the type of the location as defined in TS 29.002 [214].

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 TS 49.031 [227].

5.1.4.2.8 Provider Error

This parameter is used to indicate a protocol related type of error as defined in TS 29.002 [214].

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 [311].

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 [200].

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 TS 23.003 [200].

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 TS 29.002 [214]:

- 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

5.1.4.3.0 Introduction

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

5.1.4.3.1 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.

5.1.4.3.2 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.

5.1.4.3.3 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.

5.1.4.3.4 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.

5.1.4.3.5 Participant Access Priority

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

5.1.4.3.6 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.

5.1.4.3.7 PoC controlling address

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

5.1.4.3.8 PoC Event Type

This field contains the PoC session unrelated charging event type.

5.1.4.3.9 PoC group name

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

5.1.4.3.10 PoC session id

This field uniquely identifies the overall PoC session.

5.1.4.3.11 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

5.1.4.3.12 PoC session type

The field identifies the type of the PoC session.

5.1.4.3.13 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 [216].

5.1.4.3.14 User Participating Type

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

5.1.4.4 MBMS CDR parameters

5.1.4.4.0 Introduction

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

5.1.4.4.1 CN IP Multicast Distribution

This field is used to indicate if IP multicast distribution to UTRAN is used for the MBMS user plane data.

5.1.4.4.2 MBMS 2G 3G Indicator

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

5.1.4.4.2A MBMS Data Transfer Start

The field contains the absolute time stamp of the data delivery start. The value indicates the time in seconds for the radio resources set up relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of 1/2**32 second.

This field is only valid for E-UTRAN access type.

5.1.4.4.2B MBMS Data Transfer Stop

The field contains the absolute time stamp of the data delivery stop. The value indicates the time in seconds for the release of radio resources relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of 1/2**32 second.

This field is only valid for E-UTRAN access type.

5.1.4.4.3 MBMS GW Address

This parameter holds the IP-address of the MBMS GW that generated the Charging Id when MBMS GW is stand-alone.

5.1.4.4.4 MBMS Service Area

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

5.1.4.4.5 MBMS Service Type

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

5.1.4.4.6 MBMS Session Identity

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

5.1.4.4.7 Required MBMS Bearer Capabilities

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

5.1.4.4.8 TMGI

The field contains the Temporary Mobile Group Identity allocated to a particular MBMS bearer service. TMGI use and structure is specified in TS 23.003 [200].

5.1.4.5 MMTel CDR parameters

5.1.4.5.0 Introduction

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, the "Pilot Identity" for FA and the "Initiator party" for 3PTY, 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;
- AoC information.

Service Type is defined in clause 5.1.4.5.6

Service Mode is defined in clause 5.1.4.5.5

Number Of Diversions is defined in clause 5.1.4.5.3

Associated Party Address is defined in clause 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 is 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.CUG Information indicates the "CUG interlock code" used during the "Closed User Group" communication.

AoC information is defined in clause 5.1.3.1.3A.

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 [211]. 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 [50].

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 MMTel-SService-Type AVP and described in TS 32.299 [50].

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

5.1.4.5.7 Void

5.1.4.6 SMS CDR parameters

5.1.4.6.0 Introduction

This clause contains the description of each field of the SMS CDRs specified in TS 32.274 [34].

5.1.4.6.1 Event Timestamp

This field contains the timestamp of the event that triggered the generation of charging information for the SMS transaction.

5.1.4.6.0A Carrier Select Routing

This field contains information on carrier select routing, received by S-CSCF during ENUM/DNS processes.

5.1.4.6.1A External Identifier

This field contains theE xternalI dentifier of the UE, which identifies a subscription associated to an IMSI, as specified in TS 23.003 [200].

5.1.4.6.2 Local Record Sequence Number

This field includes a unique record number created by this node. The number is allocated sequentially The number is allocated sequentially including all CDR types. The number is unique within the CDF.

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

5.1.4.6.3 Message Class

This field contains a class of messages such as personal, advertisement, information service. For more information see TS 23.140 [206].

5.1.4.6.4 Message Reference

This field contains the identity used to identify a Short Message in the SMS node associated with entity that submitted it, and corresponds to the TP-Message-Reference (TP-MR) as defined in TS 23.040 [201].

5.1.4.6.5 Message Size

This field contains the length of the user data part of the Short Message, corresponding to the TP-User-Data-Length (TP-UDL) as defined in TS 23.040 [201].

5.1.4.6.6 MTC IWF Address

This field contains the MTC IWF address.

5.1.4.6.6A Number Portability Routing

This field contains information on number portability routing, received by S-CSCF during ENUM/DNS processes.

5.1.4.6.7 Originator IMSI

This field contains IMSI of the originator of the Short Message. The structure of the IMSI is defined in TS 23.003 [200].

5.1.4.6.8 Originator Info

This field contains a set of information on the originator of the Short Message, and includes following elements:

- Originator IMSI
- Originator MSISDN
- Originator Other Address
- Originator SCCP Address
- Originator Received Address
- SM Originator Interface
- SM Originator Protocol Id

These fields are described in the appropriate subclause.

5.1.4.6.9 Originator MSISDN

This field contains MSISDN (E.164 number [308]) of the originator of the Short Message.

5.1.4.6.10 Originator Other Address

This field contains the addresse of an originator of the Short Message other than IMSI and MSISDN: e.g short code, email.

5.1.4.6.11 Originator Received Address

This field contains the original address of the originator of the Short Message, as received by the SMS node.

5.1.4.6.12 Originator SCCP Address

This field contains the SCCP calling address used to receive the Short Message at the SMS node.

5.1.4.6.12A PDP Address

This field contains the UE IP address used by the subscriber for the SMS transaction.

5.1.4.6.13 RAT Type

This field contains the Radio Access Technology (RAT) type used for the SMS transaction, as provided to the SMS Node, and specified in TS 29.061 [216] 3GPP RAT Type.

5.1.4.6.14 Recipient IMSI

This field contains IMSI of aRecipient of the Short Message. The structure of the IMSI is defined in TS 23.003 [200].

5.1.4.6.15 Recipient Info

This field contains a set of information on a Recipient of the Short Message, and includes following elements:

- Recipient IMSI
- Recipient MSISDN
- Recipient Other Address
- Recipient Received Address
- Recipient SCCP Address
- SM Destination Interface
- SM Recipient Protocol Id

These fields are described in the appropriate subclause.

5.1.4.6.16 Recipient MSISDN

This field contains MSISDN (E.164 number [308]) of a Recipient of the Short Message.

5.1.4.6.17 Recipient Other Address

This field contains the addresse of a Recipient of the Short Message other than IMSI and MSISDN: e.g short code, email....

5.1.4.6.18 Recipient Received Address

This field contains the original address of the originator of the Short Message, as received by the SMS node.

5.1.4.6.19 Recipient SCCP Address

This field contains the SCCP called address used by the SMS node to onward deliver the Short Message.

5.1.4.6.20 Record Type

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

5.1.4.6.21 Record Extensions

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

5.1.4.6.22 Served IMEI

This fields contains the international mobile equipment identity (IMEI) or IMEISV of the equipment served. The term "served" equipment is used to describe the UE involved in the SMS transaction recorded.

The structure of the IMEI, IMEISV is specified in TS 23.003 [200].

5.1.4.6.22A Session ID

This fields contains the SIP CALL ID of the SIP session, as defined in the Session Initiation Protocol RFC 3261 [401].

5.1.4.6.23 SM Data Coding Scheme

This field contains the data coding scheme used within the Short Message and corresponds to TP-DCS header.

5.1.4.6.24 SM Delivery Report Requested

This field contains an indication whether a delivery report is requested by the Short Message originator.

5.1.4.6.25 SM Destination Interface

This field contains the information describing the interface on which the Short Message is to be delivered by the SMS node.

5.1.4.6.26 SM Device Trigger Indicator

This field contains indication whether the Short Message submission/delivery to/from SMS-SC is related to Device Trigger, and which Device trigger action is requested: request, replace or recall.

5.1.4.6.27 SM Device Trigger information

This field contains the set of information related to SMS submission to SMS-SC for Device Trigger, and includes following elements:

- MTC IWF Address
- SM DT Reference Number
- SM Serving Node
- SM DT Validity Period
- SM DT Priority Indication
- SMS Application Port ID

These fields are described in the appropriate subclause.

5.1.4.6.28 SM Discharge Time

This field contains the time associated with the event being reported in the Short Message Status field as defined in TS 23.040 [201]. This information is only applicable to delivery report charging procedures

5.1.4.6.29 SM DT Priority Indication

This field holds the priority of the device trigger request received via T4 reference point, as specified in TS 29.337 [231].

5.1.4.6.30 SM DT Reference Number

This field contains the Reference Number related to the device trigger request received via T4 reference point, as specified in TS 29.337 [231].

5.1.4.6.31 SM DT Validity Period

This field contains the validity period of the device trigger request received via T4 reference point, as specified in TS 29.337 [231].

5.1.4.6.32 SM Message Type

This field contains the message type that triggered the generation of charging information: submission, delivery report, SM Service Request, T4 Device Trigger, or SM Device Trigger, or MO-SMS T4 submission.

5.1.4.6.33 SM Originator Interface

This field contains the information describing the interface on which the Short Message was received by the SMS node

5.1.4.6.34 SM Originator Protocol Id

This field contains the TP-PROTOCOL-ID (TP-PID) as defined in TS 23.040 [201] describing the protocol used for the Short Message by originator.

5.1.4.6.35 SM Priority

This field contains any priority information associated with a Short Message, as defined in TS 23.040 [201].

5.1.4.6.36 SM Recipient Protocol Id

This field contains the TP-PROTOCOL-ID (TP-PID) as defined in TS 23.040 [201], describing the protocol used for the Short Message to the recipient.

5.1.4.6.37 SM Reply Path Requested

This field contains an indication of whether a reply Short Message to an original Short Message shall follow the same path and corresponds to the TP-Reply-Path (TP-RP) flag.

5.1.4.6.38 SMS Application Port ID

This field holds the Application Port ID of triggering application for the device trigger request received via T4 reference point, as specified in TS 29.337 [231] , or the Application port ID associated with the UE on MO delivery to the SCS.

5.1.4.6.39 SM Sequence Number

This field contains the sequence number of the SMS within the concatenated short message when part of concatenated short message.

5.1.4.6.40 SM Serving Node

This field contains the serving node identity, i.e. SGSN/MME/MSC identity serving the UE, received from MTC-IWF via T4 reference point for device trigger, as specified in TS 29.337 [231].

5.1.4.6.41 Void

5.1.4.6.42 Void

5.1.4.6.43 SM Status

This field contains the information from the TP-Status field in a Status-Report TPDU as defined in TS 23.040 [201]. This information is only applicable to delivery report charging procedures.

5.1.4.6.44 SM Total Number

This field contains the total number of short messages when the SMS is part of concatenated short message.

5.1.4.6.45 SM User Data Header

This field contains the user data header extracted from the user data of the SM, corresponding to the user data header (TP-UDH) is specified in TS 23.040 [201].

5.1.4.6.45A SMS Node Address

This field contains the Address of the SMS Node that produced the record: assigned E.164 number.

5.1.4.6.45B SMS Result

The field contains the result of an attempt for a Short Message transaction (submission or delivery) at SMS Service Center, when unsuccessful.

5.1.4.6.46 Submission Time

This field contains the timestamp of when the submitted Short Message arrived at the originating SMS Node, obtained from the TP-Service-Center-Time-Stamp (TP-SCTS) as defined in TS 23.040 [201].

5.1.4.6.47 UE Time Zone

This field contains the “Time zone” as specified in TS 29.060 [215], provided for the Mobile User during the SMS transaction.

5.1.4.6.48 User Location Info

This field contains the information about the location of the subscriber during the SMS transaction , as provided to the SMS Node, and specified in TS 29.061 [216] 3GPP user location.

5.1.4.7 ProSe CDR parameters

5.1.4.7.0 Introduction

This clause contains the description of each field of the ProSe CDRs specified in TS 32.277 [37].

5.1.4.7.0A Announcing PLMN ID

This field contains PLMN identity of the serving PLMN which signalled the carrier frequency, when this serving PLMN is not the HPLMN or VPLMN, if available.

5.1.4.7.1 Announcing UE HPLMN Identifier

This field contains identifier of Annoucing UE HPLMN (MCC and MNC).

5.1.4.7.2 Announcing UE VPLMN Identifier

This field contains PLMN identity (MCC and MNC) of VPLMN for announcing UE. This field correspondes to Monitored PLMN ID in match report request, as defined in TS 23.303[235] clause 5.3.4. In this case it’s the same with Announcing UE HPLMN Identifier when non-roaming.

5.1.4.7.3 Application ID

This field carries a globally unique identifier identifying a specific 3rd party application, as upper layer of ProSe.

5.1.4.7.4 Cause for Record Closing

This field contains a reason for the release of the CDR. In case of Rf interface is used, it is derived from Change-Condition AVP at ProSe-information AVP level defined in TS 32.299 [50], when received. The following is included:- proximity alerted: It corresponds to "Proximity Alerted" in Change-Condition AVP.

- time expired with norenewal: It corresponds to "Time Expired With No Renewal" in Change-Condition AVP.
- requestor cancellation: It corresponds to "Requestor Cancellation" in Change-Condition AVP.
- time limited: It corresponds to "Time Limit" in Change-Condition AVP.
- maximum number of reports: It corresponds to "Max Number of reports" in Change-Condition AVP.
- abnormal release: It corresponds to "Abnormal Release" in Change-Condition AVP.

5.1.4.7.5 Direct Discovery Model

This field indicates model of the Direct Discovery used by the UE, i.e. Model A, Model B.

5.1.4.7.5A Discoveree UE HPLMN Identifier

This field contains identifier Discoveree of Discoveree UE HPLMN.

5.1.4.7.5B Discoveree UE VPLMN Identifier

This field contains identifier of Discoveree UE VPLMN.

5.1.4.7.5C Discoverer UE HPLMN Identifier

This field contains identifier of Discoverer UE HPLMN.

5.1.4.7.5D Discoverer UE VPLMN Identifier

This field contains identifier of Discoverer UE VPLMN.

5.1.4.7.6 Layer two Group ID

This field contains the identifier of a ProSe communication group, uniquely represents a specific one to-many ProSe Direct Communication and is included in CDRs for each participantes in the specific group.

5.1.4.7.6A List of Application Specific Data

This field contains a list of data blocks provided by the application in the UE. The content of each block is application-specific.

5.1.4.7.6B List of Coverage Info

This field contains a list of coverage status changes with time stamps. When in coverage, additionally includes list of location changes (i.e., ECGI change) and time stamps.

5.1.4.7.6C List of Radio Parameter Sets

This field contains a list of radio parameter sets configured in the UE for direct communication use. Each set has an associated time stamp of when it became active.

5.1.4.7.7 List of Reception Data Containers and List of Transmission Data Containers

The same structure is used to convey both the List of Reception Data Containers and the List of Transmission Data Containers. Each list includes a list of changes in trigger conditions (e.g. change of PLMN, go out of coverage, come back to coverage, etc.) for a specific Communication. Each change is time stamped. Trigger condition is used to categorize received or transmitted data volumes, respectively, such as per coverage status duration. Each Direct Communication data containers may include the following fields:

- Local Sequence Number
- Change Time.

- Coverage status.
- UE Location.
- Data Volume (transmitted or received).
- Change Condition.
- VPLMN Identifier.
- Usage Information Report Sequence Number.
- Radio Resources Indicator.
- Radio Frequency.

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 direct communication.

Change Time includes the time when the container is closed and reported due to ProSe charging condition change..

Coverage status indicates whether UE is served by E-UTRAN or not, i.e. enter coverage, leave coverage.

UE Location contains the location information of the UE, i.e. ECGI

Data Volume is the amount of data received or transmitted by UE.

Change Condition contains the reason for closing the container, e.g. change of PLMN, go out of coverage, come back to coverage.

VPLMN Identifier contains the indentifier of PLMN (MCC and MNC) that the UE visits.

Usage Information Report Sequence Number contains the sequence number of usage information report, which is used to generate the container.

Radio Resource Indicator identifies whether the operator-provided radio resources or the configured radio resources were used for ProSe direction communication.

Radio Frequency identifies the radio frequency used for ProSe direct communication.

5.1.4.7.7A List of Transmitters

This field contains a list of transmitters detected for the group. The information stored consists of the source IP address and the ProSe UE ID for each transmitter.

5.1.4.7.8 Monitored PLMN Identifier

This field carries Monitored PLMN ID (MCC and MNC) in Match Report request, as defined in TS 23.303[235] clause 5.3.4. It corresponds to the Announcing UE VPLMN Identifier when roaming and Announcing UE HPLMN Identifier when non-roaming.

5.1.4.7.9 Monitoring UE PLMN Identifier

This field contains identifier of monitoring UE PLMN (MCC and MNC).

5.1.4.7.10 Monitoring UE Identifier

This field carries identifier of the party who initiate Monitor/Match report, i.e. IMSI, which corresponds to UE Identifier parameter in Monitor/Match report request, as defined in TS 23.303[235].

5.1.4.7.11 Monitoring UE VPLMN Identifier

This field contains identifier of Monitoring UE VPLMN (MCC and MNC).

5.1.2.7.12 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.

5.1.4.7.13 PC Three Control Protocol Cause

This field holds the particular reason why a DISCOVERY_REQUEST or Match_Report messages from the UE have been rejected by the ProSe Function.

5.1.4.7.14 PC Three EPC Control Protocol Cause

This field holds the particular reason why a proximity request messages from the UE have been rejected by the ProSe Function.

5.1.4.7.14A PC5 Radio Technology

This field indicates the PC5 radio technology that the UE used for ProSe Direct Discovery.

5.1.4.7.15 ProSe Application ID

This field carries an identity used for ProSe direct discovery, identifying application related information for the ProSe-enabled UE.

5.1.4.7.16 ProSe Event Type

This field indicates ProSe charging event, i.e. open Annoucing, open Monitoring, open Match Report, restricted Announcing, restricted Monitoring, restricted Match Report, restricted Discovery Request and restricted Discovery Reporting.

5.1.4.7.17 ProSe Function ID

This field holds the FQDN that identifies a ProSe Function.

5.1.4.7.18 ProSe Function IP Address

This field holds the IP-address of the ProSe Function.

5.1.4.7.19 ProSe Function PLMN Identifier

This field holds the PLMN Identifier (MCC and MNC) of the ProSe Function.

5.1.4.7.20 ProSe Group IP multicast address

This field holds The IP multicast address to be used for performing ProSe Direct Communication.

5.1.4.7.21 ProSe Reason for Cancellation

This field contains a reason for proximity request session is canceled. In case of Rf interface is used, it is derived from ProSe-Reason-For-Cancellation AVP at ProSe-Information AVP level defined in TS 32.299 [50], when received. The following is included:

- Proximity alerted: When ProSe Function determines that two UEs are in proximity, a PROXIMITY_ALERT message is sent to UE. It corresponds to "Proximity alerted" in ProSe-Reason-For-Cancellation AVP.
- Time expired with no renewal: Allowed time windows is expired and no renewal request is received from UE. It corresponds to "Time expired with no renewal" in ProSe-Reason-For-Cancellation AVP.
- Requestor cancellation: a CANCEL_PROXIMITY_REQUEST messag is received from UE. It corresponds to "Requestor cancellation" in ProSe-Reason-For-Cancellation AVP.

5.1.4.7.22 ProSe Request Timestamp

This field holds the timestamp when ProSe Request is received from UE.

5.1.4.7.22A ProSe Target Layer-2 ID

This field carries the identifier of UE, uniquely represents a specific one-to-one ProSe Direct Communication.

5.1.4.7.23 ProSe UE ID

This field carries a link layer identifier assigned by the EPS that uniquely represents the UE in the context of ProSe Direct Communication.

5.1.4.7.23A ProSe UE-to-Network Relay UE ID

The fiels holds a link layer identifier that uniquely represents the ProSe UE-to-Network relay UE in the context of ProSe Direct Communication via UE-to-Network.

5.1.4.7.24 Proximity Alert Indication

This field indicates whether proximity alert has been sent before proximity request cancellation.

5.1.4.7.25 Proximity Alert Timestamp

This field holds the timestamp when proximity alert is sent, to indicate two UEs are in proximity.

5.1.4.7.26 Proximity Cancellation Timestamp

This field holds the timestamp when proximity request cancellation is requested.

5.1.4.7.27 Proximity Request Renewal Info Block List

This field holds a list of information blocks that are added by each of the Proximity Request renewal messages captured in the CDR. The information block contains information of the renewal request, e.g. timestamp, time window, range class, and UE location. Each Proximity Request Renewal Info Block may include the following fields:

- ProSe Request Timestamp
- Time Window
- Range Class
- UE Location

ProSe Request Timestamp is the time when ProSe Renewal Request is received from UE.

Time Window is the time interval in minutes during which a proximity renewal request is valid.

Range Class is the range class for a specific proximity renewal request.

UE Location the UE location with the best known accuracy (e.g. Cell ID or geo-location coordinates) at the time fo the renewal request.

5.1.4.7.28 Range Class

This field carries a range class for a specific proximity request, e.g. 50 m, 100 m, 200 m, 500 m, 1000 m, which as "Range Class" defined in TS 24.334 [236].

5.1.4.7.29 Reason for Cancellation

This field indicates the reason for cancellation of an EPC-level Discovery request, i.e. Proximity alerted, Time expired with no renewal, Requestor cancellation.

5.1.4.7.30 Record Type

The field identifies the type of the record i.e. PF-DD-CDR, PF-ED-CDR and PF-DC-CDR.

5.1.4.7.30A Relay IP address

The field carries the IP address used as ProSe UE-to-Network Relay UE address for performing ProSe Direct Communication via UE-to-Network.

5.1.4.7.31 Requested Application Layer User ID

This field carrys the user identifier designated in 3rd party application for the user who is targeted in proximity request.

5.1.4.7.32 Requested PLMN Identifier

This field contains PLMN identifier (MCC and MNC) of the user who is targeted in proximity request.

5.1.4.7.33 Requestor Application Layer User ID

This field carrys the user identifier designated in 3rd party application for the user who initiate EPC-level ProSe discovery request.

5.1.4.7.34 Requestor EPC ProSe User ID

This field carrys the identifier generated in ProSe Function for UE who initiate EPC-level ProSe Discovery request.

5.1.4.7.35 Requestor PLMN Identifier

This field contains PLMN identifier (MCC and MNC) of the user who initiate proximity request.

5.1.4.7.36 Role Of ProSe Function

This field indicates ProSe Function resides in which PLMN, i.e. HPLMN, VPLMN, Local PLMN.

5.1.4.7.37 Role Of UE

This field indicates role of the UE using ProSe served by the ProSe Function who generates the CDR, e.g. Announcing UE, Monitoring UE.

5.1.4.7.38 Source IP address

This field holds the IP address UE used as source address for performing ProSe Direct Communication.

5.1.4.7.38a Target IP address

The field holds the IP address used as target address for performing ProSe Direct one-to-one Communication.

5.1.4.7.38A Time of First Reception

This field contains the time when collection of reception data is started for the group in this CDR, i.e., the first one-to-many direct communication reception started.

5.1.4.7.38B Time of First Transmission

This field contains the time when collection of transmitted data is started for the group in this CDR, i.e., the first one-to-many direct communication transmission started.

5.1.4.7.39 Time Window

This field specify a time interval in minutes during which a proximity request is valid. The Time Window is in the range of 1 – 1440 minutes.

5.1.4.7.40 UE Location

This field carries the UE location with the best known accuracy (e.g. Cell ID or geo-location coordinates). The UE Location is set to the cell identity part of the Evolved Cell Global Identifier and obtained from the lower layers of the UE. The value of UE Location is with fixed length of 28 bits.

5.1.4.7.41 Validity Period

This field holds the time interval duration in minutes during which user is authorized for using ProSe Direct Discovery functionality (e.g. Announcing, Monitoring, Match reporting).

5.1.4.7.42 WLAN Link Layer ID

This field carrys WLAN link layer identifier.

5.1.4.8 Monitoring Event CDR parameters

5.1.4.8.0 Introduction

This clause contains the description of each field of the Monitoring Event CDRs specified in TS 32.278 [38].

5.1.4.8.1 Accuracy

This field contains desired level of accuracy of the requested location information and is applicable to the "Location Reporting" Monitoring Event type. Accuracy could be at cell level (CGI/ECGI), eNB, TA/RA level.

5.1.4.8.2 Chargeable Party Identifier

This field identifies the entity towards which accounting/charging functionality is performed by the involved 3GPP network elements.

5.1.4.8.3 Event Timestamp

This field contains the timestamp of the event that triggered the generation of charging information for the Monitoring Event action.

5.1.4.8.4 List of Locations

This field identifies the list of cells, eNBs and/or RAI(s)/TAI(s) for determination of the number of UEs in the area and is applicable to the "Number of UEs present in a geographic area" Monitoring Event type.

5.1.4.8.5 List of Monitoring Event Report Data

This list includes charging information for one or more Monitoring Event reports. Each Monitoring Event Report Data container may include the following fields:

- Event Timestamp
- SCEF Reference ID
- SCEF Id
- Monitoring Event Report Number
- Chargeable Party Identifier

- Monitored User
- Monitoring Type
- Reachability Information
- Reported Location
- Communication Failure Information
- List of Number Of UE Per Location Reports

Event Timestamp is a time stamp, which defines the moment when the event triggered the generation of charging information for the Monitoring Event report.

SCEF Reference ID is the identifier created by the SCEF, to identify a Monitoring Request. When combined with the SCEF Id, serves as a globally unique identifier for the Monitoring Request.

SCEF Id is the identifier of the SCEF to which the Monitoring Event Report message was sent.

Monitoring Event Report Number contains the number of the report being sent for the specific request from this node. The number is monotonically increasing for each report starting at 1 for each unique request.

Chargeable Party Identifier identifies the entity towards which accounting/charging functionality is performed by the involved 3GPP network elements.

Monitored User identifies the user that is monitored and is applicable to the "Loss of connectivity", "UE reachability", "Location Reporting", "Communication Failure" and "Availability after DDN Failure" monitoring event types.

Monitoring Type identifies the specific Monitoring Event being reporting.

Reachability Information identifies the reachability status of the UE and is applicable to the "UE reachability" Monitoring Event type.

Reported Location indicates the reported 3GPP system specific location information and is applicable to the "Location Reporting" Monitoring Event type.

Communication Failure Information indicates the reported the reason for communication failure and is applicable to the "Communication Failure" Monitoring Event type.

List of Number of UE per Location Reports contains a list of the location information along with the number of UEs found at that location by the MME/SGSN. It is applicable to the "the number of UEs at a given geographic location" Monitoring Event type.

5.1.4.8.6 Local Record Sequence Number

This field includes a unique record number created by this node. The number is allocated sequentially for each 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.

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

5.1.4.8.7 Location Type

This field identifies whether the request is for Current Location or Last Known Location and is applicable to the "Location Reporting" and "Number of UEs present in a geographic area" Monitoring Event type.

5.1.4.8.8 Maximum Detection Time

This field identifies the maximum period of time without any communication with the UE after which the SCEF is to be informed that the UE is considered to be unreachable and is applicable to the "Loss of connectivity" Monitoring Event type. The value is on the order of 1 minute to multiple hours.

5.1.4.8.9 Maximum Number of Reports

This field identifies the maximum number of event reports to be generated until the associated Monitoring Event is considered to expire. A value of one implies a single event report is to be generated which makes it equivalent to a One-time Monitoring Request. This parameter is not applicable to the "Availability after DDN Failure" Monitoring Event type.

5.1.4.8.10 Monitored User

This field identifies the user that is monitored and is applicable to the "Loss of connectivity", "UE reachability", "Location Reporting", "Communication Failure" and "Availability after DDN Failure" Monitoring Event types.

5.1.4.8.11 Monitoring Duration

This field identifies the absolute time at which the related Monitoring Event request is considered to expire.

5.1.4.8.12 Monitoring Event Config Status

This field identifies whether the request was successful or not. When the request is not successful, a specific value is chosen to indicate the error occurred during handling of the Requested action for the Monitoring event.

5.1.4.8.13 Monitoring Event Configuration Activity

This field indicates Monitoring Event Configuration Activity, i.e. create, transfer, update, and delete.

5.1.4.8.14 Monitoring Type

This field identifies the specific Monitoring Event being requested, which can have the following values:

- Loss of connectivity.
- UE reachability.
- Location Reporting.
- Communication Failure.
- Availability after DDN Failure
- Number of UEs present in a geographic area.

5.1.4.8.15 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.

5.1.4.8.16 Reachability Configuration

This field contains the details for configuration for UE reachability, including reachability type, maximum latency and maximum response time.

5.1.2.8.17 Record Opening Time

A time stamp reflecting the time the CDF opened this record.

5.1.2.8.18 Record Type

The field identifies the type of the record i.e. ME-CO-CDR and ME-RE-CDR.

5.1.2.8.19 Retransmission

This parameter, when present, indicates that information from retransmitted Accounting Requests have been used in this CDR.

5.1.4.8.20 SCEF ID

This field contains identifier of the SCEF to which the Monitoring Event Report message was sent.

5.1.4.8.21 SCEF Reference ID

When combined with the SCEF ID, this field serves as a globally unique identifier for the Monitoring Event Request.

5.1.5 Common charging data in CHF-CDR

5.1.5.0 CHF record (CHF-CDR)

If enabled, CHF records shall be produced for chargeable events, with or without quota management. The generic fields in the record are specified in table 5.1.5.0.1. The NF specific parts will be concatenated to this e.g. the PDU Session Information, PDU Container Information and Roaming QBC Information are concatenated for the SMF.

Table 5.1.5.0.1: CHF record (CHF-CDR)

Field	Category	Description
Record Type	M	CHF record.
Recording Network Function ID	O_M	This field holds the name of the recording entity, i.e. the CHF id.
Charging Session Identifier	O_C	This field holds the Session Identifier described in TS 32.290 [57].
Subscriber Identifier	O_M	This field holds the 5G Subscription Permanent Identifier (SUPI) of the served party as specified in TS 29.571 [249], if available.
Tenant Identifier	O_M	This field holds the tenant identifier
MnS Consumer Identifier	O_M	This fields holds the identifier of the MnS Consumer.
NF Consumer Information	M	This field holds the information of the NF consumer of the charging service.
NF Functionality	M	This field holds the type of functionality the NF provides.
NF Name	O_C	This field holds the name of the NF used.
NF Address	O_C	This field holds the IP Address of the NF used.
NF PLMN ID	O_C	This field holds the PLMN identifier (MCC MNC) of the NF.
Triggers	O_C	This field holds the triggers that are common to all Multiple Unit Usage. Can be the same as in Used Unit Container.
SMF Triggers	O_C	This field holds the 5G data connectivity specific triggers described in TS 32.255 [15].
List of Multiple Unit Usage	O_C	This field holds the parameters for the unit reporting. It may have multiple occurrences.
Rating Group	M	This filed holds the rating group. The parameter corresponds to the Charging Key as specified in TS 23.203 [203]
Used Unit Container	O_C	This field holds the used units and information connected to the reported units.
Service Identifier	O_C	This field holds the Service Identifier.
Quota management Indicator	O_C	This field holds an indicator on whether the reported used units are with or without quota management control. If the field is not present, it indicates the used unit is without quota management applied.
Local Sequence Number	O_M	This field holds the container sequence number.
Time	O_C	This field holds the amount of used time.
Uplink Volume	O_C	This field holds the amount of used volume in uplink direction.
Downlink Volume	O_C	This field holds the amount of used volume in downlink direction.
Total Volume	O_C	This field holds the amount of used volume in both uplink and downlink directions.
Service Specific Units	O_C	This field holds the amount of used service specific units.
Event Time Stamp	O_C	This field holds the timestamps of the event reported in the Service Specific Units, if the reported units are event based.
Rating Indicator	O_C	This field indicates if the units have been rated or not.
Triggers	O_C	This field holds the triggers that caused the Used Unit Container to be reported, independently on if they are PDU Session or RG level triggers.
SMF Triggers	O_C	This field holds the 5G data connectivity specific triggers described in TS 32.255 [15].
Trigger Time Stamp	O_C	This field holds the timestamp of the trigger.
PDU Container Information	O_C	This field holds the 5G data connectivity specific information described in TS 32.255 [15].
NSPA Container Information	O_C	This field holds the network slice performance and analytics container specific information described in TS 28.201 [151].
UPF ID	O_C	This field holds the UPF identifier used to identify the UPF when reporting the usage for the UPF.
Record Opening Time	O_C	Time stamp when the PDU session is activated in the SMF or record opening time on subsequent partial records.
Duration	M	This field holds the duration of this record.

Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Cause for Record Closing	M	The reason for the release of the record.
Local Record Sequence Number	O_M	Consecutive record number created by the CDF. The number is allocated sequentially including all CDR types.
Record Extensions	O_C	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension. This field can be used to capture the specific information for charging.
Service Specification Information	O_C	Identifies service specific document that applies to the request, e.g. the service specific document ('middle tier' TS) and 3GPP release the service specific document is based upon.
PDU Session Charging Information	O_M	This field holds the 5G data connectivity specific information described in TS 32.255 [15]
Roaming QBC Information	O_M	This field holds the roaming 5G data connectivity specific information described in TS 32.255 [15]
SMS Charging Information	O_C	This field holds the SMS specific information described in TS 32.274 [34].
Registration Charging Information	O_M	This field holds the 5G registration specific information described in TS 32.256 [16].
N2 connection charging Information	O_M	This field holds the N2 connection specific information described in TS 32.256 [16].
Location reporting charging Information	O_M	This field holds the Location reporting specific information described in TS 32.256 [16].
NSPA Charging Information	O_M	This field holds the performance and analytics specific information described in TS 28.201 [151].
NSM charging Information	O_M	This field holds the Network Slice Management (NSM) specific information described in TS 28.202 [71].

5.1.5.1 CHF CDR parameters

5.1.5.1.1 Introduction

This clause contains the description of each field of the CHF CDRs which are common to all CHF CDRs independent of Network Function using the Converged Charging service. This CDR will be concatenated with the Network Function specific information.

5.1.5.1.2 Cause for Record Closing

This field contains a reason for the release of the CDR, in CHF case reception of Charging Data Request [Termination].

5.1.5.1.3 Duration

This field contains the relevant duration in seconds for the session. 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.

5.1.5.1.4 List of Multiple Unit Usage

This list applicable in CHF-CDR and includes one or more containers.

Each container includes the following fields:

- **Rating Group** This field holds the rating group. The parameter corresponds to the Charging Key as specified in TS 23.203 [203]
- **Used Unit Container** This field holds the used units and information connected to the reported units.
- **PDU Container Information** This field holds the 5G data connectivity specific information described in TS 32.255 [15].

- **UPF ID** This field holds the UPF identifier used to identify the UPF when reporting the usage for the UPF.

5.1.5.1.5 Local Record Sequence Number

This field includes a unique record number created by this network function. The number is allocated sequentially for each partial CDR (or whole CDR) including all CDR types. The number is unique within one network function, which is identified by field Recording Network Function ID.

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

5.1.5.1.6 NF Consumer Information

This field contains the information about the NF that used the charging service.

It includes the following fields:

- **NF Functionality** includes the functionality provided by the NF.
- **NF Name** contains the UUID of the NF.
- **NF Address** contains the IP-address and/or FQDN of the NF
- **NF PLMN ID** holds the PLMN id of the NF

For further details see TS 23.003 [200].

5.1.5.1.7 Rating Group

The field identifies the rating group. The parameter corresponds to the Charging Key as specified in TS 23.203 [203].

5.1.5.1.8 Record Opening Time

This field contains the time stamp when the request Charging Data Request [Initial] is received in the CHF from the NF or Charging Data Request [Update] in the case of a partial record.

5.1.5.1.9 Record Sequence Number

This field contains a running sequence number employed to link the partial records generated in the CHF.

5.1.5.1.10 Record Type

The field identifies the type of the record i.e. CHF-CDR.

5.1.5.1.11 Recording Network Function ID

This field contains the UUID of the Network Function Instance ID assigned to the instance that produced the record. For further details see TS 23.003 [200].

5.1.5.1.12 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 X.721 [305].
This is conditioned upon the existence of an extension. This field may contain the specific information for converged charging (e.g. with quota management).

5.1.5.1.13 Subscriber Identifier

This field contains the 5G Subscription Permanent Identifier (SUPI) of the served party, if available. For further details see TS 23.003 [200].

5.1.5.1.14 Used Unit Container

This list applicable in CHF-CDR includes one or more containers.

Each container includes the following fields:

- **Service Identifier** may designate an end user service, a part of an end user service or an arbitrarily formed group thereof.
- **Quota management Indicator** holds an indicator on whether the reported used units are with or without quota management control. If the field is not present, it indicates the used unit is without quota management applied.
- **Local Sequence Number** is the sequence number for the used unit containers, i.e. the order in which charging information was reported or used unit container was closed.
- **Time** includes the duration of a time based service.
- **Uplink Volume** includes the number of octets transmitted during the use of the packet data services in the uplink direction. The counting of uplink data volumes is optional.
- **Downlink Volume** includes the number of octets transmitted during the use of the packet data services in the downlink direction.
- **Total Volume** includes the total number of octets transmitted in both uplink and downlink direction.
- **Service Specific Units** includes the number of units, specific for the service, used during the service.
- **Event Time Stamp** defines the moment when the event was reported in the Service Specific Units when event based charging applies.
- **Rating Indicator** indicates if the units have been rated or not.
- **Triggers** includes the reason for charging information reporting or closing for the used unit container, the 5G data connectivity specific triggers are described in TS 32.255 [15].
- **Trigger Time Stamp** is the date and time of the charging information reporting or closing for the used unit container.
- **PDU Container Information** is the 5G data connectivity specific information described in TS 32.255 [15].

5.1.5.1.15 User Location Information

This field contains the User Location as described in TS 29.571 [249].

5.1.5.1.16 Service Specification Information

This field contains the Service Specification Information, e.g. the service specific document ('middle tier' TS) and 3GPP release the service specific document is based upon.

5.1.5.1.17 RAT Type

This field contains the Radio Access Technology (RAT) type used, as provided to CHF, it’s based on the RatType specified in TS 29.571 [249] with 3GPP RAT Type specified in TS 29.061 [216] added for backwards compatibility.

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 [214].

```
.$GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

AddressString,
ISDN-AddressString,
LCSClientExternalID,
LCSClientInternalID
FROM MAP-CommonDataTypes { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }
-- from TS 29.002 [214]

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)  version18 (18)}
-- from TS 29.002 [214]

ObjectInstance
FROM CMIP-1 {joint-iso-itu-t ms (9) cmip (1) modules (0) protocol (3)}
-- from Rec. X.711 [304]

ManagementExtension
FROM Attribute-ASN1Module {joint-iso-itu-t ms (9) smi (3) part2 (2) asn1Module (2) 1}
-- from Rec. X.721 [305]

AE-title
FROM ACSE-1 {joint-iso-itu-t association-control (2) modules (0) apdus (0) version1 (1) };
-- Note that the syntax of AE-title to be used is from
-- ITU-T Rec. X.227[306) / ISO 8650 corrigendum and not "ANY"

--
--  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 [208].
-- 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.
--

CalledNumber            ::= BCDDirectoryNumber
```

```
CallingNumber   ::= BCDDirectoryNumber

CellId  ::= OCTET STRING (SIZE(2))
--
-- Coded according to TS 24.008 [208]
--

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

CauseForRecClosing  ::= INTEGER
--
-- Cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
-- There is no direct correlation between these two types.
--
-- LCS related causes belong to the MAP error causes acc. TS 29.002 [214]
--
-- 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
--
-- sWGChange value is used in both the S-GW, TWAG and ePDG for inter serving node change
--
{
    normalRelease                   (0),
    abnormalRelease                 (4),
    cAMELInitCallRelease            (5),
    volumeLimit                     (16),
    timeLimit                       (17),
    servingNodeChange               (18),
    maxChangeCond                   (19),
    managementIntervention          (20),
    intraSGSNIntersystemChange      (21),
    rATChange                       (22),
    mSTimeZoneChange                (23),
    sGSNPLMNIDChange                (24),
    sGWChange                       (25),
    aPNAMBRChange                   (26),
    mOExceptionDataCounterReceipt   (27),
    unauthorizedRequestingNetwork   (52),
    unauthorizedLCSClient           (53),
    positionMethodFailure           (54),
    unknownOrUnreachableLCSClient   (58),
    listofDownstreamNodeChange      (59)
}

CauseForTerm            ::= INTEGER
--
-- Cause codes from 16 up to 31 are defined 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 [214].
--
{
    normalRelease                       (0),
    partialRecord                       (1),
    partialRecordCallReestablishment    (2),
    unsuccessfulCallAttempt             (3),
    abnormalRelease                     (4),
    cAMELInitCallRelease                (5),
    unauthorizedRequestingNetwork       (52),
    unauthorizedLCSClient               (53),
    positionMethodFailure               (54),
    unknownOrUnreachableLCSClient       (58)
}

ChargingID  ::= INTEGER (0..4294967295)
--
-- Generated in P-GW, part of IP-CAN bearer
-- 0..4294967295 is equivalent to 0..2**32-1
--

CivicAddressInformation     ::= OCTET STRING
```

```
--
-- as defined in subclause 3.1 of IETF RFC 4776 [409] excluding the first 3 octets.
--

CNIPMulticastDistribution       ::= ENUMERATED
{
    nO-IP-MULTICAST             (0),
    iP-MULTICAST                (1)
}

DataVolumeOctets        ::= INTEGER
--
-- The volume of data transferred in octets.
--

DynamicAddressFlag  ::= BOOLEAN


Diagnostics                     ::= CHOICE
{
    gsm0408Cause                                [0] INTEGER,
    -- See TS 24.008 [208]
    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 [214].
    --
    itu-tQ767Cause                          [2] INTEGER,
    -- See Q.767 [309]
    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 [214]
    unauthorizedLCSClientCause              [6] UnauthorizedLCSClient-Diagnostic,
    -- see TS 29.002 [214]
    diameterResultCodeAndExperimentalResult [7] INTEGER
    -- See TS 29.338 [230], TS 29.337 [231], TS 29.128 [244]
}

DiameterIdentity        ::= OCTET STRING

EnhancedDiagnostics                 ::= SEQUENCE
{
    rANNASCause                     [0] SEQUENCE OF RANNASCause
}

GSNAddress  ::= IPAddress

InvolvedParty ::= CHOICE
{
    sIP-URI     [0] GraphicString, -- refer to rfc3261 [401]
    tEL-URI     [1] GraphicString,  -- refer to rfc3966 [402]
    uRN         [2] GraphicString,  -- refer to rfc5031 [407]
    iSDN-E164   [3] GraphicString   -- refer to ITU-T Recommendation E.164[308]
}

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

IPBinaryAddress ::= CHOICE
{
    iPBinV4Address          [0] IPBinV4Address,
    iPBinV6Address              IPBinV6AddressWithOrWithoutPrefixLength
}

IPBinV4Address  ::= OCTET STRING (SIZE(4))

IPBinV6Address  ::= OCTET STRING (SIZE(16))

IPBinV6AddressWithOrWithoutPrefixLength ::= CHOICE
{
       iPBinV6Address             [1] IPBinV6Address,
       iPBinV6AddressWithPrefix   [4] IPBinV6AddressWithPrefixLength
```

```
}

IPBinV6AddressWithPrefixLength ::= SEQUENCE
{
       iPBinV6Address                   IPBinV6Address,
       pDPAddressPrefixLength           PDPAddressPrefixLength DEFAULT 64
}

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 [227]
--

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 [227]
--

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 [208]
--

ManagementExtensions    ::= SET OF ManagementExtension

MBMS2G3GIndicator       ::= ENUMERATED
{
    twoG                (0),    -- For GERAN access only
    threeG          (1),    -- For UTRAN access only
    twoG-AND-threeG (2)     -- For both UTRAN and GERAN access
}

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,
```

```
    mBMSGWAddress               [10] GSNAddress OPTIONAL,
    cNIPMulticastDistribution   [11] CNIPMulticastDistribution OPTIONAL,
    mBMSDataTransferStart       [12] MBMSTime OPTIONAL,
    mBMSDataTransferStop            [13] MBMSTime OPTIONAL
}

MBMSServiceArea     ::= OCTET STRING

MBMSServiceType     ::= ENUMERATED
{
    mULTICAST       (0),
    bROADCAST       (1)
}

MBMSSessionIdentity     ::= OCTET STRING (SIZE (1))
--
-- This octet string is a 1:1 copy of the contents of the MBMS-Session-Identity
-- AVP specified in TS 29.061 [82]
--

MBMSTime    ::= OCTET STRING (SIZE (8))
--
-- This value indicates the time in seconds relative to 00:00:00 on 1 January 1900 (calculated as
-- continuous time without leap seconds and traceable to a common time reference) where binary
-- encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in
-- the last 32 bits. The fraction part is expressed with a granularity of 1 /2**32 second as
-- specified in TS 29.061 [82].
--

MBMSUserServiceType     ::= ENUMERATED
{
    dOWNLOAD        (0),
    sTREAMING   (1)
}

MCC-MNC     ::= OCTET STRING (SIZE(3))
--
-- See TS 24.008 [208]
--

MessageClass        ::= ENUMERATED
{
    personal            (0),
    advertisement       (1),
    information-service (2),
    auto                (3)
}

MessageReference        ::= OCTET STRING

MSCAddress      ::= AddressString

MscNo                   ::= ISDN-AddressString
--
-- See TS 23.003 [200]
--

MSISDN                  ::= ISDN-AddressString
--
-- See TS 23.003 [200]
--

MSTimeZone  ::= OCTET STRING (SIZE (2))
--
-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060 [215]
--

NodeID      ::= IA5String (SIZE(1..20))

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

PDPAddressPrefixLength      ::=INTEGER (1..64)
--
-- This is an interger indicating the leght of the PDP/PDN IPv6 address prefix
```

```
-- and the default value is 64 bits.
--

PDPAddress      ::= CHOICE
{
    iPAddress               [0] IPAddress
--  eTSIAddress             [1] ETSIAddress
--                              has only been used in earlier releases for X.121 format
}

PLMN-Id     ::= OCTET STRING (SIZE (3))
--
--  This is in the same format as octets 2,3,and 4 of the Routing Area Identity (RAI) IE specified
--  in TS 29.060 [215]
--

PositioningData ::= OCTET STRING (SIZE(1..33))
--
-- See Positioning Data IE (octet 3..n), TS 49.031 [227]
--

PriorityType    ::= ENUMERATED
{
    low         (0),
    normal      (1),
    high        (2)
}

RANNASCause             ::= OCTET STRING
-- This octet string is a 1:1 copy of the contents (i.e. starting with octet 5)
-- of the "RAN/NAS Cause" information element specified in TS 29.274 [223].

RATType     ::= INTEGER (0..255)
--
--This integer is 1:1 copy of the RAT type value as defined in TS 29.061 [215].
--

RecordingEntity         ::= AddressString

RecordType  ::= INTEGER
--
--  Record values 0..17 and 87,89  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),   -- also MME UE originated SMS record
    sgsnSMTRecord       (22),   -- also MME UE terminated SMS record
--
--  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..70, 82, 89..91 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),
    eCSCFRecord         (70),
    iBCFRecord          (82),
    tRFRecord           (89),
    tFRecord                (90),
    aTCFRecord          (91),
--
--  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..79,86 are MBMS specific.
--  The contents are defined in TS 32.251 [11] and TS 32.273 [33]
--
--  Record values 76,77 and 86 are MBMS bearer context specific
--
    sgsnMBMSRecord      (76),
    ggsnMBMSRecord      (77),
    gwMBMSRecord        (86),
--
--  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 and 92,95,96, 97 are EPC specific.
--  The contents are defined in TS 32.251 [11]
--
    sGWRecord           (84),
    pGWRecord           (85),
    tDFRecord           (92),
    iPERecord           (95),
    ePDGRecord          (96),
    tWAGRecord          (97),
--
--  Record Value 83 is MMTel specific. The contents are defined in TS 32.275 [35]
--
    mMTelRecord         (83),
--
--  Record value  87,88 and 89 are CS specific. The contents are defined in TS 32.250 [10]
--
    mSCsRVCCRecord      (87),
    mMTRFRecord         (88),
    iCSRegisterRecord   (99),
--
--  Record values 93 and 94 are SMS specific. The contents are defined in TS 32.274 [34]
--
    sCSMORecord         (93),
    sCSMTRecord         (94),
--
--  Record values 100, 101 and 102 are ProSe specific. The contents are defined in TS 32.277 [36]
--
    pFDDRecord          (100),
    pFEDRecord          (101),
    pFDCRecord          (102),
--
--  Record values103 and 104 are Monitoring Event specific. The contents are defined in TS
--  32.278 [38]
--
    mECORecord          (103),
    mERERecord          (104),
--
--  Record values 105 to 106 are CP data transfer specific. The contents are defined in TS
--  32.253 [13]
--
    cPDTSCERecord           (105),
    cPDTSNNRecord           (106), --
--  Record values 110 to 113 are SMS specific. The contents are defined in TS
--  32.274 [34]
--
    sCDVTT4Record           (110),
    sCSMOT4Record           (111),
    iSMSMORecord            (112),
    iSMSMTRecord            (113),
--
--  Record values 120 are Exposure Function API specific. The contents are defined in TS
--  32.254 [14]
--
    eASCERecord         (120),
--
--  Record values from 200 are specific to Charging Function domain
--
    chargingFunctionRecord      (200)
--


}

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 TS 29.060 [75].
--

RoutingAreaCode ::= OCTET STRING (SIZE(1))
--
-- See TS 24.008 [208]
--
```

```
SCSASAddress        ::= SET
--
--
--
{
    sCSAddress  [1] IPAddress,
    sCSRealm        [2] DiameterIdentity
}

Session-Id  ::= GraphicString
--
-- rfc3261 [401]: example for SIP CALL-ID: f81d4fae-7dec-11d0-a765-00a0c91e6bf6@foo.bar.com
--

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 [201].
-- This encoding includes type of number and numbering plan indication
-- together with the address value range.
--

SubscriberEquipmentNumber   ::= SET
--
-- If SubscriberEquipmentType is set to IMEISV and IMEI is received, the number of digits is 15.
--
{
    subscriberEquipmentNumberType   [0] SubscriberEquipmentType,
    subscriberEquipmentNumberData   [1] OCTET STRING
}

SubscriberEquipmentType ::= ENUMERATED
--
-- It should be noted that depending on the services, not all equipment types are applicable.
-- For IMS equipment types 0 and 3 are applicable.
--
{
    iMEISV          (0),
    mAC             (1),
    eUI64           (2),
    modifiedEUI64   (3)
}

SubscriptionID  ::= SET
--
-- used for ExternalIdentifier with SubscriptionIdType = END-User-NAI. See TS 23.003 [200]
--
{
    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)

--
-- eND-USER-IMSI can be used for 5G BRG or 5G CRG.
-- eND-USER-NAI can be used to contain GLI or GCI for wireless access network scenarios
-- NAI format containing a GCI or GLI is specified in 28.15.5 and 28.15.6 of TS 23.003 [200].
--
```

```
}

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

ThreeGPPPSDataOffStatus     ::= ENUMERATED
{
    active          (0),
    inactive        (1)
}


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
--

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 TS 29.060 [75].
--

.#END
```

5.2.2 Bearer level CDR definitions

5.2.2.0 General

This clause 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]) and the Packet Switched (PS) domain, i.e. GPRS (TS 32.251 [11]).

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) version2 (1)}  DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

AE-title,
BCDDirectoryNumber,
CallDuration,
CalledNumber,
CallingNumber,
CauseForTerm,
CellId,
ChargeIndicator,
Diagnostics,
LCSCause,
LCSClientIdentity,
LCSQoSInfo,
LevelOfCAMELService,
LocationAreaAndCell,
LocationAreaCode,
ManagementExtensions,
MCC-MNC,
MessageReference,
MSCAddress,
MscNo,
MSISDN,
NodeAddress,
ObjectInstance,
PositioningData,
RecordingEntity,
RecordType,
SMSResult,
SmsTpDestinationNumber,
SystemType,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

BearerServiceCode
FROM MAP-BS-Code {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-BS-Code (20)  version18 (18) }
-- from TS 29.002 [214]

TeleserviceCode
FROM MAP-TS-Code {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-TS-Code (19)  version18 (18) }
-- from TS 29.002 [214]

SS-Code
FROM MAP-SS-Code { itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-SS-Code (15)  version18 (18) }
-- from TS 29.002 [214]

MOLR-Type
FROM SS-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2)
modules (3) ss-DataTypes (2)  version14 (14)}
-- from TS 24.080 [209]

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)  version18 (18) }
-- from TS 29.002 [214]

CallReferenceNumber,
NumberOfForwarding
FROM MAP-CH-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-CH-DataTypes (13)  version18 (18) }
-- from TS 29.002 [214]

AddressString,
BasicServiceCode,
IMEI,
IMSI,
ISDN-AddressString
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }
-- from TS 29.002 [214]

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)  version18 (18) }
-- from TS 29.002 [214]

IMS-Charging-Identifier,
InterOperatorIdentifierList,
TransitIOILists
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version2 (1)}

BasicService
FROM Basic-Service-Elements {itu-t(0) identified-organization (4) etsi (0) 196 basic-service-
elements (8) }
-- from "Digital Subscriber Signalling System No. one (DSS1) protocol" ETS 300 196 [310]

DestinationRoutingAddress
FROM CAP-datatypes { itu-t(0) identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) cap-datatypes (52) version8 (7) }
-- from TS 29.078 [217]

;

--
--  CS CALL AND EVENT RECORDS
--

CSRecord    ::= CHOICE
--
-- Record values 0..21 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,
    mSCsRVCCRecord         [20] MSCsRVCCRecord,
```

```
    mMTRFRecord             [21] MTRFRecord,
    iCSRegisterRecord       [22] ICSregisterRecord
}

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] CallReferenceNumber,
    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,
    iCSI2ActiveFlag             [75] NULL OPTIONAL,
    iMS-Charging-Identifier     [76] IMS-Charging-Identifier OPTIONAL,
    privateUserID               [77] GraphicString 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] CallReferenceNumber,
    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,
    iCSI2ActiveFlag         [59] NULL OPTIONAL,
    iMS-Charging-Identifier [60] IMS-Charging-Identifier OPTIONAL,
    privateUserID           [61] GraphicString 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] CallReferenceNumber,
    sequenceNumber          [20] INTEGER OPTIONAL,
    recordExtensions            [21] ManagementExtensions OPTIONAL,
    networkCallReference        [22] NetworkCallReference OPTIONAL,
    mSCAddress              [23] MSCAddress OPTIONAL,
    locationRoutNum         [24] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [25] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQueryStatus          [26] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                 [27] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [28] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus          [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] CallReferenceNumber,
    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,
    lrnQueryStatus              [38] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                     [39] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                        [40] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQueryStatus              [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] CallReferenceNumber,
    sequenceNumber         [14] INTEGER OPTIONAL,
    recordExtensions            [15] ManagementExtensions OPTIONAL,
    locationRoutNum        [16] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [17] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus          [18] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                [19] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [20] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus          [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] CallReferenceNumber,
    sequenceNumber         [14] INTEGER OPTIONAL,
    recordExtensions            [15] ManagementExtensions OPTIONAL,
    locationRoutNum        [16] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [17] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus          [18] LocationRoutingNumberQueryStatus OPTIONAL,
    jIPPara                [19] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [20] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus          [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] CallReferenceNumber,
    sequenceNumber          [15] INTEGER OPTIONAL,
    recordExtensions            [16] ManagementExtensions OPTIONAL,
    locationRoutNum         [17] LocationRoutingNumber OPTIONAL,
    lrnSoInd                    [18] LocationRoutingNumberSourceIndicator OPTIONAL,
    lrnQuryStatus           [19] LocationRoutingNumberQueryStatus OPTIONAL,
```

```
    jIPPara                 [20] JurisdictionInformationParameter OPTIONAL,
    jIPSoInd                    [21] JurisdictionInformationParameterSourceIndicator OPTIONAL,
    jIPQuryStatus           [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,
    locationExtension       [15] LocationCellExtension 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,
    locationExtension       [13] LocationCellExtension 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] CallReferenceNumber,
    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
}

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,
    locationExtension       [10] LocationCellExtension 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] CallReferenceNumber,
    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] CallReferenceNumber 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 OPTIONAL,
    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,
    servedIMEI              [22] IMEI OPTIONAL
}

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
}

--
--  SRVCC RECORDS
--

MSCsRVCCRecord  ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI OPTIONAL,
    servedIMEI                  [2] IMEI OPTIONAL,
    servedMSISDN                    [3] MSISDN OPTIONAL,
    calledNumber                    [5] CalledNumber,
    recordingEntity             [9] RecordingEntity,
    mscOutgoingTKGP             [11] TrunkGroup OPTIONAL,
    location                        [12] LocationAreaAndCell,
    changeOfLocation                [13] SEQUENCE OF LocationChange OPTIONAL,
    basicService                    [14] BasicServiceCode,
    supplServicesUsed           [17] SEQUENCE OF SuppServiceUsed OPTIONAL,
    msClassmark                 [20] Classmark OPTIONAL,
    seizureTime                 [22] TimeStamp OPTIONAL,
    answerTime                  [23] TimeStamp OPTIONAL,
    releaseTime                 [24] TimeStamp OPTIONAL,
    callDuration                    [25] CallDuration,
    causeForTerm                    [30] CauseForTerm,
    diagnostics                 [31] Diagnostics OPTIONAL,
    callReference               [32] CallReferenceNumber,
    sequenceNumber              [33] INTEGER OPTIONAL,
    recordExtensions                [35] ManagementExtensions OPTIONAL,
    partialRecordType           [69] PartialRecordType OPTIONAL,
    iMS-Charging-Identifier     [75] IMS-Charging-Identifier OPTIONAL,
    iCSI2ActiveFlag             [76] NULL OPTIONAL,
    relatedICID                 [77] IMS-Charging-Identifier OPTIONAL,
    relatedICIDGenerationNode   [78] NodeAddress OPTIONAL
}

--
--  MTRF RECORD
--

MTRFRecord          ::= SET
{
    recordType              [0] RecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN                [3] CalledNumber OPTIONAL,
    callingNumber           [4] CallingNumber OPTIONAL,
    roamingNumber           [5] RoamingNumber OPTIONAL,
    recordingEntity         [6] RecordingEntity,
    mscIncomingTKGP         [7] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [8] TrunkGroup OPTIONAL,
    basicService                [9] BasicServiceCode OPTIONAL,
    seizureTime             [10] TimeStamp OPTIONAL,
    answerTime              [11] TimeStamp OPTIONAL,
    releaseTime             [12] TimeStamp OPTIONAL,
    callDuration                [13] CallDuration,
    causeForTerm                [14] CauseForTerm,
    diagnostics             [15] Diagnostics OPTIONAL,
    callReference           [16] CallReferenceNumber,
    sequenceNumber          [17] INTEGER OPTIONAL,
    recordExtensions            [18] ManagementExtensions OPTIONAL,
    partialRecordType       [19] PartialRecordType OPTIONAL
}

--
--  ICS RECORD
```

```
--

ICSregisterRecord ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [1] IMSI,
    servedMSISDN                    [2] MSISDN,
    privateUserID               [3] GraphicString OPTIONAL,
    recordingEntity             [4] RecordingEntity,
    newLocation                 [5] Location-info,
    locationExtension           [6] LocationCellExtension OPTIONAL,
    updateTime                  [7] TimeStamp OPTIONAL,
    iMS-Charging-Identifier     [8] IMS-Charging-Identifier OPTIONAL,
    interOperatorIdentifiers        [9] InterOperatorIdentifierList OPTIONAL,
    transit-IOI-Lists           [10] TransitIOILists OPTIONAL,
    updateResult                    [11] LocUpdResult OPTIONAL,
    recordExtensions                [12] ManagementExtensions OPTIONAL
}

--
--  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 [208]
-- (note that value "4" is intentionally missing
-- because it is not used in TS 24.008 [208])
--
{
    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 [104].
--
{
    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 Recommendation Q.763.
--

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, Mobile station classmark 3, TS 24.008[208]
--

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

EquipmentId             ::= INTEGER

EquipmentType           ::= INTEGER
{
    conferenceBridge    (0)
}

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

```
}

Fnur                    ::= ENUMERATED
--
-- See Bearer Capability TS 24.008 [208]
--
{
    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 [217]
--

GenericNumber           ::= BCDDirectoryNumber

GenericNumbers          ::= SET OF GenericNumber

Gsm-SCFAddress          ::= ISDN-AddressString
--
-- See TS 29.002 [214]
--

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)
}

LocationCellExtension   ::= BIT STRING (SIZE (12))

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

Location-info           ::= SEQUENCE
{
    mscNumber           [1] MscNo OPTIONAL,
    location-area       [2] LocationAreaCode,
    cell-identification [3] CellId OPTIONAL,
    mCC-MNC             [4] MCC-MNC 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
}

Month       ::= INTEGER (1..12)

MSPowerClasses  ::= SET OF RFPowerCapability

NetworkCallReference    ::= CallReferenceNumber
--
-- See TS 29.002 [214]
--

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

```
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 [208]
--
{
    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 [208] expressed as an integer.
--

RoamingNumber           ::= ISDN-AddressString
--
-- See TS 23.003 [200]
--

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
--
-- Note that these values correspond to the contents
-- of the attributes aocServiceId and zoneId
-- respectively.
--
{
    aocService          [0] INTEGER,
    chargingZone            [1] INTEGER OPTIONAL
}

SimpleIntegerName           ::= INTEGER

SimpleStringName            ::= GraphicString

SpeechVersionIdentifier     ::= OCTET STRING (SIZE(1))
--
--  see GSM 08.08[313]
--
--  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
--
-- Note that the value of tariffId corresponds to the attribute tariffId.
--
{
    switchoverTime          [0] SwitchoverTime,
    tariffId                [1] INTEGER
}

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
--
-- Note that if the changeover time is not
-- specified then the change is immediate.
--
{
    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
}

TSCheckError            ::= SEQUENCE
{
    errorId             [0] TSCheckErrorId,
    fail                    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 [200]
--


.#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) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

AddressString,
CallDuration,
CallingNumber,
CauseForRecClosing,
CellId,
ChargingID,
CivicAddressInformation,
Diagnostics,
DiameterIdentity,
DynamicAddressFlag,
EnhancedDiagnostics,
GSNAddress,
InvolvedParty,
IPAddress,
LCSCause,
LCSClientIdentity,
LCSQoSInfo,
LevelOfCAMELService,
LocalSequenceNumber,
LocationAreaAndCell,
LocationAreaCode,
ManagementExtensions,
MBMSInformation,
MessageReference,
MSISDN,
MSTimeZone,
NodeID,
PDPAddress,
PLMN-Id,
PositioningData,
RATType,
RecordingEntity,
RecordType,
RoutingAreaCode,
SCSASAddress,
ServiceSpecificInfo,
SMSResult,
SmsTpDestinationNumber,
SubscriptionID,
ThreeGPPPSDataOffStatus,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

DefaultGPRS-Handling,
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) version18 (18)}
-- from TS 29.002 [214]

IMEI,
IMSI,
ISDN-AddressString,
RAIdentity
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0)gsm-Network (1)
modules (3) map-CommonDataTypes (18) version18 (18)}
-- from TS 29.002 [214]

CallReferenceNumber
```

```
FROM MAP-CH-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0)gsm-Network (1)
modules (3) map-CH-DataTypes (13) version18 (18)}
-- from TS 29.002 [214]

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) version18 (18) }
-- from TS 29.002 [214]

LocationMethod
FROM SS-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2)
modules (3) ss-DataTypes (2) version14 (14)}
-- from TS 24.080 [209]

;

--
--  GPRS RECORDS
--

GPRSRecord  ::= CHOICE
--
-- Record values 20, 22..27 are specific
-- Record values 76, 77, 86 are MBMS specific
-- Record values 78,79 and 92, 95, 96 are EPC specific
--
{
    sgsnPDPRecord           [20] SGSNPDPRecord,
    sgsnMMRecord            [22] SGSNMMRecord,
    sgsnSMORecord           [23] SGSNSMORecord,
    sgsnSMTRecord           [24] SGSNSMTRecord,
    sgsnMTLCSRecord         [25] SGSNMTLCSRecord,
    sgsnMOLCSRecord         [26] SGSNMOLCSRecord,
    sgsnNILCSRecord         [27] SGSNNILCSRecord,

    sgsnMBMSRecord          [76] SGSNMBMSRecord,
    ggsnMBMSRecord          [77] GGSNMBMSRecord,
    sGWRecord               [78] SGWRecord,
    pGWRecord               [79] PGWRecord,

    gwMBMSRecord            [86] GWMBMSRecord,

    tDFRecord               [92] TDFRecord,

    iPERecord               [95] IPERecord,
    ePDGRecord              [96] EPDGRecord,
    tWAGRecord              [97] TWAGRecord
}

SGWRecord   ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [3] IMSI OPTIONAL,
    s-GWAddress                 [4] GSNAddress,
    chargingID                  [5] ChargingID,
    servingNodeAddress          [6] SEQUENCE OF GSNAddress,
    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,
```

```
    servedIMEI                  [29] IMEI OPTIONAL,
    rATType                     [30] RATType OPTIONAL,
    mSTimeZone                  [31] MSTimeZone OPTIONAL,
    userLocationInformation     [32] OCTET STRING OPTIONAL,
    sGWChange                   [34] SGWChange OPTIONAL,
    servingNodeType             [35] SEQUENCE OF ServingNodeType,
    p-GWAddressUsed             [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier          [37] PLMN-Id OPTIONAL,
    startTime                   [38] TimeStamp OPTIONAL,
    stopTime                    [39] TimeStamp OPTIONAL,
    pDNConnectionChargingID     [40] ChargingID OPTIONAL,
    iMSIunauthenticatedFlag     [41] NULL OPTIONAL,
    userCSGInformation          [42] UserCSGInformation OPTIONAL,
    servedPDPPDNAddressExt      [43] PDPAddress OPTIONAL,
    lowPriorityIndicator        [44] NULL OPTIONAL,
    dynamicAddressFlagExt       [47] DynamicAddressFlag OPTIONAL,
    s-GWiPv6Address             [48] GSNAddress OPTIONAL,
    servingNodeiPv6Address      [49] SEQUENCE OF GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed         [50] GSNAddress OPTIONAL,
    retransmission              [51] NULL OPTIONAL,
    userLocationInfoTime        [52] TimeStamp OPTIONAL,
    cNOperatorSelectionEnt      [53] CNOperatorSelectionEntity OPTIONAL,
    presenceReportingAreaInfo   [54] PresenceReportingAreaInfo OPTIONAL,
    lastUserLocationInformation [55] OCTET STRING OPTIONAL,
    lastMSTimeZone              [56] MSTimeZone OPTIONAL,
    enhancedDiagnostics         [57] EnhancedDiagnostics OPTIONAL,
    cPCIoTEPSOptimisationIndicator [59] CPCIoTEPSOptimisationIndicator OPTIONAL,
    uNIPDUCPOnlyFlag            [60] UNIPDUCPOnlyFlag OPTIONAL,
    servingPLMNRateControl      [61] ServingPLMNRateControl OPTIONAL,
    pDPPDNTypeExtension         [62] PDPPDNTypeExtension OPTIONAL,
    mOExceptionDataCounter      [63] MOExceptionDataCounter OPTIONAL,
    listOfRANSecondaryRATUsageReports [64] SEQUENCE OF RANSecondaryRATUsageReport OPTIONAL
}

PGWRecord   ::= SET
--
--  List of traffic volumes is only applicable when Charging per IP-CAN session is active and
--  IP-CAN bearer charging is being performed for the session.
--
--  EPC QoS Information is only applicable when Charging per IP-CAN session is active.
--
{
    recordType                      [0] RecordType,
    servedIMSI                      [3] IMSI OPTIONAL,
    p-GWAddress                     [4] GSNAddress,
    chargingID                      [5] ChargingID,
    servingNodeAddress              [6] SEQUENCE OF GSNAddress,
    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,
    pSFurnishChargingInformation    [28] PSFurnishChargingInformation OPTIONAL,
    servedIMEI                      [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,
    servedMNNAI                     [36] SubscriptionID OPTIONAL,
    p-GWPLMNIdentifier              [37] PLMN-Id OPTIONAL,
    startTime                       [38] TimeStamp OPTIONAL,
    stopTime                        [39] TimeStamp OPTIONAL,
```

```
    served3gpp2MEID                 [40] OCTET STRING OPTIONAL,
    pDNConnectionChargingID         [41] ChargingID OPTIONAL,
    iMSIunauthenticatedFlag         [42] NULL OPTIONAL,
    userCSGInformation              [43] UserCSGInformation OPTIONAL,
    threeGPP2UserLocationInformation    [44] OCTET STRING OPTIONAL,
    servedPDPPDNAddressExt              [45] PDPAddress OPTIONAL,
    lowPriorityIndicator                [46] NULL OPTIONAL,
    dynamicAddressFlagExt               [47] DynamicAddressFlag OPTIONAL,
    servingNodeiPv6Address              [49] SEQUENCE OF GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed                 [50] GSNAddress OPTIONAL,
    tWANUserLocationInformation         [51] TWANUserLocationInfo OPTIONAL,
    retransmission                      [52] NULL OPTIONAL,
    userLocationInfoTime                [53] TimeStamp OPTIONAL,
    cNOperatorSelectionEnt              [54] CNOperatorSelectionEntity OPTIONAL,
    ePCQoSInformation                   [55] EPCQoSInformation OPTIONAL,
    presenceReportingAreaInfo           [56] PresenceReportingAreaInfo OPTIONAL,
    lastUserLocationInformation         [57] OCTET STRING OPTIONAL,
    lastMSTimeZone                      [58] MSTimeZone OPTIONAL,
    enhancedDiagnostics                 [59] EnhancedDiagnostics OPTIONAL,
    nBIFOMMode                          [60] NBIFOMMode OPTIONAL,
    nBIFOMSupport                       [61] NBIFOMSupport OPTIONAL,
    uWANUserLocationInformation         [62] UWANUserLocationInfo OPTIONAL,
    sGiPtPTunnellingMethod              [64] SGiPtPTunnellingMethod OPTIONAL,
    uNIPDUCPOnlyFlag                    [65] UNIPDUCPOnlyFlag OPTIONAL,
    servingPLMNRateControl              [66] ServingPLMNRateControl OPTIONAL,
    aPNRateControl                      [67] APNRateControl OPTIONAL,
    pDPPDNTypeExtension                 [68] PDPPDNTypeExtension OPTIONAL,
    mOExceptionDataCounter              [69] MOExceptionDataCounter OPTIONAL,
    chargingPerIPCANSessionIndicator    [70] ChargingPerIPCANSessionIndicator OPTIONAL,
    threeGPPPSDataOffStatus             [71] ThreeGPPPSDataOffStatus OPTIONAL,
    sCSASAddress                        [72] SCSASAddress OPTIONAL,
    listOfRANSecondaryRATUsageReports   [73] SEQUENCE OF RANSecondaryRATUsageReport OPTIONAL
}

TDFRecord   ::= SET
{
    recordType                      [0] RecordType,
    servedIMSI                      [3] IMSI OPTIONAL,
    p-GWAddress                     [4] GSNAddress,
    servingNodeAddress              [6] SEQUENCE OF GSNAddress,
    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,
    servingNodePLMNIdentifier       [27] PLMN-Id OPTIONAL,
    pSFurnishChargingInformation    [28] PSFurnishChargingInformation OPTIONAL,
    servedIMEI                      [29] IMEI OPTIONAL,
    rATType                         [30] RATType OPTIONAL,
    mSTimeZone                      [31] MSTimeZone OPTIONAL,
    userLocationInformation         [32] OCTET STRING OPTIONAL,
    listOfServiceData               [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL,
    servingNodeType                 [35] SEQUENCE OF ServingNodeType,
    servedMNNAI                     [36] SubscriptionID OPTIONAL,
    p-GWPLMNIdentifier              [37] PLMN-Id OPTIONAL,
    startTime                       [38] TimeStamp OPTIONAL,
    stopTime                        [39] TimeStamp OPTIONAL,
    served3gpp2MEID                 [40] OCTET STRING OPTIONAL,
    pDNConnectionChargingID         [41] ChargingID,
    userCSGInformation              [43] UserCSGInformation OPTIONAL,
    threeGPP2UserLocationInformation    [44] OCTET STRING OPTIONAL,
    servedPDPPDNAddressExt              [45] PDPAddress OPTIONAL,
    dynamicAddressFlagExt               [47] DynamicAddressFlag OPTIONAL,
    servingNodeiPv6Address              [49] SEQUENCE OF GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed                 [50] GSNAddress OPTIONAL,
    tWANUserLocationInformation         [51] TWANUserLocationInfo OPTIONAL,
    retransmission                      [52] NULL OPTIONAL,
```

```
    tDFAddress                          [53] GSNAddress,
    tDFiPv6AddressUsed                  [54] GSNAddress OPTIONAL,
    tDFPLMNIdentifier                   [55] PLMN-Id OPTIONAL,
    servedFixedSubsID                   [56] FixedSubsID OPTIONAL,
    accessLineIdentifier                [57] AccessLineIdentifier OPTIONAL,
    fixedUserLocationInformation        [59] FixedUserLocationInformation OPTIONAL
}

IPERecord   ::= SET
{
    recordType                      [0] RecordType,
    servedIMSI                      [3] IMSI OPTIONAL,
    iPEdgeAddress                   [4] GSNAddress,
    chargingID                      [5] ChargingID,
    accessPointNameNI               [7] AccessPointNameNI OPTIONAL,
    iPCANsessionType                [8] PDPType OPTIONAL,
    servedIPCANsessionAddress       [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,
    servedMSISDN                    [22] MSISDN OPTIONAL,
    chargingCharacteristics         [23] ChargingCharacteristics,
    chChSelectionMode               [24] ChChSelectionMode OPTIONAL,
    pSFurnishChargingInformation    [28] PSFurnishChargingInformation OPTIONAL,
    servedIMEI                      [29] IMEI OPTIONAL,
    listOfServiceData               [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL,
    servedMNNAI                     [36] SubscriptionID OPTIONAL,
    iPEdgeOperatorIdentifier        [37] PLMN-Id OPTIONAL,
    startTime                       [38] TimeStamp OPTIONAL,
    stopTime                        [39] TimeStamp OPTIONAL,
    servedIPCANsessionAddressExt    [45] PDPAddress OPTIONAL,
    dynamicAddressFlagExt           [47] DynamicAddressFlag OPTIONAL,
    iPEdgeiPv6AddressUsed           [50] GSNAddress OPTIONAL,
    retransmission                  [52] NULL OPTIONAL,
    servedFixedSubsID               [55] FixedSubsID OPTIONAL,
    accessLineIdentifier            [56] AccessLineIdentifier OPTIONAL,
    fixedUserLocationInformation    [57] FixedUserLocationInformation OPTIONAL
}

EPDGRecord  ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [3] IMSI OPTIONAL,
    ePDGAddressUsed             [4] GSNAddress,
    chargingID                  [5] ChargingID,
    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,
    servedIMEI                  [29] IMEI OPTIONAL,
    rATType                     [30] RATType OPTIONAL,
    sGWChange                   [34] SGWChange OPTIONAL,
    p-GWAddressUsed             [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier          [37] PLMN-Id OPTIONAL,
    startTime                   [38] TimeStamp OPTIONAL,
    stopTime                    [39] TimeStamp OPTIONAL,
    pDNConnectionChargingID     [40] ChargingID OPTIONAL,
```

```
    servedPDPPDNAddressExt      [43] PDPAddress OPTIONAL,
    dynamicAddressFlagExt       [47] DynamicAddressFlag OPTIONAL,
    ePDGiPv6AddressUsed         [48] GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed         [50] GSNAddress OPTIONAL,
    retransmission              [51] NULL OPTIONAL,
    enhancedDiagnostics         [52] EnhancedDiagnostics OPTIONAL,
    uWANUserLocationInformation [53] UWANUserLocationInfo OPTIONAL,
    userLocationInfoTime        [54] TimeStamp OPTIONAL,
    iMSIunauthenticatedFlag     [55] NULL OPTIONAL
}

TWAGRecord  ::= SET
{
    recordType                  [0] RecordType,
    servedIMSI                  [3] IMSI OPTIONAL,
    tWAGAddressUsed             [4] GSNAddress,
    chargingID                  [5] ChargingID,
    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,
    servedIMEI                  [29] IMEI OPTIONAL,
    rATType                     [30] RATType OPTIONAL,
    sGWChange                   [34] SGWChange OPTIONAL,
    p-GWAddressUsed             [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier          [37] PLMN-Id OPTIONAL,
    startTime                   [38] TimeStamp OPTIONAL,
    stopTime                    [39] TimeStamp OPTIONAL,
    pDNConnectionChargingID     [40] ChargingID OPTIONAL,
    servedPDPPDNAddressExt      [43] PDPAddress OPTIONAL,
    dynamicAddressFlagExt       [47] DynamicAddressFlag OPTIONAL,
    tWAGiPv6AddressUsed         [48] GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed         [50] GSNAddress OPTIONAL,
    retransmission              [51] NULL OPTIONAL,
    enhancedDiagnostics         [52] EnhancedDiagnostics OPTIONAL,
    tWANUserLocationInformation [53] TWANUserLocationInfo OPTIONAL,
    iMSIunauthenticatedFlag     [54] NULL 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,
```

```
    servingNodePLMNIdentifier   [24] PLMN-Id OPTIONAL,
    cNOperatorSelectionEnt      [25] CNOperatorSelectionEntity OPTIONAL
}

SGSNPDPRecord   ::= SET
{
    recordType                  [0] RecordType,
    networkInitiation           [1] NetworkInitiatedPDPContext OPTIONAL,
    servedIMSI                  [3] IMSI OPTIONAL,
    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,
    iMSIunauthenticatedFlag     [34] NULL OPTIONAL,
    userCSGInformation          [35] UserCSGInformation OPTIONAL,
    servedPDPPDNAddressExt      [36] PDPAddress OPTIONAL,
    lowPriorityIndicator        [37] NULL OPTIONAL,
    servingNodePLMNIdentifier   [38] PLMN-Id OPTIONAL,
    cNOperatorSelectionEnt      [39] CNOperatorSelectionEntity OPTIONAL
}

SGSNSMORecord   ::= SET
--
--   also for MME UE originated SMS record
--
{
    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,
    servingNodeType             [21] ServingNodeType,
    servingNodeAddress          [22] GSNAddress OPTIONAL,
    servingNodeiPv6Address      [23] GSNAddress OPTIONAL,
    mMEName                     [24] DiameterIdentity OPTIONAL,
    mMERealm                    [25] DiameterIdentity OPTIONAL,
```

```
    userLocationInformation     [26] OCTET STRING OPTIONAL,
    retransmission              [27] NULL OPTIONAL,
    servingNodePLMNIdentifier   [28] PLMN-Id OPTIONAL,
    userLocationInfoTime        [29] TimeStamp OPTIONAL,
    cNOperatorSelectionEnt      [30] CNOperatorSelectionEntity OPTIONAL
}

SGSNSMTRecord   ::= SET
--
--   also for MME UE terminated SMS record
--
{
    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,
    originatingAddress           [19] AddressString OPTIONAL,
    servingNodeType              [20] ServingNodeType,
    servingNodeAddress           [21] GSNAddress OPTIONAL,
    servingNodeiPv6Address       [22] GSNAddress OPTIONAL,
    mMEName                      [23] DiameterIdentity OPTIONAL,
    mMERealm                     [24] DiameterIdentity OPTIONAL,
    userLocationInformation      [25] OCTET STRING OPTIONAL,
    retransmission               [26] NULL OPTIONAL,
    servingNodePLMNIdentifier    [27] PLMN-Id OPTIONAL,
    userLocationInfoTime         [28] TimeStamp OPTIONAL,
    cNOperatorSelectionEnt       [29] CNOperatorSelectionEntity 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,
    servingNodePLMNIdentifier    [28] PLMN-Id OPTIONAL,
    cNOperatorSelectionEnt       [29] CNOperatorSelectionEntity OPTIONAL
}
```

```
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,
    servingNodePLMNIdentifier   [26] PLMN-Id OPTIONAL,
    cNOperatorSelectionEnt      [27] CNOperatorSelectionEntity OPTIONAL
}

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,
    servingNodePLMNIdentifier   [26] PLMN-Id OPTIONAL,
    cNOperatorSelectionEnt      [27] CNOperatorSelectionEntity OPTIONAL
}

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
}

GWMBMSRecord    ::= SET
{
    recordType                  [0] RecordType,
    mbmsGWAddress               [1] GSNAddress,
    chargingID                  [2] ChargingID,
    listofDownstreamNodes       [3] SEQUENCE OF GSNAddress,
    accessPointNameNI           [4] AccessPointNameNI OPTIONAL,
    pdpPDNType                  [5] PDPType OPTIONAL,
    servedPDPPDNAddress         [6] PDPAddress OPTIONAL,
    listOfTrafficVolumes        [7] SEQUENCE OF ChangeOfMBMSCondition OPTIONAL,
    recordOpeningTime           [8] TimeStamp,
    duration                    [9] CallDuration,
    causeForRecClosing          [10] CauseForRecClosing,
    diagnostics                 [11] Diagnostics OPTIONAL,
    recordSequenceNumber        [12] INTEGER OPTIONAL,
    nodeID                      [13] NodeID OPTIONAL,
    recordExtensions            [14] ManagementExtensions OPTIONAL,
    localSequenceNumber         [15] LocalSequenceNumber OPTIONAL,
    mbmsInformation             [16] MBMSInformation OPTIONAL,
    commonTeid                  [17] CTEID OPTIONAL,
    iPMulticastSourceAddress    [18] PDPAddress OPTIONAL
}

--
--  PS DATA TYPES
--


AccessAvailabilityChangeReason      ::= INTEGER (0..4294967295)
--
-- 0 (RAN rule indication)   : This value shall be used to indicate that the availability
--                             of an access is changed due to the RAN rule indication.
-- 1 (Access usable/unusable): This value shall be used to indicate that the availability
--                             of an access is changed due to the access is unusable or usable
--                             again.
--

AccessLineIdentifier    ::= SEQUENCE
--
-- "Physical Access Id" includes a port identifier and the identity of the access node where the
--  port resides. "logical Access Id" contains a Circuit-ID. Both are defined ETSI TS 283 034 [314]
--
{
    physicalAccessID    [0] UTF8String OPTIONAL,
    logicalAccessID     [1] OCTET STRING OPTIONAL
}

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.
--

ADCRuleBaseName     ::= IA5String
--
-- identifier for the group of charging rules
-- see ADC-Rule-Base-Name AVP as desined in TS 29.212 [220]
--
AdditionalExceptionReports      ::= ENUMERATED
{
    notAllowed      (0),
    allowed         (1)
}


AFChargingIdentifier    ::= OCTET STRING
--
-- see AF-Charging-Identifier AVP as defined in TS 29.214[221]
--
AFRecordInformation ::= SEQUENCE
{
    aFChargingIdentifier        [1] AFChargingIdentifier,
    flows                       [2] Flows OPTIONAL
}


APNRateControl      ::= SEQUENCE
--
-- See TS 24.008 [208] for more information
--
{
    aPNRateControlUplink    [0] APNRateControlParameters OPTIONAL,
    aPNRateControlDownlink  [1] APNRateControlParameters OPTIONAL
}

APNRateControlParameters        ::= SEQUENCE
{
    additionalExceptionReports  [0] AdditionalExceptionReports OPTIONAL,
    rateControlTimeUnit         [1] RateControlTimeUnit OPTIONAL,
    rateControlMaxRate          [2] INTEGER OPTIONAL,
    rateControlMaxMessageSize   [3] DataVolumeGPRS OPTIONAL -- aPNRateControlDownlink only
}


APNSelectionMode    ::= ENUMERATED
--
-- See Information Elements TS 29.060 [215], TS 29.274 [223] or TS 29.275 [224]
--
{
    mSorNetworkProvidedSubscriptionVerified             (0),
    mSProvidedSubscriptionNotVerified                   (1),
    networkProvidedSubscriptionNotVerified              (2)
}

CalleePartyInformation  ::= SEQUENCE
{
called-Party-Address                [0] InvolvedParty OPTIONAL,
requested-Party-Address             [1] InvolvedParty OPTIONAL,
list-Of-Called-Asserted-Identity    [2] SEQUENCE OF InvolvedParty OPTIONAL
}

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
}

ChangeCondition ::= ENUMERATED
{
    qoSChange                       (0),
    tariffTime                      (1),
    recordClosure                   (2),
    cGI-SAICHange                   (6),    -- bearer modification. "CGI-SAI Change"
    rAIChange                       (7),    -- bearer modification. "RAI Change"
    dT-Establishment                (8),
    dT-Removal                      (9),
    eCGIChange                      (10),   -- bearer modification. "ECGI Change"
    tAIChange                       (11),   -- bearer modification. "TAI Change"
    userLocationChange              (12),   -- bearer modification. "User Location Change"
    userCSGInformationChange        (13),   -- bearer modification. "User CSG info Change"
    presenceInPRAChange             (14),   -- bearer modification. "Change of UE Presence
                                                    -- in Presence Reporting Area"
    removalOfAccess                 (15),   -- NBIFOM "Removal of Access"
    unusabilityOfAccess             (16),   -- NBIFOM "Unusability of Access"
    indirectChangeCondition         (17),   -- NBIFOM "Indirect Change Condition"
    userPlaneToUEChange             (18),   -- bearer modification. "Change of user plane to UE"
    servingPLMNRateControlChange    (19),
-- bearer modification “Serving PLMN Rate Control Change"
    threeGPPPSDataOffStatusChange   (20),   -- "Change of 3GPP PS DataO ff Status"
    aPNRateControlChange            (21)    -- bearer modification. "APN Rate ControlChange"


}

ChangeOfCharCondition   ::= SEQUENCE
--
-- qosRequested and qosNegotiated are used in S-CDR only
-- ePCQoSInformation used in SGW-CDR,PGW-CDR, IPE-CDR, TWAG-CDR and ePDG-CDR only
-- userLocationInformation is used only in S-CDR, SGW-CDR and PGW-CDR
-- chargingID used in PGW-CDR only when Charging per IP-CAN session is active
-- accessAvailabilityChangeReason and relatedChangeOfCharCondition applicable only in PGW-CDR
-- cPCIoTOptimisationIndicator is used in SGW-CDR only
-- aPNRateControl is valid for PGW-CDR only

--
{
    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,
    ePCQoSInformation                       [9] EPCQoSInformation OPTIONAL,
```

```
    chargingID                              [10] ChargingID OPTIONAL,
    presenceReportingAreaStatus             [11] PresenceReportingAreaStatus OPTIONAL,
    userCSGInformation                      [12] UserCSGInformation OPTIONAL,
    diagnostics                             [13] Diagnostics OPTIONAL,
    enhancedDiagnostics                     [14] EnhancedDiagnostics OPTIONAL,
    rATType                                 [15] RATType OPTIONAL,
    accessAvailabilityChangeReason          [16] AccessAvailabilityChangeReason OPTIONAL,
    uWANUserLocationInformation             [17] UWANUserLocationInfo OPTIONAL,
    relatedChangeOfCharCondition            [18] RelatedChangeOfCharCondition OPTIONAL,
    cPCIoTEPSOptimisationIndicator          [19] CPCIoTEPSOptimisationIndicator OPTIONAL,
    servingPLMNRateControl                  [20] ServingPLMNRateControl OPTIONAL,
    threeGPPPSDataOffStatus                 [21] ThreeGPPPSDataOffStatus OPTIONAL,
    listOfPresenceReportingAreaInformation  [22] SEQUENCE OF PresenceReportingAreaInfo OPTIONAL,
    aPNRateControl                          [23] APNRateControl 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 and Application based Charging service data container
-- presenceReportingAreaStatus is used in PGW-CDR Only
--
{
    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] EPCQoSInformation 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] OCTET STRING OPTIONAL,
    eventBasedChargingInformation       [21] EventBasedChargingInformation OPTIONAL,
    timeQuotaMechanism                  [22] TimeQuotaMechanism OPTIONAL,
    serviceSpecificInfo                 [23] SEQUENCE OF ServiceSpecificInfo OPTIONAL,
    threeGPP2UserLocationInformation    [24] OCTET STRING OPTIONAL,
    sponsorIdentity                     [25] OCTET STRING OPTIONAL,
    applicationServiceProviderIdentity  [26] OCTET STRING OPTIONAL,
    aDCRuleBaseName                     [27] ADCRuleBaseName OPTIONAL,
    presenceReportingAreaStatus         [28] PresenceReportingAreaStatus OPTIONAL,
    userCSGInformation                  [29] UserCSGInformation OPTIONAL,
    rATType                             [30] RATType OPTIONAL,
    uWANUserLocationInformation         [32] UWANUserLocationInfo OPTIONAL,
    relatedChangeOfServiceCondition     [33] RelatedChangeOfServiceCondition OPTIONAL,
    servingPLMNRateControl              [35] ServingPLMNRateControl OPTIONAL,
    aPNRateControl                      [36] APNRateControl OPTIONAL,
    threeGPPPSDataOffStatus             [37] ThreeGPPPSDataOffStatus OPTIONAL,
    trafficSteeringPolicyIDDownlink     [38] TrafficSteeringPolicyIDDownlink OPTIONAL,
    trafficSteeringPolicyIDUplink       [39] TrafficSteeringPolicyIDUplink OPTIONAL,
    tWANUserLocationInformation         [40] TWANUserLocationInfo OPTIONAL,
    listOfPresenceReportingAreaInformation  [41] SEQUENCE OF PresenceReportingAreaInfo OPTIONAL,
    voLTEInformation                        [42] VoLTEInformation 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))


ChargingPerIPCANSessionIndicator    ::= ENUMERATED
{
    inactive            (0),
    active              (1)
}

ChargingRuleBaseName    ::= IA5String
--
-- identifier for the group of charging rules
-- see Charging-Rule-Base-Name AVP as desined in TS 29.212 [220]
--

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, P-GW, TDF and IP-Edge
    roamingDefault              (4),    -- For SGSN, S-GW, P-GW, TDF and IP-Edge
    visitingDefault             (5),    -- For SGSN, S-GW, P-GW, TDF and IP-Edge
    fixedDefault                (6)     -- For TDF and IP-Edge
}

CNOperatorSelectionEntity   ::= ENUMERATED
{
    servCNSelectedbyUE      (0),
    servCNSelectedbyNtw     (1)
}

CPCIoTEPSOptimisationIndicator ::= BOOLEAN

CSGAccessMode       ::= ENUMERATED
{
    closedMode  (0),
    hybridMode  (1)
}

CSGId       ::= OCTET STRING (SIZE(4))
--
-- Defined in TS 23.003 [200]. Coded according to TS 29.060 [215] for GTP, and
-- in TS 29.274 [223] for eGTP.
--

CTEID       ::= OCTET STRING (SIZE(4))
--
-- Defined in TS 32.251[11] for MBMS-GW-CDR. Common Tunnel Endpoint Identifier
-- of MBMS GW for user plane, defined in TS 23.246 [207].
--

DataVolumeGPRS      ::= INTEGER
--
-- The volume of data transferred in octets.
--

DataVolumeMBMS ::= INTEGER
--
-- The volume of data transferred in octets.
--


EPCQoSInformation   ::= SEQUENCE
--
```

```
-- See TS 29.212 [220] for more information
--
{
    qCI                         [1] INTEGER,
    maxRequestedBandwithUL      [2] INTEGER OPTIONAL,
    maxRequestedBandwithDL      [3] INTEGER OPTIONAL,
    guaranteedBitrateUL         [4] INTEGER OPTIONAL,
    guaranteedBitrateDL         [5] INTEGER OPTIONAL,
    aRP                         [6] INTEGER OPTIONAL,
    aPNAggregateMaxBitrateUL    [7] INTEGER OPTIONAL,
    aPNAggregateMaxBitrateDL    [8] INTEGER OPTIONAL,
    extendedMaxRequestedBWUL    [9] INTEGER OPTIONAL,
    extendedMaxRequestedBWDL    [10] INTEGER OPTIONAL,
    extendedGBRUL               [11] INTEGER OPTIONAL,
    extendedGBRDL               [12] INTEGER OPTIONAL,
    extendedAPNAMBRUL           [13] INTEGER OPTIONAL,
    extendedAPNAMBRDL           [14] INTEGER OPTIONAL
}

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


FixedSubsID ::= OCTET STRING
--
-- The fixed subscriber Id identifier is defined in Broadband Forum TR 134 [601].
--


FixedUserLocationInformation    ::= SEQUENCE
--
-- See format in IEEE Std 802.11-2012 [408] for "SSID" and "BSSID".
--
{
    sSID                    [0] OCTET STRING OPTIONAL ,
    bSSID                   [1] OCTET STRING OPTIONAL,
    accessLineIdentifier    [2] AccessLineIdentifier OPTIONAL
}

Flows       ::=     SEQUENCE
--
-- See Flows AVP as defined in TS 29.214 [221]
--
{
    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 [217]
--

GSNAddress      ::= IPAddress


MOExceptionDataCounter      ::= SEQUENCE
--
-- See TS 29.128 [244] for more information
--
{
    counterValue        [0] INTEGER,
    counterTimestamp    [1] TimeStamp
}
```

```
MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
--
-- see TS 24.008 [208]
--

NBIFOMMode      ::= ENUMERATED
{
    uEINITIATED             (0),
    nETWORKINITIATED        (1)
}

NBIFOMSupport   ::= ENUMERATED
{
    nBIFOMNotSupported          (0),
    nBIFOMSupported             (1)
}

NetworkInitiatedPDPContext      ::= BOOLEAN
--
-- Set to true if PDP context was initiated from network side
--

NumberOfDPEncountered  ::= INTEGER
PDPType     ::= OCTET STRING (SIZE(2))
--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP/PDN Type Number
-- See TS 29.060 [215] for encoding details.
--


PDPPDNTypeExtension ::= INTEGER
--
-- This integer is 1:1 copy of the PDP type value as defined in TS 29.061 [215].
--


PresenceReportingAreaElementsList ::= OCTET STRING
--
-- For EPC see Presence-Reporting-Area-Elements-List AVP defined in TS 29.212 [220]
-- For 5GC see PresenceInfo defined in TS 29.571 [249] excluding praId and presenceState
--


PresenceReportingAreaInfo   ::= SEQUENCE
{
    presenceReportingAreaIdentifier  [0] OCTET STRING,
    presenceReportingAreaStatus      [1] PresenceReportingAreaStatus OPTIONAL,
    presenceReportingAreaElementsList[2] PresenceReportingAreaElementsList OPTIONAL,
    presenceReportingAreaNode        [3] PresenceReportingAreaNode OPTIONAL
}

PresenceReportingAreaNode ::= BIT STRING
{
    oCS          (0),
    pCRF         (1)
}
--
--  This bit mask has the same format as Presence-Reporting-Area-Node AVP in TS 29.212 [220]
--


PresenceReportingAreaStatus ::= ENUMERATED
{
    insideArea   (0),
    outsideArea  (1),
    inactive     (2),
    unknown      (3)

}

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 [223].
--

RANSecondaryRATUsageReport  ::= SEQUENCE
--
{
    dataVolumeUplink                [1] DataVolumeGPRS,
    dataVolumeDownlink              [2] DataVolumeGPRS,
    rANStartTime                    [3] TimeStamp,
    rANEndTime                      [4] TimeStamp,
    secondaryRATType                [5] SecondaryRATType OPTIONAL,
    chargingID                      [6] ChargingID OPTIONAL
}


RateControlTimeUnit ::= INTEGER
{   unrestricted    (0),
    minute          (1),
    hour            (2),
    day             (3),
    week            (4)
}

RatingGroupId       ::= INTEGER
--
-- IP service flow identity (DCCA), range of 4 byte (0... 4294967295)
-- see Rating-Group AVP as used in TS 32.299 [50]
--

RelatedChangeOfCharCondition    ::= SEQUENCE
{
    changeCondition                 [5] ChangeCondition,
    changeTime                      [6] TimeStamp,
    userLocationInformation         [8] OCTET STRING OPTIONAL,
    presenceReportingAreaStatus     [11] PresenceReportingAreaStatus OPTIONAL,
    userCSGInformation              [12] UserCSGInformation OPTIONAL,
    rATType                         [15] RATType OPTIONAL,
    uWANUserLocationInformation     [17] UWANUserLocationInfo OPTIONAL
}

RelatedChangeOfServiceCondition ::= SEQUENCE
{
    userLocationInformation             [20] OCTET STRING OPTIONAL,
    threeGPP2UserLocationInformation    [24] OCTET STRING OPTIONAL,
    presenceReportingAreaStatus         [28] PresenceReportingAreaStatus OPTIONAL,
    userCSGInformation                  [29] UserCSGInformation OPTIONAL,
    rATType                             [30] RATType OPTIONAL,
    uWANUserLocationInformation         [32] UWANUserLocationInfo OPTIONAL,
    relatedServiceConditionChange       [33] ServiceConditionChange OPTIONAL
}

ResultCode      ::= INTEGER
--
-- charging protocol return value, range of 4 byte (0... 4294967295)
-- see Result-Code AVP as used in 32.299 [40]
--

SecondaryRATType    ::= INTEGER
{
    nR              (0)     -- New Radio 5G
}

ServiceConditionChange  ::= BIT STRING
{
    qoSChange                               (0),   -- bearer modification
    sGSNChange                              (1),   -- bearer modification:
                                                   -- apply to Gn-SGSN /SGW Change
    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.From "Service Stop" in
                                                      -- Change-Condition AVP
    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)
    reserved1                                 (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. "CGI-SAI Change"
    rAIChange                                 (22),   -- bearer modification. "RAI Change"
    dCCAServiceSpecificUnitExhausted          (23),   -- DCCA quota reauthorization
    recordClosure                             (24),   -- PGW-CDR closure
    timeLimit                                 (25),   -- intermediate recording. From "Service Data
                                                      --  Time Limit" Change-Condition AVP value
    volumeLimit                               (26),   -- intermediate recording.From "Service Data
                                                      --  Volume Limit" Change-Condition AVP value
    serviceSpecificUnitLimit                  (27),   -- intermediate recording
    envelopeClosure                           (28),
    eCGIChange                                (29),   -- bearer modification. "ECGI Change"
    tAIChange                                 (30),   -- bearer modification. "TAI Change"
    userLocationChange                        (31),   -- bearer modification. "User Location Change"
    userCSGInformationChange                  (32),   -- bearer modification. "User CSG info Change"
    presenceInPRAChange                       (33),   -- bearer modification. "Change of UE Presence
                                                      -- in Presence Reporting Area"
    accessChangeOfSDF                         (34),   -- "access change of service data flow"
    indirectServiceConditionChange            (35),   -- NBIFOM: "indirect service condition change"
    servingPLMNRateControlChange              (36),   -- bearer modification. "Serving PLMNRate
                                                   -- Control Change"
    aPNRateControlChange                      (37)    -- bearer modification. "APN Rate ControlChange
}
--
-- 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 [214]
--

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 [220]
--

ServingNodeType ::= ENUMERATED
{
    sGSN        (0),
    pMIPSGW     (1),
    gTPSGW      (2),
    ePDG        (3),
    hSGW        (4),
    mME         (5),
    tWAN        (6)
}


ServingPLMNRateControl      ::= SEQUENCE
--
-- See TS 29.128 [244] for more information
--
{
    sPLMNDLRateControlValue [0] INTEGER,
    sPLMNULRateControlValue [1] INTEGER
}
```

```
SGiPtPTunnellingMethod      ::= ENUMERATED
{
    uDPIPbased      (0),
    others          (1)
}


SGSNChange  ::= BOOLEAN
--
-- present if first record after inter SGSN routing area update in new SGSN
--

SGWChange       ::= BOOLEAN
--
-- present if first record after inter serving node change (SGW, ePDG, TWAG, HSGW)
--


TimeQuotaMechanism      ::= SEQUENCE
{
    timeQuotaType                   [1] TimeQuotaType,
    baseTimeInterval                [2] INTEGER
}

TimeQuotaType       ::= ENUMERATED
{
    dISCRETETIMEPERIOD          (0),
    cONTINUOUSTIMEPERIOD        (1)
}

TrafficSteeringPolicyIDDownlink ::= OCTET STRING
--
-- see Traffic-Steering-Policy-Identifier-DL AVP as defined in TS 29.212[220]

TrafficSteeringPolicyIDUplink   ::= OCTET STRING
--
-- see Traffic-Steering-Policy-Identifier-UL AVP as defined in TS 29.212[220]

TWANUserLocationInfo        ::= SEQUENCE
{
    sSID                     [0] OCTET STRING,          -- see format in IEEE Std 802.11-2012 [408]
    bSSID                    [1] OCTET STRING OPTIONAL,     -- see format in IEEE Std 802.11-2012
[408]
    civicAddressInformation [2] CivicAddressInformation OPTIONAL,
    wLANOperatorId          [3] WLANOperatorId OPTIONAL,
    logicalAccessID         [4] OCTET STRING OPTIONAL
}

UNIPDUCPOnlyFlag    ::= BOOLEAN


UserCSGInformation      ::= SEQUENCE
{
    cSGId                       [0] CSGId,
    cSGAccessMode               [1] CSGAccessMode,
    cSGMembershipIndication     [2] NULL OPTIONAL
}

UWANUserLocationInfo        ::= SEQUENCE
{
    uELocalIPAddress         [0] IPAddress,
    uDPSourcePort            [1] OCTET STRING (SIZE(2)) OPTIONAL,
    sSID                     [2] OCTET STRING OPTIONAL, -- see format in IEEE Std 802.11-2012 [408]
    bSSID                    [3] OCTET STRING OPTIONAL, -- see format in IEEE Std 802.11-2012 [408]
    tCPSourcePort           [4] OCTET STRING (SIZE(2)) OPTIONAL,
    civicAddressInformation [5] CivicAddressInformation OPTIONAL,
    wLANOperatorId          [6] WLANOperatorId OPTIONAL,
    logicalAccessID         [7] OCTET STRING OPTIONAL
}

VoLTEInformation ::= SEQUENCE
{
    callerInformation   [0] SEQUENCE OF InvolvedParty OPTIONAL,
    calleeInformation   [1] CalleePartyInformation OPTIONAL
}


WLANOperatorId ::= SEQUENCE
```

```
{
    wLANOperatorName    [0] OCTET STRING,
    wLANPLMNId          [1] PLMN-Id
}


.#END
```

5.2.2.3 Void

5.2.2.4 CP data transfer domain CDRs

This subclause contains the abstract syntax definitions that are specific to the CP data transfer CDR types defined in TS 32.253 [13].

```
.$CPDTChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) cpdtChargingDataTypes (13) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration,
ChargingID,
DiameterIdentity,
Diagnostics,
LocalSequenceNumber,
ManagementExtensions,
MSISDN,
NodeID,
PLMN-Id,
RATType,
RecordType,
ServiceContextID,
SubscriptionID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

IMEI,
IMSI
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0)gsm-Network (1)
modules (3) map-CommonDataTypes (18) version18 (18)}
-- from TS 29.002 [214]

AccessPointNameNI,
APNRateControl,
ChargingCharacteristics,
ChChSelectionMode,
DataVolumeGPRS,
ServingPLMNRateControl
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

;


--
-- CP data transfer RECORDS
--


CPDTRecord      ::= CHOICE
--
-- Record values 105 to 106 are CP data transfer specific
--
{
    cPDTSCERecord           [105]   CPDTSCERecord,
    cPDTSNNRecord           [106]   CPDTSNNRecord
}
```

```
CPDTSCERecord   ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    servedIMSI                      [2] IMSI OPTIONAL,
    servedMSISDN                    [3] MSISDN OPTIONAL,
    chargingID                      [4] ChargingID,
    serviceContextID                [5] ServiceContextID OPTIONAL,
    nodeID                          [6] NodeID OPTIONAL,
    recordOpeningTime               [7] TimeStamp,
    duration                        [8] CallDuration,
    accessPointNameNI               [9] AccessPointNameNI OPTIONAL,
    sCEFID                          [10] DiameterIdentity OPTIONAL,
    chargingCharacteristics         [11] ChargingCharacteristics,
    chChSelectionMode               [12] ChChSelectionMode OPTIONAL,
    servingNodeIdentity             [13] DiameterIdentity OPTIONAL,
    servingPLMNRateControl          [14] ServingPLMNRateControl OPTIONAL,
    listOfNIDDsubmission            [15] SEQUENCE OF NIDDsubmission OPTIONAL,
    causeForRecClosing              [16] CPCauseForRecClosing,
    diagnostics                     [17] Diagnostics OPTIONAL,
    localSequenceNumber             [18] LocalSequenceNumber OPTIONAL,
    recordSequenceNumber            [19] INTEGER OPTIONAL,
    recordExtensions                [20] ManagementExtensions OPTIONAL,
    externalIdentifier              [21] SubscriptionID OPTIONAL,
    aPNRateControl                  [22] APNRateControl OPTIONAL,
    rATType                         [23] RATType OPTIONAL,
    servingNodePLMNIdentifier       [24] PLMN-Id OPTIONAL,
    servedIMEI                      [25] IMEI OPTIONAL
}

CPDTSNNRecord   ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    servedIMSI                      [2] IMSI OPTIONAL,
    servedMSISDN                    [3] MSISDN OPTIONAL,
    chargingID                      [4] ChargingID,
    serviceContextID                [5] ServiceContextID OPTIONAL,
    nodeID                          [6] NodeID OPTIONAL,
    recordOpeningTime               [7] TimeStamp,
    duration                        [8] CallDuration,
    accessPointNameNI               [9] AccessPointNameNI OPTIONAL,
    sCEFID                          [10] DiameterIdentity OPTIONAL,
    chargingCharacteristics         [11] ChargingCharacteristics,
    chChSelectionMode               [12] ChChSelectionMode OPTIONAL,
    servingNodeIdentity             [13] DiameterIdentity OPTIONAL,
    servingPLMNRateControl          [14] ServingPLMNRateControl OPTIONAL,
    listOfNIDDsubmission            [15] SEQUENCE OF NIDDsubmission OPTIONAL,
    causeForRecClosing              [16] CPCauseForRecClosing,
    diagnostics                     [17] Diagnostics OPTIONAL,
    localSequenceNumber             [18] LocalSequenceNumber OPTIONAL,
    recordSequenceNumber            [19] INTEGER OPTIONAL,
    recordExtensions                [20] ManagementExtensions OPTIONAL,
    externalIdentifier              [21] SubscriptionID OPTIONAL,
    aPNRateControl                  [22] APNRateControl OPTIONAL,
    rATType                         [23] RATType OPTIONAL,
    servingNodePLMNIdentifier       [24] PLMN-Id OPTIONAL,
    servedIMEI                      [25] IMEI OPTIONAL
}


--
-- CP data transfer DATA TYPES
--
--
-- C
--


CPCauseForRecClosing    ::= INTEGER
{
    normalRelease                   (0),
    abnormalRelease                 (1),
    volumeLimit                     (2),
    timeLimit                       (3),
    maxNIDDsubmissions              (4),
```

```
    servingNodeChange               (5),
    pLMNChange                      (6),
    servingPLMNRateControlChange    (7),
    aPNRateControlChange            (8),
    rATTypeChange                   (9),
    managementIntervention          (10)
}

--
-- N
--

NIDDsubmission          ::= SEQUENCE
{
    submissionTimestamp         [0] TimeStamp OPTIONAL,
    eventTimestamp              [1] TimeStamp OPTIONAL,
    dataVolumeGPRSUplink        [2] DataVolumeGPRS OPTIONAL,
    dataVolumeGPRSDownlink      [3] DataVolumeGPRS OPTIONAL,
    submissionResultCode        [4] SubmissionResultCode OPTIONAL,
    serviceChangeCondition      [5] ServiceChangeCondition OPTIONAL
}

--
-- S
--

ServiceChangeCondition  ::= BIT STRING
{
    nIDDsubmissionResponseReceipt       (0),
    nIDDsubmissionResponseSending       (1),
    nIDDdeliveryToUE                    (2),
    nIDDdeliveryFromUEerror             (3),
    nIDDsubmissionTimeout               (4)
}

SubmissionResultCode        ::= INTEGER
--
-- Result-Code AVP and Experimental-Result AVP Values as specified in TS 29.128 [244]
-- for MO/MT data transfer
--

.#END
```

5.2.2.5 Exposure Function API CDRs

This subclause contains the abstract syntax definitions that are specific to the Exposure Function API CDR types defined in TS 32.254 [14].

```
.$ExposureFunctionAPIChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain
(0) charging (5) exposureFunctionAPIChargingDataTypes (14) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

DiameterIdentity,
IPAddress,
LocalSequenceNumber,
ManagementExtensions,
MSTimeZone,
NodeID,
RecordType,
SCSASAddress,
ServiceContextID,
SubscriptionID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

;
```

```
--
-- ExposureFunctionAPI RECORDS
--

ExposureFunctionAPIRecordType       ::= CHOICE
--
-- Record values 120 are ExposureFunctionAPI specific
--
{
    eASCERecord         [120] EASCERecord
}

EASCERecord     ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    serviceContextID                [2] ServiceContextID OPTIONAL,
    nodeId                          [3] NodeID OPTIONAL,
    sCEFID                          [4] DiameterIdentity OPTIONAL,
    sCEFAddress                     [5] IPAddress OPTIONAL,
    aPIIdentifier                   [6] OCTET STRING OPTIONAL,
    tLTRI                           [7] INTEGER OPTIONAL,
    sCSASAddress                    [9] SCSASAddress OPTIONAL,
    eventTimestamp                  [10] TimeStamp OPTIONAL,
    aPIInvocationTimestamp          [11] TimeStamp OPTIONAL,
    aPIDirection                    [12] APIDirection OPTIONAL,
    aPINetworkServiceNode           [13] APINetworkServiceNode OPTIONAL,
    aPIContent                      [14] UTF8String OPTIONAL,
    aPISize                         [15] INTEGER OPTIONAL,
    aPIresultCode                   [16] INTEGER OPTIONAL,
    externalIdentifier              [17] SubscriptionID OPTIONAL,
    localRecordSequenceNumber       [18] LocalSequenceNumber OPTIONAL,
    recordExtensions                [19] ManagementExtensions OPTIONAL,
    startTime                       [20] TimeStamp OPTIONAL,
    stopTime                        [21] TimeStamp OPTIONAL

}

--
-- ExposureFunctionAPI DATA TYPES
--
--
-- A
--

APIDirection            ::= ENUMERATED
--
-- Used for distinguish the API invocation or API notification
--
{
    invocation              (0),
    notification            (1)
}

APINetworkServiceNode        ::= ENUMERATED
{
    mME             (0),
    sGSN            (1),
    hSS             (2),
    pCRF            (3),
    pFDF            (4),
    bMSC            (5),
    cCSCF           (6),
    rCAF            (7)
}



.#END
```

5.2.3 Subsystem level CDR definitions

5.2.3.0 Introduction

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) version2 (1)}
DEFINITIONS IMPLICIT TAGS ::=

BEGIN

-- EXPORTS everything

IMPORTS

InvolvedParty,
IPAddress,
LocalSequenceNumber,
ManagementExtensions,
NodeAddress,
MSCAddress,
MSTimeZone,
RecordType,
ServiceContextID,
ServiceSpecificInfo,
Session-Id,
SubscriberEquipmentNumber,
SubscriptionID,
ThreeGPPPSDataOffStatus,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}



;

--
-- IMS RECORDS
--

IMSRecord ::= CHOICE
--
-- Record values 63-69, 82, 89, ,90, 91 are IMS specific
--
{
    sCSCFRecord         [63] SCSCFRecord,
    pCSCFRecord         [64] PCSCFRecord,
    iCSCFRecord         [65] ICSCFRecord,
    mRFCRecord          [66] MRFCRecord,
    mGCFRecord          [67] MGCFRecord,
    bGCFRecord          [68] BGCFRecord,
    aSRecord                [69] ASRecord,
    eCSCFRecord         [70] ECSCFRecord,
    iBCFRecord          [82] IBCFRecord,
    tRFRecord           [89] TRFRecord,
    tFRecord                [90] TFRecord,
    aTCFRecord          [91] ATCFRecord
}

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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    applicationServersInformation           [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    requested-Party-Address                 [41] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity        [42] ListOfInvolvedParties OPTIONAL,
    online-charging-flag                        [43] NULL OPTIONAL,
    realTimeTariffInformation               [44] SEQUENCE OF RealTimeTariffInformation OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    nNI-Information                             [46] NNI-Information OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    iMSEmergencyIndicator                   [52] NULL OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    iMSVisitedNetworkIdentifier             [54] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    instanceId                              [57] OCTET STRING OPTIONAL,
    subscriberEquipmentNumber               [58] SubscriberEquipmentNumber OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    routeHeaderTransmitted                  [60] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    fEIdentifierList                        [65] FEIdentifierList OPTIONAL

}

PCSCFRecord     ::= SET
--
-- This record is also applicable for P-CSCF with collocated ATCF
-- ATCF-specific fields which are not applicable to P-CSCF are indicated.
--
{
    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] InterOperatorIdentifiers 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,
    sessionPriority                         [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction         [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    list-of-Requested-Party-Address         [41] ListOfInvolvedParties OPTIONAL, -- ATCF only
    list-Of-Called-Asserted-Identity        [42] ListOfInvolvedParties OPTIONAL,
    nNI-Information                         [46] NNI-Information OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    servedPartyIPAddress                    [50] ServedPartyIPAddress OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    iMSEmergencyIndicator                   [52] NULL OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    iMSVisitedNetworkIdentifier             [54] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    instanceId                              [57] OCTET STRING OPTIONAL,
    subscriberEquipmentNumber               [58] SubscriberEquipmentNumber OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    routeHeaderTransmitted                  [60] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    initialIMS-Charging-Identifier          [105] IMS-Charging-Identifier OPTIONAL, -- ATCF only
    list-Of-AccessTransferInformation       [106] SEQUENCE OF AccessTransferInformation OPTIONAL,
                                                  -- ATCF only
    relatedICID                             [107] IMS-Charging-Identifier OPTIONAL,
    relatedICIDGenerationNode               [108] NodeAddress OPTIONAL,
    fEIdentifierList                        [109] FEIdentifierList 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] InterOperatorIdentifiers 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,
    sessionPriority                 [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction [37] Milliseconds OPTIONAL,
```

```
    transit-IOI-List                    [45] GraphicString OPTIONAL,
    userLocationInformation         [47] OCTET STRING OPTIONAL,
    mSTimeZone                      [48] MSTimeZone OPTIONAL,
    fromAddress                     [51] OCTET STRING OPTIONAL,
    iMSEmergencyIndicator           [52] NULL OPTIONAL,
    listOfReasonHeader              [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation  [56] OCTET STRING OPTIONAL,
    routeHeaderTransmitted              [60] OCTET STRING OPTIONAL,
    s-CSCF-Information                  [61] S-CSCF-Information OPTIONAL,
    cellularNetworkInformation          [64] OCTET STRING OPTIONAL,
    fEIdentifierList                    [65] FEIdentifierList OPTIONAL

}

MRFCRecord      ::= SET
{
    recordType                          [0] RecordType,
    retransmission                      [1] NULL OPTIONAL,
    sIP-Method                          [2] SIP-Method 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] InterOperatorIdentifiers 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    applicationServersInformation           [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    online-charging-flag                        [43] NULL OPTIONAL,
    transit-IOI-List                            [45] GraphicString OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    service-Id                              [70] Service-Id OPTIONAL,
    requested-Party-Address                 [71] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity        [72] ListOfInvolvedParties OPTIONAL,
    fEIdentifierList                        [73] FEIdentifierList 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] InterOperatorIdentifiers 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    realTimeTariffInformation               [44] SEQUENCE OF RealTimeTariffInformation OPTIONAL,
    transit-IOI-List                            [45] GraphicString OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    trunkGroupID                                [80] TrunkGroupID OPTIONAL,
    bearerService                           [81] TransmissionMedium OPTIONAL,
    iSUPCause                               [82] ISUPCause OPTIONAL,
    fEIdentifierList                        [83] FEIdentifierList 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,
    interOperatorIdentifiers            [14] InterOperatorIdentifiers 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,
    event                               [28] UTF8String OPTIONAL,
    accessNetworkInformation                [29] OCTET STRING OPTIONAL,
    serviceContextID                        [30] ServiceContextID OPTIONAL,
    numberPortabilityRouting                [34] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting                    [35] CarrierSelectRouting OPTIONAL,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    transit-IOI-List                            [45] GraphicString OPTIONAL,
    nNI-Information                             [46] NNI-Information OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    fEIdentifierList                        [65] FEIdentifierList 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,
    privateUserID                       [8] GraphicString OPTIONAL,
    serviceRequestTimeStamp             [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp       [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp         [11] TimeStamp OPTIONAL,
    recordOpeningTime                   [12] TimeStamp OPTIONAL,
    recordClosureTime                   [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers                [14] InterOperatorIdentifiers OPTIONAL,
    localRecordSequenceNumber           [15] 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,
    sessionPriority                         [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction         [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    list-of-Requested-Party-Address         [41] ListOfInvolvedParties OPTIONAL,
    online-charging-flag                        [43] NULL OPTIONAL,
    realTimeTariffInformation               [44] SEQUENCE OF RealTimeTariffInformation OPTIONAL,
    nNI-Information                         [46] NNI-Information OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    iMSVisitedNetworkIdentifier             [54] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    instanceId                              [57] OCTET STRING OPTIONAL,
    subscriberEquipmentNumber               [58] SubscriberEquipmentNumber OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING 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,
    outgoingSessionId                       [104] Session-Id OPTIONAL,
    initialIMS-Charging-Identifier          [105] IMS-Charging-Identifier OPTIONAL,
    list-Of-AccessTransferInformation       [106] SEQUENCE OF AccessTransferInformation OPTIONAL,
    tADS-Identifier                         [109] TADIdentifier OPTIONAL,
    vlr-Number                              [110] MSCAddress OPTIONAL,
    msc-Address                             [111] MSCAddress OPTIONAL,
    threeGPPPSDataOffStatus                 [112] ThreeGPPPSDataOffStatus OPTIONAL,
    fEIdentifierList                        [113] FEIdentifierList OPTIONAL
}

ECSCFRecord     ::= 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    applicationServersInformation           [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    requested-Party-Address                 [41] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity            [42] ListOfInvolvedParties OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    fEIdentifierList                        [65] FEIdentifierList OPTIONAL

}

IBCFRecord      ::= SET
--
-- This record is also applicable for IBCF with collocated ATCF
-- ATCF-specific fields which are not applicable to IBCF are indicated.
--
{
    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, -- ATCF only
    serviceRequestTimeStamp                 [9] TimeStamp OPTIONAL,
    serviceDeliveryStartTimeStamp           [10] TimeStamp OPTIONAL,
    serviceDeliveryEndTimeStamp             [11] TimeStamp OPTIONAL,
    recordOpeningTime                       [12] TimeStamp OPTIONAL,
    recordClosureTime                       [13] TimeStamp OPTIONAL,
    interOperatorIdentifiers                    [14] InterOperatorIdentifiers OPTIONAL,
    localRecordSequenceNumber           [   15] 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, -- ATCF only
    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, -- ATCF only
    list-Of-Early-SDP-Media-Components      [32] SEQUENCE OF Early-Media-Components-List OPTIONAL,
```

```
    iMSCommunicationServiceIdentifier       [33] IMSCommunicationServiceIdentifier OPTIONAL,
    sessionPriority                         [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction         [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    list-of-Requested-Party-Address         [41] ListOfInvolvedParties OPTIONAL, -- ATCF only
    list-Of-Called-Asserted-Identity        [42] ListOfInvolvedParties OPTIONAL, -- ATCF only
    realTimeTariffInformation               [44] SEQUENCE OF RealTimeTariffInformation OPTIONAL,
    transit-IOI-List                        [45] GraphicString OPTIONAL,
    nNI-Information                         [46] SEQUENCE OF NNI-Information OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    initialIMS-Charging-Identifier          [105] IMS-Charging-Identifier OPTIONAL, -- ATCF only
    list-Of-AccessTransferInformation       [106] SEQUENCE OF AccessTransferInformation OPTIONAL,
                                                -- ATCF only
    fEIdentifierList                        [107] FEIdentifierList OPTIONAL

}

TRFRecord       ::= 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,
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody OPTIONAL,
    recordExtensions                        [25] ManagementExtensions OPTIONAL,
    expiresInformation                  [26] INTEGER OPTIONAL,
    event                               [28] UTF8String 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction         [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    applicationServersInformation           [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    requested-Party-Address                 [41] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity            [42] ListOfInvolvedParties OPTIONAL,
    nNI-Information                         [46] SEQUENCE OF NNI-Information OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    fEIdentifierList                        [64] FEIdentifierList OPTIONAL

}

ATCFRecord  ::= 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] InterOperatorIdentifiers 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    list-of-Requested-Party-Address         [41] ListOfInvolvedParties OPTIONAL,
    list-Of-Called-Asserted-Identity            [42] ListOfInvolvedParties OPTIONAL,
    nNI-Information                         [46] NNI-Information OPTIONAL,
    userLocationInformation                 [47] OCTET STRING OPTIONAL,
    mSTimeZone                              [48] MSTimeZone OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    routeHeaderTransmitted                  [60] OCTET STRING OPTIONAL,
    list-Of-AccessNetworkInfoChange         [62] SEQUENCE OF AccessNetworkInfoChange OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    initialIMS-Charging-Identifier          [105] IMS-Charging-Identifier OPTIONAL,
    list-Of-AccessTransferInformation       [106] SEQUENCE OF AccessTransferInformation OPTIONAL,
    fEIdentifierList                        [107] FEIdentifierList OPTIONAL

}

TFRecord        ::= 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,
```

```
    list-Of-Message-Bodies              [24] SEQUENCE OF MessageBody 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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    applicationServersInformation           [40] SEQUENCE OF ApplicationServersInformation OPTIONAL,
    requested-Party-Address                 [41] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity        [42] ListOfInvolvedParties OPTIONAL,
    nNI-Information                         [46] NNI-Information OPTIONAL,
    fromAddress                             [51] OCTET STRING OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    routeHeaderReceived                     [59] OCTET STRING OPTIONAL,
    routeHeaderTransmitted                  [60] OCTET STRING OPTIONAL,
    listOfCalledIdentityChanges             [63] SEQUENCE OF CalledIdentityChange OPTIONAL,
    fEIdentifierList                        [64] FEIdentifierList OPTIONAL

}

--
-- IMS DATA TYPES
--
--
-- A
--

AccessCorrelationID     ::= CHOICE
--
-- gPRS-Charging-Id is used for GPRS, EPS and 5GS
--

{
    gPRS-Charging-Id                    [2] INTEGER (0..4294967295),
    accessNetworkChargingIdentifier [4] GraphicString
}

AccessNetworkInfoChange     ::= SEQUENCE
{
    accessNetworkInformation            [0] OCTET STRING OPTIONAL,
    additionalAccessNetworkInformation  [1] OCTET STRING OPTIONAL,
    accessChangeTime                    [2] TimeStamp OPTIONAL,
    cellularNetworkInformation          [3] OCTET STRING OPTIONAL
}

AccessTransferType  ::= ENUMERATED
{
    pSToCS (0),
    cSToPS (1) ,
    pSToPS (2),
    cSToCS (3)
}


AccessTransferInformation       ::= SEQUENCE
{
    accessTransferType                  [0] AccessTransferType OPTIONAL,
    accessNetworkInformation            [1] OCTET STRING OPTIONAL,
    additionalAccessNetworkInformation  [2] OCTET STRING OPTIONAL,
    inter-UE-Transfer                   [3] NULL OPTIONAL,
    relatedICID                         [4] IMS-Charging-Identifier OPTIONAL,
    relatedICIDGenerationNode           [5] NodeAddress OPTIONAL,
    accessTransferTime                  [6] TimeStamp OPTIONAL,
    subscriberEquipmentNumber           [7] SubscriberEquipmentNumber OPTIONAL,
    instanceId                          [8] OCTET STRING OPTIONAL,
    cellularNetworkInformation          [9] OCTET STRING OPTIONAL
}

ACRInterimLost      ::= ENUMERATED
{
    no      (0),
```

```
    yes     (1),
    unknown (2)
}

AoCCostInformation      ::= SEQUENCE
{
    accumulatedCost     [0] REAL,
    incrementalCost     [1] REAL,
    currencyCode            [2] INTEGER
}

AoCInformation ::= SET
{
    tariffInformation       [0] TariffInformation OPTIONAL,
    aoCCostInformation      [1] AoCCostInformation OPTIONAL
}

ApplicationServersInformation   ::= SEQUENCE
{
    applicationServersInvolved          [0] NodeAddress OPTIONAL,
    applicationProvidedCalledParties        [1] SEQUENCE OF InvolvedParty OPTIONAL,
    sTatus                              [2] Status OPTIONAL
}

--
-- C
--

CalledIdentityChange    ::= SEQUENCE
{
    calledIdentity  [0] InvolvedParty OPTIONAL,
    changeTime      [1] TimeStamp OPTIONAL
}

CarrierSelectRouting    ::= GraphicString

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

--
-- E
--

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,
    sDP-Type                    [5] SDP-Type OPTIONAL
}

--
-- F
--

FEIdentifierList ::= SEQUENCE OF GraphicString

--
-- I
--

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
}


ISUPCause   ::= SEQUENCE
{
    iSUPCauseLocation       [0] INTEGER OPTIONAL,
    iSUPCauseValue          [1] INTEGER OPTIONAL,
    iSUPCauseDiagnostics        [2] OCTET STRING OPTIONAL
}

--
-- L
--

ListOfInvolvedParties   ::= SEQUENCE OF InvolvedParty

ListOfReasonHeader  ::= SEQUENCE OF ReasonHeaderInformation

--
-- M
--

Media-Components-List   ::= SEQUENCE
--
--  MediaInitiatorParty is used to identify the initiator of the media
--  multi-participants session e.g. in AS PoC Server
--
{
    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,
    sIP-Request-Timestamp-Fraction  [6] Milliseconds OPTIONAL,
    sIP-Response-Timestamp-Fraction [7] Milliseconds OPTIONAL,
    sDP-Type                        [8] SDP-Type OPTIONAL
}

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

Milliseconds    ::= INTEGER (0..999)

--
-- N
--

NNI-Information     ::= SEQUENCE
{
    sessionDirection        [0] SessionDirection OPTIONAL,
    nNIType             [1] NNIType OPTIONAL,
    relationshipMode        [2] RelationshipMode OPTIONAL,
    neighbourNodeAddress    [3] IPAddress OPTIONAL
}

NNIType     ::= ENUMERATED
{
    non-roaming                 (0),
    roaming-without-loopback        (1),
    roaming-with-loopback       (2)
}
```

```
NumberPortabilityRouting        ::= GraphicString

--
-- R
--

RateElement     ::= SEQUENCE
{
    unitType                [0] INTEGER,
    unitValue           [1] REAL,
    unitCost                [2] REAL,
    unitQuotaThreshold  [3] REAL
}

RealTimeTariffInformation ::= CHOICE
{
    tariffInformation       [0] TariffInformation,
    tariffXml               [1] UTF8String
}

ReasonHeaderInformation ::= GraphicString

RelationshipMode ::= ENUMERATED
{
    trusted     (0),
    non-trusted (1)
}

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

--
-- S
--

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
                                    -- [2] is used by gPRS-Charging-Id
                                    -- [4] is used by accessNetworkChargingIdentifier
    localGWInsertedIndication       [5] BOOLEAN OPTIONAL,
    iPRealmDefaultIndication        [6] BOOLEAN OPTIONAL,
    transcoderInsertedIndication    [7] BOOLEAN OPTIONAL
}

SDP-Media-Description   ::= SEQUENCE OF GraphicString

ServedPartyIPAddress    ::=  IPAddress

Service-Id  ::= GraphicString


SessionDirection    ::= ENUMERATED
{
    inbound     (0),
    outbound        (1)
}

SessionPriority ::= ENUMERATED
--
-- PRIORITY-0 is the highest priority and Priority-4 is the lowest priority. See TS 29.229[232]
--
{
    pRIORITY-0 (0),
    pRIORITY-1 (1),
    pRIORITY-2 (2),
```

```
    pRIORITY-3 (3),
    pRIORITY-4 (4)
}

SIP-Method  ::= GraphicString

SDP-Type    ::= ENUMERATED
{
    sDP-offer   (0),
    sDP-answer  (1)
}

Status      ::= ENUMERATED
{
    fourxx          (0),
    fivexx          (1),
    time-out            (2)
}

--
-- T
--

TADIdentifier       ::= ENUMERATED
{
    cS      (0),
    pS      (1)
}

TariffInformation ::= SEQUENCE
{
    currencyCode            [0] INTEGER,
    scaleFactor         [1] REAL,
    rateElements            [2] SEQUENCE OF RateElement OPTIONAL
}

TransitIOILists ::= SEQUENCE OF GraphicString

TransmissionMedium ::= SEQUENCE
{
    tMR [0] OCTET STRING (SIZE (1)) OPTIONAL, -- required TM, refer to Q.763
    tMU [1] OCTET STRING (SIZE (1)) OPTIONAL  -- used TM, refer to Q.763
}

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

.#END
```

5.2.4 Service level CDR definitions

5.2.4.0 General

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) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS


ChargingID,
GSNAddress,
IPAddress,
LocalSequenceNumber,
ManagementExtensions,
MessageClass,
MscNo,
MSISDN,
MSTimeZone,
PLMN-Id,
PriorityType,
RATType,
RecordType,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

CallReferenceNumber
FROM MAP-CH-DataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-CH-DataTypes (13)  version18 (18)}
-- from TS 29.002 [214]


;

--
--  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,
    mSTimeZone                  [32] MSTimeZone 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,
    mSTimeZone                  [14] MSTimeZone 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,
    mSTimeZone                  [14] MSTimeZone 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,
    mSTimeZone                  [26] MSTimeZone 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,
    mSTimeZone                  [13] MSTimeZone 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,
    mSTimeZone                  [29] MSTimeZone 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,
```

```
    mSTimeZone                  [13] MSTimeZone 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,
    mSTimeZone                  [13] MSTimeZone 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,
    mSTimeZone              [16] MSTimeZone 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,
    mSTimeZone                  [20] MSTimeZone 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] PriorityType 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,
    mSTimeZone                  [22] MSTimeZone 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,
    mSTimeZone                  [22] MSTimeZone 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] MMStatusCodeType,
    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]  CallReferenceNumber
}

ContentType         ::= OCTET STRING

DataVolume          ::= INTEGER
--
-- The volume of data transfered in octets.
--

DeltaSeconds        ::= OCTET STRING (SIZE(8))

MediaComponent  ::= SEQUENCE
{
    mediaType       [0]  OCTET STRING,
    mediaSize       [1]  DataVolume
}

MediaComponents ::= SET OF MediaComponent

MessageSelection ::= INTEGER

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
--
-- mMSRecipeintType is only included when this datatype is used to identify recipients.
--
{
    mMSAgentAddressData [0]  MMSAgentAddressData,
    mMSRecipientType    [1]  SEQUENCE OF MMSRecipientType OPTIONAL
}

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
}


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) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS


IPAddress,
LCSClientIdentity,
LocalSequenceNumber,
ManagementExtensions,
MSISDN,
PLMN-Id,
```

```
PositioningData,
RecordingEntity,
RecordType,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}
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)  version18 (18) }
-- from TS 29.002 [214]

AddressString,
IMSI
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }
-- from TS 29.002 [214]

;

--
--  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] LCS-Priority 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
}

--
--  LCS DATA TYPES
--

ProviderError   ::= INTEGER
--
-- see ITU-T Q.733 [307] for invoke problem codes
--

ResultCodeType          ::= INTEGER (0..MAX)
--
-- Result codes as defined in OMA-MLP Specifications [311]
--

ServingEntity ::= AddressString

UserError   ::= OCTET STRING (SIZE (1))
--
-- see TS 29.002 [214] for error code values
--


END
```

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) version2 (1)}
```

```
DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration,
InvolvedParty,
LocalSequenceNumber,
ManagementExtensions,
NodeAddress,
NodeID,
RecordType,
ServiceContextID,
Session-Id,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

GSNAddress
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

IMS-Charging-Identifier,
Incomplete-CDR-Indication,
InterOperatorIdentifiers,
MessageBody,
Media-Components-List,
SIP-Method
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version2 (1)}

;

--
--  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] OCTET STRING OPTIONAL,
    poCInformation                  [24] POCInformation OPTIONAL,
    recordExtensions                [25] ManagementExtensions 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 OPTIONAL,
    userLocationInfo                [23] OCTET STRING OPTIONAL,
    poCInformation                  [24] POCInformation OPTIONAL,
    recordExtensions                [25] ManagementExtensions 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
{
    one-to-one-session              (0),
    chat-group-session              (1),
    pre-arranged-group-session      (2),
    ad-hoc-group-session            (3)
}

.#END
```

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) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration,
Diagnostics,
GSNAddress,
LocalSequenceNumber,
ManagementExtensions,
MBMSInformation,
MSISDN,
NodeID,
PDPAddress,
RecordType,
ServiceContextID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

IMSI
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }
-- from TS 29.002 [214]

AccessPointNameNI,
ChangeOfMBMSCondition,
PDPType
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

Media-Components-List
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version2 (1)}

;

--
--  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] MBMSCauseForRecClosing,
    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] MBMSCauseForRecClosing,
    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,
    servedpdpPDNType            [18] PDPType OPTIONAL
}

--
--  MBMS DATA TYPES
--

MBMSCauseForRecClosing  ::= INTEGER
--
-- cause codes 0 to 15 are defined as used in 'CauseForTerm'
-- (cause for termination) and 16 to 20 are as defined for 'CauseForRecClosing'
-- (cause for record closing)
--
{
    normalRelease                   (0),
    abnormalRelease                 (4),
    volumeLimit                     (16),
    timeLimit                       (17),
    maxChangeCond                   (19),
    managementIntervention          (20),
    listofDownstreamNodeChange      (59)
}

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) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

InvolvedParty,
LocalSequenceNumber,
ManagementExtensions,
NodeAddress,
RecordType,
ServiceContextID,
Session-Id,
SubscriberEquipmentNumber,
SubscriptionID,
ThreeGPPPSDataOffStatus,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}
```

```
AoCInformation,
CarrierSelectRouting,
CauseForRecordClosing,
Early-Media-Components-List,
FEIdentifierList,
IMS-Charging-Identifier,
IMSCommunicationServiceIdentifier,
Incomplete-CDR-Indication,
InterOperatorIdentifierList,
ListOfInvolvedParties,
ListOfReasonHeader,
Media-Components-List,
MessageBody,
Milliseconds,
NumberPortabilityRouting,
RealTimeTariffInformation,
ReasonHeaderInformation,
Role-of-Node,
Service-Id,
SessionPriority,
SIP-Method,
TransitIOILists
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version2 (1)}

;

--
--  MMTel RECORDS
--

MMTelServiceRecord  ::= CHOICE
--
-- Record values 83 are MMTel specific
--
{
    mMTelRecord         [83] MMTelRecord
}

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,
    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,
    sessionPriority                     [36] SessionPriority OPTIONAL,
    serviceRequestTimeStampFraction     [37] Milliseconds OPTIONAL,
    serviceDeliveryStartTimeStampFraction   [38] Milliseconds OPTIONAL,
```

```
    serviceDeliveryEndTimeStampFraction     [39] Milliseconds OPTIONAL,
    online-charging-flag                    [43] NULL OPTIONAL,
    realTimeTariffInformation               [44] SEQUENCE OF RealTimeTariffInformation OPTIONAL,
    transit-IOI-Lists                       [53] TransitIOILists OPTIONAL,
    iMSVisitedNetworkIdentifier             [54] OCTET STRING OPTIONAL,
    listOfReasonHeader                      [55] ListOfReasonHeader OPTIONAL,
    additionalAccessNetworkInformation      [56] OCTET STRING OPTIONAL,
    instanceId                              [57] OCTET STRING OPTIONAL,
    subscriberEquipmentNumber               [58] SubscriberEquipmentNumber OPTIONAL,
    cellularNetworkInformation              [64] OCTET STRING OPTIONAL,
    requested-Party-Address                 [101] InvolvedParty OPTIONAL,
    list-Of-Called-Asserted-Identity        [102] ListOfInvolvedParties OPTIONAL,
    outgoingSessionId                       [104] Session-Id OPTIONAL,
    mMTelInformation                        [110] MMTelInformation OPTIONAL,
    threeGPPPSDataOffStatus                 [112] ThreeGPPPSDataOffStatus OPTIONAL,
    fEIdentifierList                        [113] FEIdentifierList OPTIONAL
}

--
--  MMTel DATA TYPES
--

MMTelInformation            ::= SET
{
    listOfSupplServices     [0] SEQUENCE OF SupplService 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,
    cUGInformation              [8] OCTET STRING OPTIONAL,
    aoCInformation              [9] SEQUENCE OF AoCInformation 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),
    cWaiting            (8),
    mWaitingIndic       (9),
    cONF                (10),
    fLexibleAlerting    (11),
    cCBS                (12),
    cCNR                (13),
    mCID                (14),
    cAT                 (15),
    cUG                 (16),
    pNM                 (17),
    cRS                 (18),
    aoC                 (19),
    eCT                 (20)
}

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),
    threePTY            (11),
    aoC-S               (12),
    aoC-D               (13),
    aoC-E               (14)
}


END
```

5.2.4.6 SMS CDRs

This subclause contains the abstract syntax definitions that are specific to the CDR types defined in TS 32.274 [34].

```
.$SMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging (5)
smsChargingDataTypes (10) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

DataVolume
FROM CSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) csChargingDataTypes (1) asn1Module (0) version2 (1)}

DiameterIdentity,
LocalSequenceNumber,
ManagementExtensions,
MessageClass,
MessageReference,
MSISDN,
MSTimeZone,
NodeAddress,
PDPAddress,
PLMN-Id,
PriorityType,
RATType,
RecordType,
Session-Id,
SMSResult,
SubscriberEquipmentNumber,
SubscriptionID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

AddressString,
IMEI,
IMSI,
ISDN-AddressString
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }
-- from TS 29.002 [214]


CarrierSelectRouting,
NumberPortabilityRouting
FROM IMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5) imsChargingDataTypes (4) asn1Module (0) version2 (1)}
```

```
;


--
--  SMS RECORDS
--

SMSRecordType   ::= CHOICE
--
-- Record values 93,94, 110 to 113 are SMS specific.
--
{
    sCSMORecord              [93] SCSMORecord,
    sCSMTRecord              [94] SCSMTRecord,
    sCDVTT4Record           [110] SCDVTT4Record,
    sCSMOT4Record           [111] SCSMTRecord,
    iSMSMORecord            [112] ISMSMORecord,
    iSMSMTRecord            [113] ISMSMTRecord
}

SCSMORecord ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] AddressString,
    originatorInfo              [2] OriginatorInfo OPTIONAL,
    recipientInfo               [3] SEQUENCE OF RecipientInfo OPTIONAL,
    servedIMEI                  [4] IMEI OPTIONAL,
    eventtimestamp              [5] TimeStamp,
    messageReference            [6] MessageReference,
    sMTotalNumber               [7] INTEGER OPTIONAL,
    sMSequenceNumber            [8] INTEGER OPTIONAL,
    messageSize                 [9] DataVolume OPTIONAL,
    messageClass               [10] MessageClass OPTIONAL,
    sMdeliveryReportRequested  [11] BOOLEAN OPTIONAL,
    sMDataCodingScheme         [12] INTEGER OPTIONAL,
    sMMessageType              [13] SMMessageType OPTIONAL,
    sMReplyPathRequested       [14] NULL OPTIONAL,
    sMUserDataHeader           [15] OCTET STRING OPTIONAL,
    userLocationInfo           [16] OCTET STRING OPTIONAL,
    rATType                    [17] RATType OPTIONAL,
    uETimeZone                 [18] MSTimeZone OPTIONAL,
    sMSResult                  [19] SMSResult OPTIONAL,
    localSequenceNumber        [22] LocalSequenceNumber OPTIONAL,
    recordExtensions           [23] ManagementExtensions OPTIONAL
}

SCSMOT4Record   ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] AddressString,
    originatorInfo              [2] OriginatorInfo OPTIONAL,
    recipientInfo               [3] RecipientInfo OPTIONAL,
    servedIMEI                  [4] IMEI OPTIONAL,
    eventtimestamp              [5] TimeStamp,
    messageReference            [6] MessageReference,
    messageSize                 [9] DataVolume OPTIONAL,
    messageClass               [10] MessageClass OPTIONAL,
    sMdeliveryReportRequested  [11] BOOLEAN OPTIONAL,
    sMDataCodingScheme         [12] INTEGER OPTIONAL,
    sMMessageType              [13] SMMessageType OPTIONAL,
    sMReplyPathRequested       [14] NULL OPTIONAL,
    sMUserDataHeader           [15] OCTET STRING OPTIONAL,
    userLocationInfo           [16] OCTET STRING OPTIONAL,
    rATType                    [17] RATType OPTIONAL,
    uETimeZone                 [18] MSTimeZone OPTIONAL,
    sMSResult                  [19] SMSResult OPTIONAL,
    mTCIWFAddress              [20] NodeAddress OPTIONAL,
    sMSApplicationPortID       [21] INTEGER OPTIONAL,
    externalIdentifier         [22] SubscriptionID OPTIONAL,
    localSequenceNumber        [23] LocalSequenceNumber OPTIONAL,
    recordExtensions           [24] ManagementExtensions OPTIONAL
}


SCSMTRecord ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] AddressString,
```

```
    recipientInfo               [2] RecipientInfo OPTIONAL,
    originatorInfo              [3] OriginatorInfo OPTIONAL,
    servedIMEI                  [4] IMEI OPTIONAL,
    submissionTime              [5] TimeStamp OPTIONAL,
    eventtimestamp              [6] TimeStamp,
    sMPriority                  [7] PriorityType OPTIONAL,
    messageReference            [8] MessageReference OPTIONAL,
    sMTotalNumber               [9] INTEGER OPTIONAL,
    sMSequenceNumber            [10] INTEGER OPTIONAL,
    messageSize                 [11] DataVolume OPTIONAL,
    messageClass                [12] MessageClass OPTIONAL,
    sMdeliveryReportRequested   [13] BOOLEAN OPTIONAL,
    sMDataCodingScheme          [14] INTEGER OPTIONAL,
    sMMessageType               [15] SMMessageType OPTIONAL,
    sMReplyPathRequested        [16] NULL OPTIONAL,
    sMUserDataHeader            [17] OCTET STRING OPTIONAL,
    sMSStatus                   [18] SMSStatus OPTIONAL,
    sMDischargeTime             [19] TimeStamp OPTIONAL,
    userLocationInfo            [20] OCTET STRING OPTIONAL,
    rATType                     [21] RATType OPTIONAL,
    uETimeZone                  [22] MSTimeZone OPTIONAL,
    sMSResult                   [23] SMSResult OPTIONAL,
    sMDeviceTriggerInformation  [25] SMDeviceTriggerInformation OPTIONAL,
    localSequenceNumber         [26] LocalSequenceNumber OPTIONAL,
    recordExtensions            [27] ManagementExtensions OPTIONAL
}

SCDVTT4Record   ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] AddressString,
    eventtimestamp              [2] TimeStamp,
    originatorInfo              [3] OriginatorInfo OPTIONAL,
    recipientInfo               [4] RecipientInfo OPTIONAL,
    sMDeviceTriggerIndicator    [5] SMDeviceTriggerIndicator OPTIONAL,
    sMDeviceTriggerInformation  [6] SMDeviceTriggerInformation OPTIONAL,
    sMSResult                   [7] SMSResult OPTIONAL,
    localSequenceNumber         [9] LocalSequenceNumber OPTIONAL,
    recordExtensions            [10] ManagementExtensions OPTIONAL
}

ISMSMORecord    ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] NodeAddress,
    originatorInfo              [2] OriginatorInfo OPTIONAL,
    recipientInfo               [3] SEQUENCE OF RecipientInfo OPTIONAL,
    subscriberEquipmentNumber   [4] SubscriberEquipmentNumber OPTIONAL,
    eventtimestamp              [5] TimeStamp,
    messageReference            [6] MessageReference,
    sMTotalNumber               [7] INTEGER OPTIONAL,
    sMSequenceNumber            [8] INTEGER OPTIONAL,
    messageSize                 [9] DataVolume OPTIONAL,
    messageClass                [10] MessageClass OPTIONAL,
    sMdeliveryReportRequested   [11] BOOLEAN OPTIONAL,
    sMDataCodingScheme          [12] INTEGER OPTIONAL,
    sMMessageType               [13] SMMessageType OPTIONAL,
    sMReplyPathRequested        [14] NULL OPTIONAL,
    sMUserDataHeader            [15] OCTET STRING OPTIONAL,
    sMSResult                   [16] SMSResult OPTIONAL,
    userLocationInfo            [17] OCTET STRING OPTIONAL,
    rATType                     [18] RATType OPTIONAL,
    uETimeZone                  [19] MSTimeZone OPTIONAL,
    pDPAddress                  [20] PDPAddress OPTIONAL,
    session-Id                  [21] Session-Id OPTIONAL,
    numberPortabilityRouting    [22] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting        [23] CarrierSelectRouting OPTIONAL,
    localSequenceNumber         [24] LocalSequenceNumber OPTIONAL,
    recordExtensions            [25] ManagementExtensions OPTIONAL
}


ISMSMTRecord    ::= SET
{
    recordType                  [0] RecordType,
    sMSNodeAddress              [1] NodeAddress,
    recipientInfo               [2] RecipientInfo OPTIONAL,
    originatorInfo              [3] OriginatorInfo OPTIONAL,
```

```
    subscriberEquipmentNumber   [4] SubscriberEquipmentNumber OPTIONAL,
    submissionTime              [5] TimeStamp OPTIONAL,
    eventtimestamp              [6] TimeStamp,
    sMPriority                  [7] PriorityType OPTIONAL,
    messageReference            [8] MessageReference,
    sMTotalNumber               [9] INTEGER OPTIONAL,
    sMSequenceNumber            [10] INTEGER OPTIONAL,
    messageSize                 [11] DataVolume OPTIONAL,
    messageClass                [12] MessageClass OPTIONAL,
    sMdeliveryReportRequested   [13] BOOLEAN OPTIONAL,
    sMDataCodingScheme          [14] INTEGER OPTIONAL,
    sMMessageType               [15] SMMessageType OPTIONAL,
    sMReplyPathRequested        [16] NULL OPTIONAL,
    sMUserDataHeader            [17] OCTET STRING OPTIONAL,
    sMSStatus                   [18] SMSStatus OPTIONAL,
    sMDischargeTime             [19] TimeStamp OPTIONAL,
    userLocationInfo            [20] OCTET STRING OPTIONAL,
    rATType                     [21] RATType OPTIONAL,
    uETimeZone                  [22] MSTimeZone OPTIONAL,
    sMSResult                   [23] SMSResult OPTIONAL,
    pDPAddress                  [24] PDPAddress OPTIONAL,
    session-Id                  [25] Session-Id OPTIONAL,
    numberPortabilityRouting    [26] NumberPortabilityRouting OPTIONAL,
    carrierSelectRouting        [27] CarrierSelectRouting OPTIONAL,
    localSequenceNumber         [28] LocalSequenceNumber OPTIONAL,
    recordExtensions            [29] ManagementExtensions OPTIONAL
}

--
--  SMS DATA TYPES
--

OriginatorInfo  ::= SEQUENCE
--
-- OriginatorInfo is used for information about Originator of a Short Message
--
{
    originatorIMSI              [0] IMSI OPTIONAL,
    originatorMSISDN            [1] MSISDN OPTIONAL,
    originatorOtherAddress      [2] SMAddressInfo OPTIONAL,
                                    -- used if type different from IMSI and MSISDN
    originatorSCCPAddress       [3] AddressString OPTIONAL,
    originatorReceivedAddress   [4] SMAddressInfo OPTIONAL,
    sMOriginatorInterface       [5] SMInterface OPTIONAL,
    sMOriginatorProtocolID      [6] OCTET STRING OPTIONAL
}

RecipientInfo   ::= SEQUENCE
--
-- RecipientInfo is used for information about Recipient of a Short Message
--
{
    recipientIMSI               [0] IMSI OPTIONAL,
    recipientMSISDN             [1] MSISDN OPTIONAL,
    recipientOtherAddress       [2] SMAddressInfo OPTIONAL,
                                    -- used if type different from IMSI and MSISDN
    recipientSCCPAddress        [3] AddressString OPTIONAL,
    recipientReceivedAddress    [4] SMAddressInfo OPTIONAL,
    sMDestinationInterface      [5] SMInterface OPTIONAL,
    sMRecipientProtocolID       [6] OCTET STRING OPTIONAL
}

SMAddressDomain     ::= SEQUENCE
{
    sMDomainName            [0] GraphicString OPTIONAL,
    threeGPPIMSI-MCC-MNC    [1] PLMN-Id OPTIONAL
}

SMAddressInfo       ::= SEQUENCE
{
    sMAddressType       [0] SMAddressType OPTIONAL,
    sMAddressData       [1] GraphicString OPTIONAL,
    sMAddressDomain     [2] SMAddressDomain OPTIONAL
}

SMAddressType   ::= ENUMERATED
{
    emailAddress            (0),
```

```
    mSISDN                  (1),
    iPv4Address             (2),
    iPv6Address             (3),
    numericShortCode        (4),
    alphanumericShortCode   (5),
    other                   (6),
    iMSI                    (7)
}

SMDeviceTriggerIndicator    ::= ENUMERATED
{
    notDeviceTrigger        (0),
    deviceTriggerRequest    (1),
    deviceTriggerReplace    (2),
    deviceTriggerRecall     (3)
}


SMDeviceTriggerInformation  ::= SEQUENCE
--
-- SMDeviceTriggerInformation is used for information on device triggering from T4
-- as specified in TS 29.337[231]
--
{
    mTCIWFAddress           [0] NodeAddress OPTIONAL,
    sMDTReferenceNumber     [1] INTEGER OPTIONAL,
    sMServingNode           [2] SMServingNode OPTIONAL,
    sMDTValidityPeriod      [3] INTEGER OPTIONAL,
    sMDTPriorityIndication  [4] SMDTPriorityIndication OPTIONAL,
    sMSApplicationPortID    [5] INTEGER OPTIONAL
}

SMDTPriorityIndication  ::= ENUMERATED
{
    nonpriority (0),
    priority    (1)
}

SMInterface     ::= SEQUENCE
{
    interfaceId         [0] GraphicString OPTIONAL,
    interfaceText       [1] GraphicString OPTIONAL,
    interfacePort       [2] GraphicString OPTIONAL,
    interfaceType       [3] SMInterfaceType OPTIONAL
}

SMInterfaceType ::= ENUMERATED
{
    unkown                  (0),
    mobileOriginating       (1),
    mobileTerminating       (2),
    applicationOriginating  (3),
    applicationTerminating  (4),
    deviceTrigger           (5)
}

SMMessageType   ::= ENUMERATED
{
    submission          (0),
    deliveryReport      (1),
    sMServiceRequest    (2),
    delivery            (3),
    t4DeviceTrigger     (4),
    sMDeviceTrigger     (5)
}

SMServingNode       ::= SEQUENCE
{
    sGSNName            [0] DiameterIdentity OPTIONAL,
    sGSNRealm           [1] DiameterIdentity OPTIONAL,
    sGSNNumber          [2] AddressString OPTIONAL,
    mMEName             [3] DiameterIdentity OPTIONAL,
    mMERealm            [4] DiameterIdentity OPTIONAL,
    mMENumberForMTSMS   [5] AddressString OPTIONAL,
    mSCNumber           [6] AddressString OPTIONAL,
    iPSMGWNumber        [7] AddressString OPTIONAL,
    iPSMGWName          [8] DiameterIdentity OPTIONAL
}
```

```
SMSStatus       ::= OCTET STRING (SIZE(1))


.#END
```

5.2.4.7 ProSe CDRs

This subclause contains the abstract syntax definitions that are specific to the ProSe CDR types defined in TS 32.277 [36].

```
.$ProSeChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) proseChargingDataType (11) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

IPAddress,
LocalSequenceNumber,
ManagementExtensions,
NodeID,
PLMN-Id,
RecordType,
ServiceContextID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}


IMSI
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18) version18 (18)}
-- from TS 29.002 [214]


ChargingCharacteristics,
ChChSelectionMode,
DataVolumeGPRS

FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

;

--
-- ProSe RECORDS
--

ProSeRecordType     ::= CHOICE
--
-- Record values 100..102 are ProSe specific
--
{
    pFDDRecord          [100] PFDDRecord,
    pFEDRecord          [101] PFEDRecord,
    pFDCRecord          [102] PFDCRecord
}

PFDDRecord  ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    serviceContextID                [2] ServiceContextID OPTIONAL,
    servedIMSI                      [3] IMSI OPTIONAL,
    proSeFunctionIPAddress          [4] IPAddress OPTIONAL,
    chargingCharacteristics         [5] ChargingCharacteristics,
    chChSelectionMode               [6] ChChSelectionMode OPTIONAL,
    recordExtensions                [7] ManagementExtensions OPTIONAL,
    proSeRequestTimestamp           [8] TimeStamp OPTIONAL,
    roleofUE                        [9] ProSeUERole OPTIONAL,
```

```
    pCThreeControlProtocolCause     [10] INTEGER OPTIONAL,
    roleofProSeFunction             [11] ProSeFunctionRole OPTIONAL,
    proSeApplicationID              [12] UTF8String OPTIONAL,
    proSeEventType                  [13] ProSeEventType OPTIONAL,
    nodeID                          [14] NodeID OPTIONAL,
    proseFunctionId                 [15] UTF8String OPTIONAL,
    announcingUEHPLMNIdentifier     [16] PLMN-Id OPTIONAL,
    announcingUEVPLMNIdentifier     [17] PLMN-Id OPTIONAL,
    monitoringUEHPLMNIdentifier     [18] PLMN-Id OPTIONAL,
    monitoringUEVPLMNIdentifier     [19] PLMN-Id OPTIONAL,
    monitoredPLMNIdentifier         [20] PLMN-Id OPTIONAL,
    applicationID                   [21] UTF8String OPTIONAL,
    directDiscoveryModel            [22] UTF8String OPTIONAL,
    validityPeriod                  [23] INTEGER OPTIONAL,
    monitoringUEIdentifier          [24] IMSI OPTIONAL,
    discovererUEHPLMNIdentifier     [25] PLMN-Id OPTIONAL,
    discovererUEVPLMNIdentifier     [26] PLMN-Id OPTIONAL,
    discovereeUEHPLMNIdentifier     [27] PLMN-Id OPTIONAL,
    discovereeUEVPLMNIdentifier     [28] PLMN-Id OPTIONAL,
    announcingPLMNID                [29] PLMN-Id OPTIONAL,
    pc5RadioTechnology              [30] PC5RadioTechnology OPTIONAL

}

PFEDRecord  ::= SET
{
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    serviceContextID                [2] ServiceContextID OPTIONAL,
    servedIMSI                      [3] IMSI OPTIONAL,
    proSeFunctionIPAddress          [4] IPAddress OPTIONAL,
    chargingCharacteristics         [5] ChargingCharacteristics,
    chChSelectionMode               [6] ChChSelectionMode OPTIONAL,
    recordExtensions                [7] ManagementExtensions OPTIONAL,
    proSeRequestTimestamp           [8] TimeStamp OPTIONAL,
    roleofUE                        [9] ProSeUERole OPTIONAL,
    pCThreeEPCControlProtocolCause  [10] INTEGER OPTIONAL,
    proseFunctionPLMNIdentifier     [11] PLMN-Id OPTIONAL,
    proseFunctionId                 [12] UTF8String OPTIONAL,
    recordOpeningTime               [13] TimeStamp OPTIONAL,
    recordClosureTime               [14] TimeStamp OPTIONAL,
    applicationID                   [15] UTF8String OPTIONAL,
    requestorApplicationLayerUserID [16] UTF8String OPTIONAL,
    wLANLinkLayerID                 [17] UTF8String OPTIONAL,
    requestorEPCProSeUserID         [18] UTF8String OPTIONAL,
    requestedApplicationLayerUserID [19] UTF8String OPTIONAL,
    requestedPLMNIdentifier         [20] PLMN-Id OPTIONAL,
    timeWindow                      [21] INTEGER OPTIONAL,
    rangeClass                      [22] RangeClass OPTIONAL,
    uELocation                      [23] OCTET STRING OPTIONAL,
    proximityAlertIndication        [24] ProximityAlertIndication OPTIONAL,
    proximityAlertTimestamp         [25] TimeStamp OPTIONAL,
    proximityCancellationTimestamp  [26] TimeStamp OPTIONAL,
    reasonforCancellation           [27] ReasonforCancellation OPTIONAL,
    causeForRecClosing              [28] ProSeCauseForRecClosing,
    proximityRequestRenewalInfoBlockList    [29] SEQUENCE OF ProximityRequestRenewalInfoBlock
OPTIONAL
}

PFDCRecord  ::= SET
{
-- General CDR information
    recordType                      [0] RecordType,
    retransmission                  [1] NULL OPTIONAL,
    serviceContextID                [2] ServiceContextID OPTIONAL,
    servedIMSI                      [3] IMSI OPTIONAL,
    proSeFunctionIPAddress          [4] IPAddress OPTIONAL,
    chargingCharacteristics         [5] ChargingCharacteristics,
    chChSelectionMode               [6] ChChSelectionMode OPTIONAL,
    recordExtensions                [7] ManagementExtensions OPTIONAL,
    nodeID                          [8] NodeID OPTIONAL,
    proseFunctionPLMNIdentifier     [9] PLMN-Id OPTIONAL,
    proseFunctionId                 [10] UTF8String OPTIONAL,
    recordOpeningTime               [11] TimeStamp OPTIONAL,
    recordClosureTime               [12] TimeStamp OPTIONAL,
-- Common ProSe information. The same data is provided in all currently open group-level CDRs
    listOfCoverageInfo              [13] SEQUENCE OF CoverageInfo OPTIONAL,
    listOfRadioParameterSet         [14] SEQUENCE OF RadioParameterSetInfo OPTIONAL,
```

```
-- Group-specific information. This data could be different in each open group-level CDR
    proSeUEID                       [15] OCTET STRING OPTIONAL,
    sourceIPaddress                 [16] IPAddress OPTIONAL,
    layerTwoGroupID                 [17] OCTET STRING OPTIONAL,
    proSeGroupIPmulticastaddress    [18] IPAddress OPTIONAL,
    timeOfFirstTransmission         [19] TimeStamp OPTIONAL,
    timeOfFirstReception            [20] TimeStamp OPTIONAL,
    listOfTransmitters              [21] SEQUENCE OF TransmitterInfo OPTIONAL,
    listOfTransmissionData          [22] SEQUENCE OF ChangeOfProSeCondition OPTIONAL,
    listOfReceptionData             [23] SEQUENCE OF ChangeOfProSeCondition OPTIONAL,
    causeForRecClosing              [24] ProSeCauseForRecClosing,
    listOfAppSpecificData           [25] SEQUENCE OF AppSpecificData,
    targetIPaddress                 [26] IPAddress OPTIONAL,
    relayIPaddress                  [27] IPAddress OPTIONAL,
    proSeUEtoNetworkRelayUEID       [28] OCTET STRING OPTIONAL,
    proSeTargetLayerTwoID           [29] OCTET STRING OPTIONAL

}

--
-- ProSe DATA TYPES
--
--
-- A
--
AppSpecificData ::= OCTET STRING

--
-- C
--

ChangeOfProSeCondition       ::= SEQUENCE
--
-- Used for transmitted and received data container
--
{
    changeConditionTimestamp    [0] TimeStamp OPTIONAL,
    coverageStatus                  [1] CoverageStatus OPTIONAL,
    uELocation                      [2] OCTET STRING OPTIONAL,
    dataVolume              [3] DataVolumeGPRS OPTIONAL,
    serviceChangeCondition          [4] ServiceChangeCondition OPTIONAL,
    localSequenceNumber             [5] LocalSequenceNumber OPTIONAL,
    usageInformationReportSequenceNumber    [6] INTEGER OPTIONAL,
    radioResourcesInd               [7] RadioResourcesIndicator OPTIONAL,
    radiofrequency                  [8] RadioFrequency OPTIONAL,
    vPLMNIdentifier                 [9] PLMN-Id OPTIONAL
}
CoverageInfo    ::= SEQUENCE
{
    coverageStatus  [0] CoverageStatus,
    timeStamp       [1] TimeStamp OPTIONAL,
    listOfLocation  [2] SEQUENCE OF LocationInfo OPTIONAL
}

CoverageStatus              ::= ENUMERATED
{
    outOfCoverage               (0),
    inCoverage                  (1)
}

--
-- L
--

LocationInfo    ::= SEQUENCE
{
    uELocation      [0] OCTET STRING OPTIONAL,
    timeStamp       [1] TimeStamp OPTIONAL
}

--
-- P
--
PC5RadioTechnology          ::= ENUMERATED
{
    eUTRA                   (0),
    wLAN                    (1),
    bothEUTRAAndWLAN        (2)
```

```
}

ProSeCauseForRecClosing     ::= ENUMERATED
{
    proximityAlerted            (0),
    timeExpiredWithNoRrenewal   (1),
    requestorCancellation       (2),
    timeLimited                 (3),
    maxNumberOfReports          (4),
    abnormalRelease             (5)
}

ProSeEventType              ::= ENUMERATED
{
    openAnnouncing                  (0),
    openMonitoring                  (1),
    openMatchReport                 (2),
    restrictedAnnouncing            (3),
    restrictedMonitoring            (4),
    restrictedMatchReport           (5),
    restrictedDiscoveryRequest      (6),
    restrictedDiscoveryReporting    (7)
}

ProSeFunctionRole           ::= ENUMERATED
{
    hPLMN           (0),
    vPLMN          (1),
    localPLMN      (2)
}

ProSeUERole                 ::= ENUMERATED
{
    annoucingUE                 (0),
    monitoringUE                (1),
    requestorUE                 (2),
    requestedUE                 (3),
    discovererUE                (4),
    discovereeUE                (5)
}

ProximityAlertIndication    ::= ENUMERATED
{
    alerted                     (0),
    noAlert                     (1)
}

ProximityRequestRenewalInfoBlock            ::= SEQUENCE
--
-- Used for EPC-level discovery charging
--
{
    proSeRequestTimestamp           [0] TimeStamp OPTIONAL,
    timeWindow                      [1] INTEGER OPTIONAL,
    rangeClass                      [2] RangeClass OPTIONAL,
    uELocation                      [3] OCTET STRING OPTIONAL
}

--
-- R
--

RadioFrequency  ::= OCTET STRING
--
-- Format of the value is according to the carrierFreq-r12 ASN.1 data type described in TS
-- 36.331 [241].
--

RadioParameterSetInfo   ::= SEQUENCE
--
-- Format of the params value is according to the ProsePreconfiguration-r12 ASN.1 data type
-- described in TS 36.331 [241].
--
{
    timeStamp   [0] TimeStamp OPTIONAL,
    params      [1] OCTET STRING
}
```

```
RadioResourcesIndicator ::= INTEGER
{
    operatorProvided    (1),
    configured          (2)
}

RangeClass                  ::= ENUMERATED
{
    reserved                    (0),
    fiftyMeter                  (1),
    onehundredMeter             (2),
    twohundredMeter             (3),
    fivehundredMeter            (4),
    onethousandMeter            (5)
}

ReasonforCancellation       ::= ENUMERATED
{
    proximityAlerted            (0),
    timeExpiredWithNoRrenewal   (1),
    requestorCancellation       (2)
}

--
-- S
--

ServiceChangeCondition  ::= BIT STRING
{
    pLMNchange                  (0),
    coverageStatusChange        (1),
    locationChange              (2)
}

--
-- T
--

TransmitterInfo     ::= SEQUENCE
{
    sourceIPaddress [0] IPAddress,
    proSeUEID       [1] OCTET STRING
}

.#END
```

5.2.4.8 Monitoring Event CDRs

This subclause contains the abstract syntax definitions that are specific to the Monitoring Event CDR types defined in TS 32.278 [38].

```
.$MONTEChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) mONTEChargingDataType (12) asn1Module (0) version2 (1)}

DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

DiameterIdentity,
LocalSequenceNumber,
ManagementExtensions,
NodeID,
RecordType,
ServiceContextID,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}


IMSI
```

```
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18) version18 (18)}
-- from TS 29.002 [214]


UserCSGInformation
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

;

--
-- Monitoring Event RECORDS
--

MERecordType        ::= CHOICE
--
-- Record values 103..104 are Monitoring Event specific
--
{
    mECORecord          [103] MECORecord,
    mERERecord          [104] MERERecord
}

MECORecord  ::= SET
{
    recordType                              [0] RecordType,
    retransmission                          [1] NULL OPTIONAL,
    serviceContextID                        [2] ServiceContextID OPTIONAL,
    nodeID                                  [3] NodeID OPTIONAL,
    recordTimeStamp                         [4] TimeStamp OPTIONAL,
    eventTimestamp                          [5] TimeStamp OPTIONAL,
    monitoringEventConfigurationActivity    [6] MonitoringEventConfigurationActivity OPTIONAL,
    sCEFReferenceID                         [7] SCEFReferenceID OPTIONAL,
    sCEFID                                  [8] DiameterIdentity OPTIONAL,
    monitoringType                          [9] MonitoringType OPTIONAL,
    maximumNumberofReports                  [10] INTEGER OPTIONAL,
    monitoringDuration                      [11] TimeStamp OPTIONAL,
    chargeablePartyIdentifier               [12] UTF8String OPTIONAL,
    monitoredUser                           [13] IMSI OPTIONAL,
    maximumDetectionTime                    [14] INTEGER OPTIONAL,
    localRecordSequenceNumber               [15] LocalSequenceNumber OPTIONAL,
    reachabilityConfiguration               [16] ReachabilityConfiguration OPTIONAL,
    locationType                            [17] LocationType OPTIONAL,
    accuracy                                [18] Accuracy OPTIONAL,
    listofLocations                         [19] SEQUENCE OF EPSLocationInfo OPTIONAL,
    monitoringEventConfigStatus             [20] MonitoringEventConfigStatus OPTIONAL,
    recordExtensions                        [21] ManagementExtensions OPTIONAL
}

MERERecord  ::= SET
{
    recordType                              [0] RecordType,
    retransmission                          [1] NULL OPTIONAL,
    serviceContextID                        [2] ServiceContextID OPTIONAL,
    nodeID                                  [3] NodeID OPTIONAL,
    recordTimeStamp                         [4] TimeStamp OPTIONAL,
    localRecordSequenceNumber               [5] LocalSequenceNumber OPTIONAL,
    listofMonitoringEventReportData         [6] SEQUENCE OF MonitoringEventReportData OPTIONAL,
    recordExtensions                        [7] ManagementExtensions OPTIONAL
}

--
-- Monitoring Event DATA TYPES
--
--
-- A
--

Accuracy            ::= ENUMERATED
--
-- Note: value "3" is not used in this specification: it is provided to reflect
-- the full list specified in TS 29.336 Accuracy AVP
--

{
    cGIECGI             (0),
    eNB                 (1),
```

```
    lATARA              (2),
    pRA                 (3)
}
CauseType       ::= ENUMERATED
{
    radioNetworkLayer       (0),
    transportLayer          (1),
    nAS                     (2),
    protocol                    (3),
    miscellaneous           (4)
}

--
-- C
--

CommunicationFailureInfo        ::= SEQUENCE
{
    causeType   [0] CauseType OPTIONAL,
    s1APCause   [1] INTEGER OPTIONAL,
    rANAPCause  [2] INTEGER OPTIONAL,
    bSSGPCause  [3] INTEGER OPTIONAL,
    gMMCause        [4] INTEGER OPTIONAL,
    sMCause     [5] INTEGER OPTIONAL
}
CurrentLocationRetrieved        ::= ENUMERATED
{
    activeLocationRetrieval     (0)
}

--
-- E
--

EPSLocationInfo     ::= SEQUENCE
--
-- Only one element is present.
--
{
    mMELocationInformation  [0] MMELocationInformation OPTIONAL,
    sGSNLocationInformation [1] SGSNLocationInformation OPTIONAL
}

--
-- L
--

LocationType                ::= ENUMERATED
{
    currentLocation             (0),
    lastKnownLocation           (1)
}

--
-- M
--

MMELocationInformation      ::= SEQUENCE
{
    eUTRANCellGlobalIdentity        [0] OCTET STRING OPTIONAL,
    trackingAreaIdentity            [1] OCTET STRING OPTIONAL,
    geographicalInformation     [2] OCTET STRING OPTIONAL,
    geodeticInformation         [3] OCTET STRING OPTIONAL,
    currentLocationRetrieved        [4] CurrentLocationRetrieved OPTIONAL,
    ageOfLocationInformation        [5] INTEGER OPTIONAL,
    userCSGInformation          [6] UserCSGInformation OPTIONAL,
    eNodeBID                        [7] OCTET STRING OPTIONAL
}

MonitoringEventConfigStatus     ::= SEQUENCE
{
    serviceResult   [0] ServiceResult OPTIONAL,
    sCEFReferenceID [1] SCEFReferenceID OPTIONAL,
    sCEFID          [2] DiameterIdentity OPTIONAL
}

MonitoringEventConfigurationActivity                ::= ENUMERATED
{
```

```
    create              (0),
    transfer            (1),
    update              (2),
    delete              (3)
}

MonitoringEventReportData       ::= SEQUENCE
{
    eventTimestamp                          [0] TimeStamp OPTIONAL,
    sCEFReferenceID                         [1] SCEFReferenceID OPTIONAL,
    sCEFID                                  [2] DiameterIdentity OPTIONAL,
    monitoringEventReportNumber             [3] INTEGER OPTIONAL,
    chargeablePartyIdentifier               [4] UTF8String OPTIONAL,
    monitoredUser                           [5] IMSI OPTIONAL,
    monitoringType                          [6] MonitoringType OPTIONAL,
    reachabilityInformation                 [7] ReachabilityType OPTIONAL,
    reportedLocation                            [8] EPSLocationInfo OPTIONAL,
    communicationFailureInformation             [9] SEQUENCE OF CommunicationFailureInfo OPTIONAL,
    listOfNumberOfUEPerLocationReport       [10] SEQUENCE OF NumberOfUEPerLocationReport OPTIONAL
}

MonitoringType              ::= ENUMERATED
--
-- Note: value "3" and "4" are not used in this specification: they are provided to reflect the full
-- list specified in TS 29.336 Monitoring-Type AVP.
--
{
    lossOfConnectivity                      (0),
    ueReachability                          (1),
    locationReporting                       (2),
    changeOfIMSIIMEISVAssociation           (3),
    roamingStatus                           (4),
    communicationFailure                    (5),
    availabilityAfterDDNFailure             (6),
    numberOfUEPerLocation                   (7)
}

--
-- N
--

NumberOfUEPerLocationReport     ::= SEQUENCE
{
    ePSLocationInformation  [0] EPSLocationInfo OPTIONAL,
    uECount                 [1] INTEGER OPTIONAL
}

--
-- R
--

ReachabilityConfiguration       ::= SEQUENCE
{
    reachabilityType            [0] ReachabilityType OPTIONAL,
    maximumLatency              [1] INTEGER OPTIONAL,
    maximumResponseTime         [2] INTEGER OPTIONAL
}

ReachabilityType            ::= ENUMERATED
{
    reachabilityforSMS              (0),
    reachabilityforData             (1)
}

--
-- S
--

SGSNLocationInformation     ::= SEQUENCE
{
    cellGlobalIdentity          [0] OCTET STRING OPTIONAL,
    locationAreaIdentity            [1] OCTET STRING OPTIONAL,
    serviceAreaIdentity         [2] OCTET STRING OPTIONAL,
    routingAreaIdentity         [3] OCTET STRING OPTIONAL,
    geographicalInformation     [4] OCTET STRING OPTIONAL,
    geodeticInformation         [5] OCTET STRING OPTIONAL,
    currentLocationRetrieved        [6] CurrentLocationRetrieved OPTIONAL,
    ageOfLocationInformation        [7] INTEGER OPTIONAL,
```

```
    userCSGInformation          [8] UserCSGInformation OPTIONAL
}
SCEFReferenceID ::= INTEGER (0..4294967295)
--
-- 0..4294967295 is equivalent to 0..2**32-1
--

ServiceResult       ::= SEQUENCE
{
    vendorId            [0] INTEGER OPTIONAL,
    serviceResultCode   [1] INTEGER OPTIONAL
}

.#END
```

5.2.5 Charging Function domain CDRs

5.2.5.1 General

This subclause contains the syntax definitions of the CDRs for the CHF.

5.2.5.2 CHF CDRs

This subclause contains the abstract syntax definitions that are specific to the CHF CDR types defined in this document.

```
.$CHFChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging (5)
chfChargingDataTypes (15) asn1Module (0) version1 (0)}
DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

IMPORTS

CallDuration,
CauseForRecClosing,
ChargingID,
DataVolumeOctets,
Diagnostics,
EnhancedDiagnostics,
DynamicAddressFlag,
InvolvedParty,
IPAddress,
LocalSequenceNumber,
ManagementExtensions,
MessageClass,
MessageReference,
MSTimeZone,
NodeAddress,
PLMN-Id,
PriorityType,
RecordType,
ServiceSpecificInfo,
Session-Id,
SubscriberEquipmentNumber,
SubscriptionID,
ThreeGPPPSDataOffStatus,
TimeStamp
FROM GenericChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0)
charging (5) genericChargingDataTypes (0) asn1Module (0) version2 (1)}

AddressString
FROM MAP-CommonDataTypes {itu-t identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18)  version18 (18) }

ChargingCharacteristics,
ChargingRuleBaseName,
ChChSelectionMode,
EventBasedChargingInformation,
PresenceReportingAreaInfo,
RatingGroupId,
ServiceIdentifier
```

```
FROM GPRSChargingDataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) charging
(5) gprsChargingDataTypes (2) asn1Module (0) version2 (1)}

OriginatorInfo,
RecipientInfo,
SMMessageType,
SMSResult,
SMSStatus
FROM SMSChargingDataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) charging
(5)  smsChargingDataTypes (10) asn1Module (0) version2 (1)}

APIDirection
FROM ExposureFunctionAPIChargingDataTypes {itu-t (0) identified-organization (4) etsi (0)
mobileDomain (0) charging (5) exposureFunctionAPIChargingDataTypes (14) asn1Module (0) version2 (1)}


;

--
--  CHF RECORDS
--

CHFRecord   ::= CHOICE
--
-- Record values 200..201 are specific
--
{
    chargingFunctionRecord          [200] ChargingRecord
}

ChargingRecord  ::= SET
{
    recordType                              [0] RecordType,
    recordingNetworkFunctionID              [1] NetworkFunctionName,
    subscriberIdentifier                    [2] SubscriptionID OPTIONAL,
    nFunctionConsumerInformation            [3] NetworkFunctionInformation,
    triggers                                [4] SEQUENCE OF Trigger OPTIONAL,
    listOfMultipleUnitUsage                 [5] SEQUENCE OF MultipleUnitUsage OPTIONAL,
    recordOpeningTime                       [6] TimeStamp,
    duration                                [7] CallDuration,
    recordSequenceNumber                    [8] INTEGER OPTIONAL,
    causeForRecClosing                      [9] CauseForRecClosing,
    diagnostics                             [10] Diagnostics OPTIONAL,
    localRecordSequenceNumber               [11] LocalSequenceNumber OPTIONAL,
    recordExtensions                        [12] ManagementExtensions OPTIONAL,
    pDUSessionChargingInformation           [13] PDUSessionChargingInformation OPTIONAL,
    roamingQBCInformation                   [14] RoamingQBCInformation OPTIONAL,
    sMSChargingInformation                  [15] SMSChargingInformation OPTIONAL,
    chargingSessionIdentifier               [16] ChargingSessionIdentifier OPTIONAL,
    serviceSpecificationInformation         [17] OCTET STRING OPTIONAL,
    exposureFunctionAPIInformation          [18] ExposureFunctionAPIInformation OPTIONAL,
    registrationChargingInformation         [19] RegistrationChargingInformation OPTIONAL,
    n2ConnectionChargingInformation         [20] N2ConnectionChargingInformation OPTIONAL,
    locationReportingChargingInformation    [21] LocationReportingChargingInformation OPTIONAL,
    incompleteCDRIndication                 [22] IncompleteCDRIndication OPTIONAL,
    tenantIdentifier                        [23] TenantIdentifier OPTIONAL,
    mnSConsumerIdentifier                   [24] MnSConsumerIdentifier OPTIONAL,
    nSMChargingInformation                  [25] NSMChargingInformation OPTIONAL,
    nSPAChargingInformation                 [26] NSPAChargingInformation OPTIONAL

}

--
-- PDU Session Charging Information
--

PDUSessionChargingInformation   ::= SET
{
    pDUSessionChargingID            [0] ChargingID,
    userIdentifier                  [1] InvolvedParty OPTIONAL,
    userEquipmentInfo               [2] SubscriberEquipmentNumber OPTIONAL,
    userLocationInformation         [3] UserLocationInformation OPTIONAL,
    userRoamerInOut                 [4] RoamerInOut OPTIONAL,
    presenceReportingAreaInfo       [5] PresenceReportingAreaInfo OPTIONAL,
    pDUSessionId                    [6] PDUSessionId,
    networkSliceInstanceID          [7] SingleNSSAI OPTIONAL,
    pDUType                         [8] PDUSessionType OPTIONAL,
    sSCMode                         [9] SSCMode OPTIONAL,
```

```
    sUPIPLMNIdentifier              [10] PLMN-Id OPTIONAL,
    servingNetworkFunctionID        [11] SEQUENCE OF ServingNetworkFunctionID OPTIONAL,
    rATType                         [12] RATType OPTIONAL,
    dataNetworkNameIdentifier       [13] DataNetworkNameIdentifier OPTIONAL,
    pDUAddress                      [14] PDUAddress OPTIONAL,
    authorizedQoSInformation        [15] AuthorizedQoSInformation OPTIONAL,
    uETimeZone                      [16] MSTimeZone OPTIONAL,
    pDUSessionstartTime             [17] TimeStamp OPTIONAL,
    pDUSessionstopTime              [18] TimeStamp OPTIONAL,
    diagnostics                     [19] Diagnostics OPTIONAL,
    chargingCharacteristics         [20] ChargingCharacteristics OPTIONAL,
    chChSelectionMode               [21] ChChSelectionMode OPTIONAL,
    threeGPPPSDataOffStatus         [22] ThreeGPPPSDataOffStatus OPTIONAL,
    rANSecondaryRATUsageReport      [23] SEQUENCE OF NGRANSecondaryRATUsageReport OPTIONAL,
    subscribedQoSInformation        [24] SubscribedQoSInformation OPTIONAL,
    authorizedSessionAMBR           [25] SessionAMBR OPTIONAL,
    subscribedSessionAMBR           [26] SessionAMBR OPTIONAL,
    servingCNPLMNID                 [27] PLMN-Id OPTIONAL,
    sUPIunauthenticatedFlag         [28] NULL OPTIONAL,
    dnnSelectionMode                [29] DNNSelectionMode OPTIONAL,
    homeProvidedChargingID          [30] ChargingID OPTIONAL,
    mAPDUNonThreeGPPUserLocationInfo[31] UserLocationInformation OPTIONAL,
    mAPDUNonThreeGPPRATType         [32] RATType OPTIONAL,  mAPDUSessionInformation         [33]
MAPDUSessionInformation OPTIONAL

}

--
-- Roaming QBC Information

--

RoamingQBCInformation   ::= SET
{
    multipleQFIcontainer            [0] SEQUENCE OF MultipleQFIContainer OPTIONAL,
    uPFID                           [1] NetworkFunctionName OPTIONAL,
    roamingChargingProfile          [2] RoamingChargingProfile OPTIONAL
}


--
-- SMS Charging Information
--

SMSChargingInformation  ::= SET
{
    sMSNodeAddress              [0] AddressString,
    originatorInfo              [1] OriginatorInfo OPTIONAL,
    recipientInfos              [2] SEQUENCE OF RecipientInfo OPTIONAL,
    userEquipmentInfo           [3] SubscriberEquipmentNumber OPTIONAL,
    userLocationInformation     [4] UserLocationInformation OPTIONAL,
    uETimeZone                  [5] MSTimeZone OPTIONAL,
    rATType                     [6] RATType OPTIONAL,
    sMSCAddress                 [7] AddressString OPTIONAL,
    eventtimestamp              [8] TimeStamp,
-- 9 to 19 is for future use
    sMDataCodingScheme          [20] INTEGER OPTIONAL,
    sMMessageType               [21] SMMessageType OPTIONAL,
    sMReplyPathRequested        [22] SMReplyPathRequested OPTIONAL,
    sMUserDataHeader            [23] OCTET STRING OPTIONAL,
    sMSStatus                   [24] SMSStatus OPTIONAL,
    sMDischargeTime             [25] TimeStamp OPTIONAL,
    sMTotalNumber               [26] INTEGER OPTIONAL,
    sMServiceType               [27] SMServiceType OPTIONAL,
    sMSequenceNumber            [28] INTEGER OPTIONAL,
    sMSResult                   [29] SMSResult OPTIONAL,
    submissionTime              [30] TimeStamp OPTIONAL,
    sMPriority                  [31] PriorityType OPTIONAL,
    messageReference            [32] MessageReference,
    messageSize                 [33] INTEGER OPTIONAL,
    messageClass                [34] MessageClass OPTIONAL,
    sMdeliveryReportRequested   [35] SMdeliveryReportRequested OPTIONAL
}


--
-- Exposure Function API Information
--
```

```
ExposureFunctionAPIInformation  ::= SET
{
    groupIdentifier             [0] AddressString,
    aPIDirection                [1] APIDirection OPTIONAL,
    aPITargetNetworkFunction    [2] NetworkFunctionInformation OPTIONAL,
    aPIResultCode               [3] APIResultCode OPTIONAL,
    aPIName                     [4] IA5String,
    aPIReference                [5] IA5String OPTIONAL,
    aPIContent                  [6] OCTET STRING OPTIONAL
}


--
-- Registration Charging Information
--

RegistrationChargingInformation     ::= SET
{
    registrationMessagetype             [0] RegistrationMessageType,
    userIdentifier                      [1] InvolvedParty OPTIONAL,
    userEquipmentInfo                   [2] SubscriberEquipmentNumber OPTIONAL,
    sUPIunauthenticatedFlag             [3] NULL OPTIONAL,
    userRoamerInOut                     [4] RoamerInOut OPTIONAL,
    userLocationInformation             [5] OCTET STRING OPTIONAL,
    userLocationInfoTime                [6] TimeStamp OPTIONAL,
    uETimeZone                          [7] MSTimeZone OPTIONAL,
    rATType                             [8] RATType OPTIONAL,
    mICOModeIndication                  [9] MICOModeIndication OPTIONAL,
    smsIndication                       [10] SmsIndication OPTIONAL,
    taiList                             [11] SEQUENCE OF TAI OPTIONAL,
    serviceAreaRestriction              [12] ServiceAreaRestriction OPTIONAL,
    requestedNSSAI                      [13] SEQUENCE OF SingleNSSAI OPTIONAL,
    allowedNSSAI                        [14] SEQUENCE OF SingleNSSAI OPTIONAL,
    rejectedNSSAI                       [15] SEQUENCE OF SingleNSSAI OPTIONAL

}


--
-- N2 connection charging Information
--

N2ConnectionChargingInformation     ::= SET
{
    n2ConnectionMessageType             [0] N2ConnectionMessageType,
    userIdentifier                      [1] InvolvedParty OPTIONAL,
    userEquipmentInfo                   [2] SubscriberEquipmentNumber OPTIONAL,
    sUPIunauthenticatedFlag             [3] NULL OPTIONAL,
    userRoamerInOut                     [4] RoamerInOut OPTIONAL,
    userLocationInformation             [5] OCTET STRING OPTIONAL,
    userLocationInfoTime                [6] TimeStamp OPTIONAL,
    uETimeZone                          [7] MSTimeZone OPTIONAL,
    rATType                             [8] RATType OPTIONAL,
    ranUeNgapId                         [9] RanUeNgapId OPTIONAL,
    ranNodeId                           [10] GlobalRanNodeId OPTIONAL,
    restrictedRatList                   [11] SEQUENCE OF RATType OPTIONAL,
    forbiddenAreaList                   [12] SEQUENCE OF Area OPTIONAL,
    serviceAreaRestriction              [13] ServiceAreaRestriction OPTIONAL,
    restrictedCnList                    [14] SEQUENCE OF CoreNetworkType OPTIONAL,
    allowedNSSAI                        [15] SEQUENCE OF SingleNSSAI OPTIONAL,
    rrcEstablishmentCause               [16] RrcEstablishmentCause OPTIONAL

}


--
-- Location reporting charging Information
--


LocationReportingChargingInformation    ::= SET
{
    locationReportingMessagetype        [0] LocationReportingMessageType,
    userIdentifier                      [1] InvolvedParty OPTIONAL,
    userEquipmentInfo                   [2] SubscriberEquipmentNumber OPTIONAL,
    sUPIunauthenticatedFlag             [3] NULL OPTIONAL,
    userRoamerInOut                     [4] RoamerInOut OPTIONAL,
```

```
    userLocationInformation             [5] OCTET STRING OPTIONAL,
    userLocationInfoTime                [6] TimeStamp OPTIONAL,
    uETimeZone                          [7] MSTimeZone OPTIONAL,
    presenceReportingAreaInfo           [8] PresenceReportingAreaInfo OPTIONAL,
    rATType                             [9] RATType OPTIONAL

}

--
-- Network Slice Performance and Analytics charging Information
--

NSPAChargingInformation         ::= SET
{
    singelNSSAI                 [0] SingleNSSAI
}

--
-- PDU Container Information
--

PDUContainerInformation         ::= SEQUENCE
{
    chargingRuleBaseName                [0] ChargingRuleBaseName OPTIONAL,
    -- aFCorrelationInformation [1] is replaced by afChargingIdentifier [14]
    timeOfFirstUsage                    [2] TimeStamp OPTIONAL,
    timeOfLastUsage                     [3] TimeStamp OPTIONAL,
    qoSInformation                      [4] FiveGQoSInformation OPTIONAL,
    userLocationInformation             [5] UserLocationInformation OPTIONAL,
    presenceReportingAreaInfo           [6] PresenceReportingAreaInfo OPTIONAL,
    rATType                             [7] RATType OPTIONAL,
    sponsorIdentity                     [8] OCTET STRING OPTIONAL,
    applicationServiceProviderIdentity  [9] OCTET STRING OPTIONAL,
    servingNetworkFunctionID            [10] SEQUENCE OF ServingNetworkFunctionID OPTIONAL,
    uETimeZone                          [11] MSTimeZone OPTIONAL,
    threeGPPPSDataOffStatus             [12] ThreeGPPPSDataOffStatus OPTIONAL,
    qoSCharacteristics                  [13] QoSCharacteristics OPTIONAL,
    afChargingIdentifier                [14] ChargingID OPTIONAL,
    afChargingIdString                  [15] AFChargingID OPTIONAL,
mAPDUSteeringFunctionality      [16] MAPDUSteeringFunctionality OPTIONAL,
    mAPDUSteeringMode                   [17] MAPDUSteeringMode OPTIONAL

}

--
-- NSM charging Information
--
--
-- See TS 28.541 [254] for more information
--


NSMChargingInformation  ::= SET
{
    managementOperation                     [0] ManagementOperation OPTIONAL,
    iDnetworkSliceInstance                  [1] OCTET STRING OPTIONAL,
    listOfserviceProfileChargingInformation [2] SEQUENCE OF ServiceProfileChargingInformation
OPTIONAL,
    managementOperationStatus               [3] ManagementOperationStatus OPTIONAL,
    operationalState                        [4] OperationalState OPTIONAL,
    administrativeState                     [5] AdministrativeState OPTIONAL


}



--
-- QFI Container Information
--

MultipleQFIContainer        ::= SEQUENCE
{
    qosFlowId                           [0] QoSFlowId OPTIONAL,
    triggers                            [1] SEQUENCE OF Trigger,
    triggerTimeStamp                    [2] TimeStamp OPTIONAL,
    dataTotalVolume                     [3] DataVolumeOctets OPTIONAL,
    dataVolumeUplink                    [4] DataVolumeOctets OPTIONAL,
```

```
    dataVolumeDownlink                  [5] DataVolumeOctets OPTIONAL,
    localSequenceNumber                 [6] LocalSequenceNumber OPTIONAL,
    timeOfFirstUsage                    [8] TimeStamp OPTIONAL,
    timeOfLastUsage                     [9] TimeStamp OPTIONAL,
    qoSInformation                      [10] FiveGQoSInformation OPTIONAL,
    userLocationInformation             [11] UserLocationInformation OPTIONAL,
    uETimeZone                          [12] MSTimeZone OPTIONAL,
    presenceReportingAreaInfo           [13] PresenceReportingAreaInfo OPTIONAL,
    rATType                             [14] RATType OPTIONAL,
    reportTime                          [15] TimeStamp,
    servingNetworkFunctionID            [16] SEQUENCE OF ServingNetworkFunctionID OPTIONAL,
    threeGPPPSDataOffStatus             [17] ThreeGPPPSDataOffStatus OPTIONAL,
    threeGPPChargingID                  [18] ChargingID OPTIONAL,
    diagnostics                         [19] Diagnostics OPTIONAL,
    extensionDiagnostics                [20] EnhancedDiagnostics OPTIONAL,
    qoSCharacteristics                  [21] QoSCharacteristics OPTIONAL,
    time                                [22] CallDuration OPTIONAL


}

--
-- CHF CHARGING TYPES
--
--
-- A
--


AFChargingID    ::= UTF8String
--
-- See 3GPP TS 29.571 [249] for details.
--

AdministrativeState     ::= ENUMERATED
{
    lOCKED       (0),
    uNLOCKED     (1),
    sHUTTINGDOWN (2)

}

AccessType  ::= ENUMERATED
{
    threeGPPAccess                  (0),
    nonThreeGPPAccess               (1)

}


AllocationRetentionPriority ::= SEQUENCE
{
    priorityLevel           [1] INTEGER,
    preemptionCapability    [2] PreemptionCapability,
    preemptionVulnerability [3] PreemptionVulnerability
}

AMFID   ::= OCTET STRING (SIZE(3))
-- See subclause 2.10.1 of 3GPP TS 23.003 [7] for encoding.

AmfUeNgapId ::= INTEGER

Area    ::= SEQUENCE
{
    tacs        [0] SEQUENCE OF TAC OPTIONAL,
    areaCode    [1] OCTET STRING OPTIONAL

}


ATSSSCapability ::= ENUMERATED
{
    aTSSS-LL                    (0),
    mPTCP-ATSS-LL               (1),
    mPTCP-ATSS-LL-ASModeUL      (2),
    mPTCP-ATSS-LL-ExSDModeUL    (3),
    mPTCP-ATSS-LL-ASModeDLUL    (4)
```

```
}


AuthorizedQoSInformation    ::= SEQUENCE
--
-- See TS 32.291 [58] for more information
--
{
    fiveQi              [1] INTEGER,
    aRP                 [2] AllocationRetentionPriority,
    priorityLevel       [3] INTEGER OPTIONAL,
    averWindow          [4] INTEGER OPTIONAL,
    maxDataBurstVol     [5] INTEGER OPTIONAL
}

--
-- B
--

Bitrate ::= OCTET STRING
--
--  See 3GPP TS 29.571 [249] Bitrate data type.
--

--
-- C
--


ChargingSessionIdentifier   ::= OCTET STRING
-- See 3GPP TS 32.290 [57] for details.

CoreNetworkType         ::= ENUMERATED
{
    fiveGC      (0),
    ePC         (1)
}


--
-- D
--

APIResultCode   ::= INTEGER
--
-- See specific API for more information
--

DataNetworkNameIdentifier   ::= IA5String (SIZE(1..63))
--
-- Network Identifier part of DNN in dot representation.
-- For example, if the complete DNN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- The Identifier is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.
--

DelayToleranceIndicator   ::= ENUMERATED
{
    dTSupported             (0),
    dTNotSupported          (1)
}

DNNSelectionMode    ::= ENUMERATED
--
-- See Information Elements TS 29.502 [250] for more information
--
{
    uEorNetworkProvidedSubscriptionVerified             (0),
    uEProvidedSubscriptionNotVerified                   (1),
    networkProvidedSubscriptionNotVerified              (2)
}

--
-- F
--

FiveGMMCapability   ::= OCTET STRING
--
-- See 3GPP TS 29.571 [249] for details
```

```
--

FiveGQoSInformation ::= SEQUENCE
--
-- See TS 32.291 [58] for more information
--
{
    fiveQi                  [1] INTEGER,
    aRP                     [2] AllocationRetentionPriority,
    qoSNotificationControl  [3] BOOLEAN OPTIONAL,
    reflectiveQos           [4] BOOLEAN OPTIONAL,
    maxbitrateUL            [5] Bitrate OPTIONAL,
    maxbitrateDL            [6] Bitrate OPTIONAL,
    guaranteedbitrateUL     [7] Bitrate OPTIONAL,
    guaranteedbitrateDL     [8] Bitrate OPTIONAL,
    priorityLevel           [9] INTEGER OPTIONAL,
    averWindow              [10] INTEGER OPTIONAL,
    maxDataBurstVol         [11] INTEGER OPTIONAL,
    maxPacketLossRateDL     [12] INTEGER OPTIONAL,
    maxPacketLossRateUL     [13] INTEGER OPTIONAL
}

--
-- G
--
GlobalRanNodeId     ::= SEQUENCE
{
    pLMNId      [0] PLMN-Id OPTIONAL,
    n3IwfId     [1] N3IwFId OPTIONAL,
    gNbId       [2] GNbId OPTIONAL,
    ngeNbId     [3] NgeNbId OPTIONAL

}


GNbId       ::= SEQUENCE
{
    bitLength   [0] INTEGER,
    gNbValue    [1] IA5String (SIZE(10))

}

--
-- I
--

IncompleteCDRIndication ::= SEQUENCE
-- The values are TRUE if the corresponding message was lost, FALSE if it is not lost
-- and not included if the status is unknown
{
    initialLost     [0] BOOLEAN OPTIONAL,   -- Initial was lost
    updateLost      [1] BOOLEAN OPTIONAL,   -- An Update was lost,
    terminationLost [2] BOOLEAN OPTIONAL    -- Termination was lost
}

--
-- L
--

LocationReportingMessageType        ::= INTEGER


--
-- M
--

ManagementOperation     ::= ENUMERATED
{
    createMOI           (0),
    modifyMOIAttributes (1),
    deleteMOI           (2)

}

ManagementOperationStatus   ::= ENUMERATED
{
    oPERATION-SUCCEEDED (0),
    oPERATION-FAILED    (1)
```

```
}

MnSConsumerIdentifier       ::= OCTET STRING


MAPDUSessionIndicator   ::= ENUMERATED
{
    mAPDURequest                    (0),
    mAPDUNetworkUpgradeAllowed      (1)

}


MAPDUSessionInformation ::= SEQUENCE
{
    mAPDUSessionIndicator           [0] MAPDUSessionIndicator OPTIONAL,
    aTSSSCapability                 [1] ATSSSCapability OPTIONAL

}



MAPDUSteeringFunctionality  ::= ENUMERATED
{
    mPTCP       (0),
    aTSSSLL     (1)

}


MAPDUSteeringMode   ::= SEQUENCE
{
    steerModeValue          [0] SteerModeValue OPTIONAL,
    active                  [1] AccessType OPTIONAL,
    standby                 [2] AccessType OPTIONAL,
    threegLoad              [3] INTEGER OPTIONAL,
    prioAcc                 [4] AccessType OPTIONAL

}


MICOModeIndication      ::= ENUMERATED
{
    mICOMode            (0),
    noMICOMode          (1)
}

MobilityLevel   ::= ENUMERATED
{
    stationary          (0),
    nomadic             (1),
    restrictedMobility  (2),
    fullyMobility       (3)

}


MultipleUnitUsage       ::= SEQUENCE
{
    ratingGroup                         [0] RatingGroupId,
    usedUnitContainers                  [1] SEQUENCE OF UsedUnitContainer OPTIONAL,
    uPFID                               [2] NetworkFunctionName OPTIONAL
}

--
-- N
--
N2ConnectionMessageType     ::= INTEGER

N3IwFId     ::= IA5String (SIZE(1..16))
--
-- See 3GPP TS 29.571 [249] for details.
--

NetworkAreaInfo ::= SEQUENCE
{
--  ecgis               [0] SEQUENCE OF ecgi OPTIONAL,
```

```
--  ncgis               [1] SEQUENCE OF ncgi OPTIONAL,
    gRanNodeIds         [2] SEQUENCE OF GlobalRanNodeId OPTIONAL,
    tais                [3] SEQUENCE OF TAI OPTIONAL
}


NetworkFunctionInformation  ::= SEQUENCE
{
    networkFunctionality                [0] NetworkFunctionality,
    networkFunctionName                 [1] NetworkFunctionName OPTIONAL,
    networkFunctionIPv4Address          [2] IPAddress OPTIONAL,
    networkFunctionPLMNIdentifier       [3] PLMN-Id OPTIONAL,
    networkFunctionIPv6Address          [4] IPAddress OPTIONAL,
    networkFunctionFQDN                 [5] NodeAddress OPTIONAL

}

NetworkFunctionName ::= IA5String (SIZE(1..36))
-- Shall be a Universally Unique Identifier (UUID) version 4, as described in IETF RFC 4122 [410]

NetworkFunctionality    ::= ENUMERATED
{
    cHF         (0),
    -- CHF is a reserved value and is not used
    sMF         (1),
    aMF         (2),
    sMSF        (3),
    sGW         (4),
-- SGW is only applicable for interworking with EPC scenario
-- when UE is connected to P-GW+SMF via EPC
    iSMF        (5),
    ePDG        (6),
-- ePDG is only applicable for interworking with EPC scenario
-- when UE is connected to P-GW+SMF via EPC/ePDG
    cEF         (7)

}


NgeNbId     ::= IA5String (SIZE(1..21))
--
-- See 3GPP TS 29.571 [249] for details.
--

NGRANSecondaryRATType   ::= OCTET STRING
--
-- "NR" or "EUTRA"
--


NGRANSecondaryRATUsageReport    ::= SEQUENCE
{
    nGRANSecondaryRATType           [0] NGRANSecondaryRATType OPTIONAL,
    qosFlowsUsageReports            [1] SEQUENCE OF QosFlowsUsageReport OPTIONAL
}


NsiLoadLevelInfo        ::= SEQUENCE
--
-- See 3GPP TS 29.520 [233] for details
--
{
    loadLevelInformation                [0] INTEGER OPTIONAL,
    snssai                              [1] SingleNSSAI OPTIONAL,
    nsiId                               [2] OCTET STRING OPTIONAL
}

NSPAContainerInformation        ::= SEQUENCE
{
    latency                             [0] INTEGER OPTIONAL,
    throughput                          [1] Throughput OPTIONAL,
    maximumPacketLossRate               [3] UTF8String OPTIONAL,
    serviceExperienceStatisticsData     [4] ServiceExperienceInfo OPTIONAL,
    numberOfPDUSessions                 [5] INTEGER OPTIONAL,
    numberOfRegisteredSubscribers       [6] INTEGER OPTIONAL,
    loadLevel                           [7] NsiLoadLevelInfo OPTIONAL
}
```

```
--
-- O
--


OperationalState    ::= ENUMERATED
{
    eNABLED (0),
    dISABLED(1)

}


--
-- P
--


PartialRecordMethod ::= ENUMERATED
{
    default         (0),
    individual      (1)
}

PDUAddress  ::= SEQUENCE
{
    pDUIPv4Address              [0] IPAddress OPTIONAL,
    pDUIPv6AddresswithPrefix    [1] IPAddress OPTIONAL,
    iPV4dynamicAddressFlag      [2] DynamicAddressFlag OPTIONAL,
    iPV6dynamicPrefixFlag       [3] DynamicAddressFlag OPTIONAL

}

PDUSessionId        ::= INTEGER (0..255)
--
-- See 3GPP TS 29.571 [249] for details
--

PDUSessionType      ::= ENUMERATED
{
    iPv4v6          (0),
    iPv4            (1),
    iPv6            (2),
    unstructured    (3),
    ethernet        (4)
}
-- See 3GPP TS 29.571 [249] for details.


PreemptionCapability        ::= ENUMERATED
{
    nOT-PREEMPT         (0),
    mAY-PREEMPT         (1)
}

PreemptionVulnerability     ::= ENUMERATED
{
    nOT-PREEMPTABLE     (0),
    pREEMPTABLE         (1)
}

--
-- Q
--

QoSCharacteristics  ::= OCTET STRING
--
-- This data is converted from JSON format of the QoSCharacteristics as described in TS 29.512
-- [251].
--

QoSFlowId       ::= INTEGER

QosFlowsUsageReport     ::= SEQUENCE
{
    qosFlowId                       [0] QoSFlowId OPTIONAL,
    startTime                       [1] TimeStamp,
```

```
    endTime                         [2] TimeStamp,
    dataVolumeDownlink              [3] DataVolumeOctets,
    dataVolumeUplink                [4] DataVolumeOctets
}
QuotaManagementIndicator    ::= ENUMERATED
{
    onlineCharging              (0),
    offlineCharging             (1),
    quotaManagementSuspended    (2)
}


--
-- R
--

RanUeNgapId ::= INTEGER

RatingIndicator ::= BOOLEAN
-- Included if the units have been rated.

RATType     ::= INTEGER
--
-- This integer is based on the RatType specified in TS 29.571 [249]
-- with 3GPP RAT Type specified in TS 29.061 [216] added for backwards compatibility.
--
{
-- 0 reserved
-- 1 reserved for uTRA
-- 2 reserved for gERA
    wLAN            (3),
-- 4 reserved for GAN
-- 5 reserved for HSPA Evolution
    eUTRAN          (6),
    virtual         (7),
-- 8 reserved for nBIoT
-- 9 reserved for lTEM
    nR              (51),
-- 51 is used for NG-RAN
    wIRELINE        (55),
    wIRELINE-CABLE  (56),
    wIRELINE-BBF    (57),
    tRUSTED-N3GA    (65)
-- 101 reserved for IEEE 802.16e
-- 102 reserved for 3GPP2 eHRPD
-- 103 reserved for 3GPP2 HRPD
-- 104 reserved for 3GPP2 1xRTT
-- 105 reserved for 3GPP2 UMB
}

RegistrationMessageType     ::= ENUMERATED
{
    initial         (0),
    mobility        (1),
    periodic        (2),
    emergency       (3),
    deregistration  (4)
}

RestrictionType     ::= ENUMERATED
{
    allowedAreas    (0),
    notAllowedAreas (1)
}


RoamingChargingProfile      ::= SEQUENCE
{
    roamingTriggers         [0] SEQUENCE OF RoamingTrigger OPTIONAL,
    partialRecordMethod     [1] PartialRecordMethod OPTIONAL
}

RoamerInOut ::= ENUMERATED
{
    roamerInBound       (0),
    roamerOutBound      (1)
}
```

```
RoamingTrigger      ::= SEQUENCE
{
    trigger                 [0] SMFTrigger OPTIONAL,
    triggerCategory         [1] TriggerCategory  OPTIONAL,
    timeLimit               [2] CallDuration OPTIONAL,
    volumeLimit             [3] DataVolumeOctets OPTIONAL,
    maxNbChargingConditions [4] INTEGER OPTIONAL
}

RrcEstablishmentCause   ::= OCTET STRING




--
-- S
--

ServiceAreaRestriction  ::= SEQUENCE
{
    restrictionType                [0] RestrictionType OPTIONAL,
    areas                          [1] SEQUENCE OF Area OPTIONAL,
    maxNumOfTAs                    [2] INTEGER OPTIONAL,
    maxNumOfTAsForNotAllowedAreas  [3] INTEGER OPTIONAL

}
-- See 3GPP TS 29.571 [249] for details.

ServiceExperienceInfo   ::= SEQUENCE
--
-- See 3GPP TS 29.520 [233] for details
--
{
    svcExprc                    [0] SvcExperience OPTIONAL,
    svcExprcVariance            [1] INTEGER OPTIONAL,
    snssai                      [2] SingleNSSAI OPTIONAL,
    appId                       [3] OCTET STRING OPTIONAL,
    confidence                  [4] INTEGER OPTIONAL,
    dnn                         [5] DataNetworkNameIdentifier OPTIONAL,
    networkArea                 [6] NetworkAreaInfo OPTIONAL,
    nsiId                       [7] OCTET STRING OPTIONAL,
    ratio                       [8] INTEGER OPTIONAL
}

ServiceProfileChargingInformation   ::= SET
{
--
-- attributes of the service profile: see TS 28.541 [254]
--
    serviceProfileIdentifier            [0] OCTET STRING OPTIONAL,
    sNSSAIList                          [1] SEQUENCE OF SingleNSSAI OPTIONAL,
    sST                                 [2] SliceServiceType OPTIONAL,
    latency                             [3] INTEGER OPTIONAL,
    availability                        [4] INTEGER OPTIONAL,
    resourceSharingLevel                [5] SharingLevel OPTIONAL,
    jitter                              [6] INTEGER OPTIONAL,
    reliability                         [7] OCTET STRING OPTIONAL,
    maxNumberofUEs                      [8] INTEGER OPTIONAL,
    coverageArea                        [9] OCTET STRING OPTIONAL,
    uEMobilityLevel                     [10] MobilityLevel OPTIONAL,
    delayToleranceIndicator             [11] DelayToleranceIndicator OPTIONAL,
    dLThroughtputPerSlice               [12] Throughput OPTIONAL,
    dLThroughtputPerUE                  [13] Throughput OPTIONAL,
    uLThroughtputPerSlice               [14] Throughput OPTIONAL,
    uLThroughtputPerUE                  [15] Throughput OPTIONAL,
    maxNumberofPDUsessions              [16] INTEGER OPTIONAL,
    kPIsMonitoringList                  [17] OCTET STRING OPTIONAL,
    supportedAccessTechnology           [18] INTEGER OPTIONAL,
    v2XCommunicationMode                [19] V2XCommunicationModeIndicator OPTIONAL,
    addServiceProfileChargingInfo       [100] OCTET STRING OPTIONAL

}

ServingNetworkFunctionID    ::= SEQUENCE
{
    servingNetworkFunctionInformation   [0] NetworkFunctionInformation,
    aMFIdentifier                       [1] AMFID OPTIONAL
```

```
}

SessionAMBR ::= SEQUENCE
{
    ambrUL              [1] Bitrate,
    ambrDL              [2] Bitrate
}

SharingLevel    ::= ENUMERATED
{
    sHARED          (0),
    nON-SHARED      (1)

}


SingleNSSAI ::= SEQUENCE
-- See S-NSSAI subclause 28.4.2 of TS 23.003 [200] for encoding.
{
    sST         [0] SliceServiceType,
    sD          [1] SliceDifferentiator OPTIONAL
}

SliceServiceType ::= INTEGER (0..255)
--
-- See subclause 28.4.2 TS 23.003 [200]
--

SliceDifferentiator     ::= OCTET STRING (SIZE(3))
--
-- See subclause 28.4.2 TS 23.003 [200]
--


SMdeliveryReportRequested ::= ENUMERATED
{
    yes     (0),
    no      (1)
}

SMFTrigger              ::= INTEGER
{
    startOfPDUSession                           (1),
    startOfServiceDataFlowNoSession             (2),
-- Change of Charging conditions
    qoSChange                                   (100),
    userLocationChange                          (101),
    servingNodeChange                           (102),
    presenceReportingAreaChange                 (103),
    threeGPPPSDataOffStatusChange               (104),
    tariffTimeChange                            (105),
    uETimeZoneChange                            (106),
    pLMNChange                                  (107),
    rATTypeChange                               (108),
    sessionAMBRChange                           (109),
    additionOfUPF                               (110),
    removalOfUPF                                (111),
    insertionOfISMF                             (112),
    removalOfISMF                               (113),
    changeOfISMF                                (114),
    gFBRGuaranteedStatusChange                  (115),
    additionOfAccess                            (116),
    removalOfAccess                             (117),
-- Limit per PDU session
    pDUSessionExpiryDataTimeLimit               (200),
    pDUSessionExpiryDataVolumeLimit             (201),
    pDUSessionExpiryDataEventLimit              (202),
    pDUSessionExpiryChargingConditionChanges    (203),
-- Limit per Rating group
    ratingGroupDataTimeLimit                    (300),
    ratingGroupDataVolumeLimit                  (301),
    ratingGroupDataEventLimit                   (302),
-- Quota management
    timeThresholdReached                        (400),
    volumeThresholdReached                      (401),
    unitThresholdReached                        (402),
    timeQuotaExhausted                          (403),
    volumeQuotaExhausted                        (404),
```

```
    unitQuotaExhausted                          (405),
    expiryOfQuotaValidityTime                   (406),
    reAuthorizationRequest                      (407),
    startOfServiceDataFlowNoValidQuota          (408),
    otherQuotaType                              (409),
    expiryOfQuotaHoldingTime                    (410),
    startOfSDFAdditionalAccessNoValidQuota      (411),
-- Others
    terminationOfServiceDataFlow                (500),
    managementIntervention                      (501),
    unitCountInactivityTime                     (502),
    endOfPDUSession                             (503),
    cHFResponseWithSessionTermination           (504),
    cHFAbortRequest                             (505),
    abnormalRelease                             (506),
-- Limit per QoS Flow
    qoSFlowExpiryDataTimeLimit                  (600),
    qoSFlowExpiryDataVolumeLimit                (601),
-- interworking with EPC
    eCGIChange                                  (700),
    tAIChange                                   (701),
    handoverCancel                              (702),
    handoverStart                               (703),
    handoverComplete                            (704)

}
-- See TS 32.255 [15] for details.

SMReplyPathRequested    ::= ENUMERATED
{
    noReplyPathSet          (0),
    replyPathSet            (1)
}

SMServiceType   ::= INTEGER
{
-- 0 to 10 VAS4SMS Short Message, see TS TS 22.142 [x] for details
    contentProcessing                   (0),
    forwarding                          (1),
    forwardingMultipleSubscriptions     (2),
    filtering                           (3),
    receipt                             (4),
    networkStorage                      (5),
    toMultipleDestinations              (6),
    virtualPrivateNetwork               (7),
    autoreply                           (8),
    personalSignature                   (9),
    deferredDelivery                    (10)
-- 11 to 99 Reserved for 3GPP defined SM services
-- 100 to 199 Vendor specific SM services
}

SmsIndication   ::= ENUMERATED
{
    sMSSupported            (0),
    sMSNotSupported         (1)
}



SSCMode ::= INTEGER
{
    sSCMode1                (1),
    sSCMode2                (2),
    sSCMode3                (3)
}
-- See 3GPP TS 29.501 [248] for details.

SteerModeValue  ::= ENUMERATED
{
    activeStandby       (0),
    loadBalancing       (1),
    smallestDelay       (2),
    priorityBased       (3)

}
```

```
SubscribedQoSInformation    ::= SEQUENCE
--
-- See TS 32.291 [58] for more information
--
{
    fiveQi              [1] INTEGER OPTIONAL,
    aRP                 [2] AllocationRetentionPriority OPTIONAL,
    priorityLevel       [3] INTEGER OPTIONAL
}


SvcExperience   ::= SEQUENCE
{
    mos                 [0] INTEGER OPTIONAL,
    upperRange          [1] INTEGER OPTIONAL,
    lowerRange          [2] INTEGER OPTIONAL
}


--
-- T
--


TAC         ::= OCTET STRING (SIZE(3))

TAI ::= SEQUENCE
{
    pLMNId      [0] PLMN-Id,
    tac         [1] TAC

}

TenantIdentifier            ::= OCTET STRING


Throughput  ::= SEQUENCE
{
    guaranteedThpt          [0] Bitrate,
    maximumThpt             [1] Bitrate
}


Trigger ::= CHOICE
{
    sMFTrigger      [0] SMFTrigger
}

TriggerCategory ::= ENUMERATED
{
    immediateReport     (0),
    deferredReport      (1)
}

--
-- U
--

UsedUnitContainer       ::= SEQUENCE
{
    serviceIdentifier                   [0] ServiceIdentifier OPTIONAL,
    time                                [1] CallDuration OPTIONAL,
    triggers                            [2] SEQUENCE OF Trigger,
    triggerTimeStamp                    [3] TimeStamp OPTIONAL,
    dataTotalVolume                     [4] DataVolumeOctets OPTIONAL,
    dataVolumeUplink                    [5] DataVolumeOctets OPTIONAL,
    dataVolumeDownlink                  [6] DataVolumeOctets OPTIONAL,
    serviceSpecificUnits                [7] INTEGER OPTIONAL,
    eventTimeStamp                      [8] TimeStamp OPTIONAL,
    localSequenceNumber                 [9] LocalSequenceNumber OPTIONAL,
    ratingIndicator                     [10] RatingIndicator OPTIONAL,
    pDUContainerInformation             [11] PDUContainerInformation OPTIONAL,
    quotaManagementIndicator            [12] BOOLEAN OPTIONAL,
    quotaManagementIndicatorExt         [13] QuotaManagementIndicator OPTIONAL,
    nSPAContainerInformation            [14] NSPAContainerInformation OPTIONAL
}
```

```
UserLocationInformation ::= OCTET STRING
--
-- This data is converted from JSON format of the User Location as described in TS 29.571 [249].
--

--
-- V
--

V2XCommunicationModeIndicator   ::= ENUMERATED
{
    v2XComSupported             (0),
    v2XComNotSupported          (1)
}


.#END
```

6 CDR encoding rules

6.0 Introduction

TS 32.297 [52] 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 [52] for a detailed description on how this information is used on the Bx interface.

6.1 3GPP standardized 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 [52], the Basic Encoding Rules (ITU-T Recommendation X.690 [301]) encoding must be supported by all 3GPP systems. Optionally, other additional CDR encodings, i.e. Packed Encoding Rules (ITU-T Recommendation X.691 [302]) and XML Encoding Rules (ITU-T Recommendation XER [303]) 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 [52]. This version indication consists of a Release Identifier and a Version Identifier.

For CDRs specified in referenced middle tier Charging TSs, applying the syntax as described in clause 5 of the present document, the Release Identifier and Version Identifier shall be set as per clause 6.1.2 of TS 32.297 [52].

Annex A (informative):
Void

Annex B (informative): Bibliography

a) The 3GPP charging specifications

- 3GPP TS 32.276: "Telecommunication management; Charging management; Voice Call Service Charging".
- 3GPP TS 32.277: "Telecommunication management; Charging management; Proximity-based Services (ProSe) Charging".
- 3GPP TS 32.293: "Telecommunication management; Charging management; Proxy Function".
- 3GPP TS 32.295: "Telecommunication management; Charging management; Charging Data Record (CDR) transfer".
- 3GPP TS 32.296: "Telecommunication management; Charging management; Online Charging System (OCS) applications and interfaces".

b) Common 3GPP specifications

- 3GPP TS 22.101: "Service aspects; Service Principles".

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

-

c) Network Management related specifications

Annex C (informative): ASN.1 Cross-reference listing and fully expanded sources

The ASN.1 Cross-reference listing and the fully expanded ASN.1 sources of the Charging protocol are provided for information at http://www.3gpp.org/ftp/Specs/archive/32_series/32.298/ASN.1/

Annex D (informative): Change history

Change history								
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Cat	Old	New
Sep 2009	SP-45	SP-090541	0103	-	Add MBMS GW address	B	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0105	-	Rel-9 CR 32.298 correction of number portability and carrier select information	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090538	0106	-	Add "Closed User Group (CUG)" for MMTel Charging	B	9.0.0	9.1.0
Sep 2009	SP-45	SP-090538	0107	-	Add 3PTY MMTel supplementary service charging	B	9.0.0	9.1.0
Sep 2009	SP-45	SP-090538	0108	-	CDR parameter for RTTI support in IMS offline charging	B	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0110	-	Set of Corrections in ASN1 description for IMS CDRs	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0112	-	Set of Corrections in ASN1 description for EPC CDRs	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0114	-	Correction on Charging Characteristics Format	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090537	0115	-	Emergency bearer service consideration for charging	B	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0117	-	Correction to MO and MT SMS CDRs for SMS over SGs	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0119	-	Remove CAMEL Charging Information from SGW CDR	A	9.0.0	9.1.0
Sep 2009	SP-45	SP-090536	0121	-	Addition of IP multicast delivery related contents in MBMS information	A	9.0.0	9.1.0
Dec 2009	SP-46	SP-090720	0123	-	Correction of PDP/PDN Type	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090720	0125	-	Alignment with TS 32.251 for "Volume Limit" and "Time Limit" in Change-Condition AVP	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090720	0127	-	Alignment with TS 32.251 for "User location Change" Condition in ServiceConditionChange and ChangeCondition	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090720	0129	-	Correction of interOperatorIdentifiers information alignment with TS 32.260	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090720	0131	-	Clarify "Change Condition" setting for containers level and "Cause for record Closing" for CDR level for P-GW and S-GW.	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090720	0133	-	Correction on priority session treatment - alignment with TS 22.153	A	9.1.0	9.2.0
Dec 2009	SP-46	SP-090721	0134	-	Editorial clean-up	D	9.1.0	9.2.0
Dec 2009	SP-46	SP-090721	0135	-	Add CSG parameters for CSG based offline charging	B	9.1.0	9.2.0
Mar 2010	SP-47	SP-100040	136	-	Correction of the Role of Node charging parameter definition	A	9.2.0	9.3.0
Mar 2010	SP-47	SP-100041	137	-	Old/New location description for Location update VLR record - Alignment with TS 32.250.	F	9.2.0	9.3.0
Mar 2010	SP-47	SP-100041	138	-	Correction on Session Id for AS acting as B2BUA	F	9.2.0	9.3.0
Mar 2010	SP-47	SP-100040	141	-	Correction on MMTel CDR description for Early SDP- Alignment with TS 32.260	A	9.2.0	9.3.0
Mar 2010	SP-47	SP-100040	143	-	Correction in MMTel Charging for session priority - Alignment with TS 32.260	A	9.2.0	9.3.0
Mar 2010	SP-47	SP-100041	144	-	Correction on SDP handling in IMS Charging	F	9.2.0	9.3.0
Mar 2010	SP-47	SP-100044	145	-	Add "Personal Network management" MMTel supplementary service charging description	B	9.2.0	9.3.0
Mar 2010	SP-47	SP-100044	146	-	Add "Customized Ringing Signal (CRS)" MMTel supplementary service charging description	B	9.2.0	9.3.0
Mar 2010	SP-47	SP-100040	147	-	Correction for offline Charging from PGW - 3GPP2 User location	A	9.2.0	9.3.0
Mar 2010	SP-47	SP-100042	148	-	Add Originating Address in SGSNSMTRecord	B	9.3.0	10.0.0
Jun 2010	SP-48	SP-100266	150	-	Correction on ASN.1 definitions	A	10.0.0	10.1.0
Jun 2010	SP-48	SP-100266	152	-	Charging information for Emergency IMS Sessions	A	10.0.0	10.1.0
Oct 2010	SP-49	SP-100496	155	-	Correction for Dual IP addresses associated to one PDN connection	A	10.1.0	10.2.0
Oct 2010	SP-49	SP-100496	158	-	Correction on SDP-Type	A	10.1.0	10.2.0
Dec 2010	SP-50	SP-100754	161	2	Add the missing RecordType for GWMBMSRecord	A	10.2.0	10.3.0
Dec 2010	SP-50	SP-100757	164	2	Add missing Charging Data Record (CDR) tag for MMTelRecord	A	10.2.0	10.3.0
Dec 2010	SP-50	SP-100758	166	2	Add missing timestamp granularity	A	10.2.0	10.3.0
Dec 2010	SP-50	SP-100758	170	-	Correction of Data Volume Uplink & Downlink in the "List of Service Data" parameter	A	10.2.0	10.3.0
Mar 2011	SP-51	SP-110109	171	2	Correction on ICSI availability - Align with SA2 TS 23.228	F	10.3.0	10.4.0
Mar 2011	SP-51	SP-110105	172	3	Adding CDR fields needed for Machine Type Communication	B	10.3.0	10.4.0
Mar 2011	SP-51	SP-110109	177	1	Addition of IARI in IMS charging information, alignment with TS 22.115 and TS 23.228	B	10.3.0	10.4.0
Mar 2011	SP-51	SP-110108	179	1	Correction on ASN.1	A	10.3.0	10.4.0
Mar 2011	SP-51	SP-110109	181	1	Correction on Subscriber role	F	10.3.0	10.4.0
Mar 2011	SP-51	SP-110108	182	1	Introduction of new CDRs for SRVCC feature in enhanced MSC server	A	10.3.0	10.4.0
Mar 2011	SP-51	SP-110108	183	1	Corrections in ASN.1 description	A	10.3.0	10.4.0
Mar 2011	SP-51	SP-110112	184	-	Add 'Advice Of Charge (AoC)' MMTel supplementary service Charging description - Align with 32.275	B	10.3.0	10.4.0
Mar 2011	SP-51	SP-110109	185	1	MMTel Charging enhancement for alignment with generic AS Charging description in TS 32.260	C	10.3.0	10.4.0
Mar 2011	SP-51	SP-110108	187	1	Correction on availability of Called Asserted Identity	A	10.3.0	10.4.0
May 2011	SP-52	SP-110281	193	-	Correction with reference to Access Correlation ID	F	10.4.0	10.5.0

May 2011	SP-52	SP-110281	196	1	Correction of RAT-Type AVP, alignment with TS 29.212, Gx interface	F	10.4.0	10.5.0
May 2011	SP-52	SP-110404	198	1	Correction on Qos information - Alignment with TS 29.212	A	10.4.0	10.5.0
May 2011	SP-52	SP-110294	199	1	CDRs enhancement for OMR Charging introduction	B	10.4.0	10.5.0
May 2011	SP-52	SP-110280	201	1	Correction in SCC AS CDR for IMS service continuity	A	10.4.0	10.5.0
May 2011	SP-52	SP-110281	205	1	Correction on IMS Application Reference Identifier (IARI) in IMS Charging	F	10.4.0	10.5.0
Sep 2011	SP-53	SP-110528	208	-	Correction on PDN connection identifier for Charging	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110528	211	1	Solve Editor's Note on Charging Id	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110530	213	1	Correction on MT-LR CDR - Alignment with TS 23.271	F	10.5.0	10.6.0
Sep 2011	SP-53	SP-110530	214	1	Correction for IARI - Alignment with TS 24.229	F	10.5.0	10.6.0
Sep 2011	SP-53	SP-110529	219	1	Alignment of the occurrence condition for IMSI with TS 32.251	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110528	222	-	Correction on RAT Type - Align with CT3 TS 29.061	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110528	225	-	Correction on pdpPDNtype for PGW	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110528	227	1	Removal of placeholder duplication for ASN.1 source code	A	10.5.0	10.6.0
Sep 2011	SP-53	SP-110528	274	-	Correction for dynamic address flags associated to PDN connection of PDP/PDN type IPv4v6	A	10.5.0	10.6.0
Sep 2011	SP-53	--	--	--	Editorial correction of misimplementation of CR 0153 in SP-100496 from SA#49 (move of 5.1.2.2.64A from clause 5.1.2.1 to 5.1.2.2).	--	10.5.0	10.6.0
Sep 2011	SP-53	SP-110541	0238	1	Addition of Sponsored Data Connectivity charging – Align with TS 23.203	B	10.6.0	11.0.0
Dec 2011	SP-54	SP-110708	0308	1	Correction on PDP/PDN Address definition - Alignment with TS 23.401	A	11.0.0	11.1.0
Dec 2011	SP-54	SP-110708	0301	1	Correction on RatingGroupId and ResultCode range	A	11.0.0	11.1.0
Dec 2011	SP-54	SP-110709	0290	1	Correction on MSC-SRVCC CDRs for Suppl services and location	A	11.0.0	11.1.0
Dec 2011	SP-54	SP-110712	0276	2	Add Transit IOI to IMS Offline Charging	B	11.0.0	11.1.0
Dec 2011	SP-54	SP-110710	0304	1	Correction on ASN.1 syntax – alignment with TS 29.002	A	11.0.0	11.1.0
Dec 2011	SP-54	SP-110710	0311	--	Correction on PDP/PDN Address definition - Alignment with TS 23.401	A	11.0.0	11.1.0
Dec 2011	SP-54	SP-110711	0302	2	Remove the Size Limitation to ChargingRuleBaseName	C	11.0.0	11.1.0
Mar 2012	SP-55	SP-120047	0321	1	Correction for E-UTRAN location (TAI and E-CGI) on Location Update (VLR) record	A	11.1.0	11.2.0
Mar 2012	SP-55	SP-120048	0313	1	Clarification on “SGSN Change” in PGW CDRs	A	11.1.0	11.2.0
Mar 2012	SP-55	SP-120049	0318	1	Add Status in IMS Charging CDR	B	11.1.0	11.2.0
Mar 2012	SP-55	SP-120055	0320	1	Correction on Charging for Mobile Terminating Roaming Forwarding (MTRF) – alignment with TS 23.018	A	11.1.0	11.2.0
June-2012	SP-56	SP-120362	0323	1	Correction of Serving Node Type, alignment with 29.274	F	11.2.0	11.3.0
June-2012	SP-56	SP-120360	0325	1	Correction of CDRs for SRVCC	A	11.2.0	11.3.0
June-2012	SP-56	SP-120374	0328	2	Enhancing IMS charging for RAVEL	B	11.2.0	11.3.0
June-2012	SP-56	SP-120360	0331	2	Correction on SGW and PGW Address reporting, alignment with 29.212	A	11.2.0	11.3.0
June-2012	SP-56	SP-120397	0332	1	Add charging parameters for NetLoc	B	11.2.0	11.3.0
June-2012	SP-56	SP-120359	0336	1	Correction of List of Message Bodies	A	11.2.0	11.3.0
Sep-2012	SP-57	SP-120646	0340	1	Rename Service-type AVP	A	11.3.0	11.4.0
Sep-2012	SP-57	SP-120576	0341	-	Introduction of Loopback indicator in BGCF CDR for RAVEL	B	11.3.0	11.4.0
Sep-2012	SP-57	SP-120561	0345	-	Remove Authorised-Qos from P-CSCF CDR	A	11.3.0	11.4.0
Sep-2012	SP-57	SP-120576	0346	1	Add TRF CDR to Offline Charging	B	11.3.0	11.4.0
Sep-2012	SP-57	SP-120575	0353	1	Addition of MS Timezone for NetLoc	B	11.3.0	11.4.0
Sep-2012	SP-57	SP-120566	0355	1	Correction of calling party handling	C	11.3.0	11.4.0
Sep-2012	SP-57	SP-120561	0359	1	Corrections to ASN.1 Syntax Definitions	A	11.3.0	11.4.0
Sep-2012	SP-57	SP-120627	0360	1	Reference list correction to align with the corrected TS 29.212 title	F	11.3.0	11.4.0
Sep-2012	SP-57	SP-120562	0362	1	Correction of Called-Party-Address AVP	A	11.3.0	11.4.0
Dec-2012	SP-58	SP-120785	0369	2	Emergency Indicator introduction in P-CSCF CDR	A	11.4.0	11.5.0
	SP-58	SP-120784	0373	-	Corrections of GenericChargingDataTypes and CSChargingDataTypes modules ASN.1 syntax definitions	A	11.4.0	11.5.0
	SP-58	SP-120786	0375	-	Corrections of GPRSChargingDataTypes module ASN.1 syntax definitions	A	11.4.0	11.5.0
	SP-58	SP-120789	0376	-	Corrections of MMSChargingDataTypes module ASN.1 syntax definitions	F	11.4.0	11.5.0
	SP-58	SP-120793	0378	3	Offline Charging description for ATCF	B	11.4.0	11.5.0
	SP-58	SP-120792	0379	1	Introduction SMS CDRs description for SMS over MME Charging	B	11.4.0	11.5.0

Dec-2012	SP-58	SP-120793	0380	1	Introduction ASN.1 description for combined IBCF and ATCF CDR	B	11.4.0	11.5.0
Dec-2012	SP-58	SP-120789	0382	2	Correction on charging for IMS transit functions	F	11.4.0	11.5.0
Mar-2013	SP-59	SP-130062	0366	3	Multiple sets of inter operator identifiers in IMS CDRs for IMS roaming	F	11.5.0	11.6.0
		SP-130054	0384	1	Related ICID Corrections for SRVCC Charging Correlation	F		
		SP-130051	0387	-	Emergency Indicator introduction in S-CSCF and I-CSCF CDR	A		
		SP-130052	0389	-	Correction on PDPAddressPrefixLength	A		
Jun-2013	SP-60	SP-130279	0392	-	Remove RTTI from TRF and TF CDRs	F	11.6.0	11.7.0
		SP-130270	0393	1	Addition of IMS Visited Network Identifier	F		
			0397	1	Introduction of Charging for access to Trusted WLAN Access Network in EPC - over S2a	F		
		SP-130271	0396	1	Adjustment on IMEI - alignment with TS 29.274	F	11.7.0	12.0.0
		SP-130271	0398	1	Add SIP Reason Header Information to CDR for IMS Offline Charging	B		
Sep-2013	SP-61	SP-130435	0404	1	Additional Access Network Information Field	B	12.0.0	12.1.0
			0405	-	retransmission indication in PS CDRs	F		
Dec-2013	SP-62	SP-130676	0410	1	Correction on missing Serving Network in PS CDRs for Network Sharing	A	12.1.0	12.2.0
		SP-130619	0411	2	Addition of Instance Id for IMS Charging	B		
		SP-130620	0412	1	Requirements for Application Based Charging functionality	B		
		SP-130677	0417	1	Correction on Serving Node PLMN description in EPC CDRs for Network Sharing	A		
		SP-130671	0422	-	Correction on inconsistencies for MMTel Charging	A		
		SP-130620	0423	1	Addition of TDF CDR for Application Based Charging functionality	B		
		SP-130627	0425	1	Correction for Route Header for IMS Interconnection Charging	A		
Mar-2014	SP-63	SP-140034	0428	1	Correction for User Location Info Time	A	12.2.0	12.3.0
		SP-140045	0429	-	Introduction of new SC-SMO and SC-SMT CDRs description	B		
		SP-140033	0440	1	Correction for S-GW change cause for record closing	A		
		SP-140037	0442	1	Charging management for IMS Centralized Services (ICS)	C		
Jun-2014	SP-64	SP-140337	0443	1	To add field definitions and make clarifications for application based charging in alignment with TS 32.251	B	12.3.0	12.4.0
			0444	2	Clarifications for ASN.1 related to TDF based charging	B		
		SP-140341	0445	1	Introduce IPE-CDR and complete TDF-CDR description	B		
		SP-140334	0450	1	Removal of IMS charging identifier from PGW CDR	A		
		SP-140336	0451	-	Introduce Core Network Operator selection origin for Shared Networks	B		
		SP-140339	0452	1	Introduction of charging information for CHIPS - align with TS 32.251	B		
		SP-140346	0454	1	Correction for TADS indication in ASN.1	A		
		SP-140343	0456	1	Correction to support multiple Transit IOI Lists in AS, TF and MMTel CDRs	A		
2014-07	-	-	-	-	Rapporteur/MCC: General editorial changes and clean-up.	-	12.4.0	12.4.1
2014-09	SP-65	SP-140565	0470	1	Introduction of Presence Reporting Areas for Charging	B	12.4.1	12.5.0
		SP-140561	0475	1	Removal of CDIVN service	A		
		SP-140562	0476	1	Correction for expanded ASN.1 sources code generation	A		
		SP-140563	0477	1	Introduction of ASN.1 Cross-reference listing	B		
		SP-140564	0478	1	Corrections for alignment between charging specifications	F		
		SP-140563	0479	1	Introduction of report the most up to date User Location Information	B		
			0484	1	Introduce Charging Characteristics in Convergent scenario	B		
		SP-140567	0485	-	Introduce Traffic Data Volumes in IPE-CDR	B		
		SP-140563	0486	1	Complete ePDG offline charging description	B		
		SP-140568	0488	1	Correction on inconsistent defined parameter for NetLoc	A		
		SP-140567	0489	2	Corrections to include missing fixed user location information for NSWO	F		
		SP-140563	0490	-	Correction of Subscriber Equipment Number and Instance Id for privacy concerns	F		
			0492	1	Removal of I-WLAN solution	A		
2014-12	SP-66	SP-140802	0498	1	Correction on User CSG Information in containers description for EPC offline Charging	A	12.5.0	12.6.0
		SP-140804	0499	1	Correction on Inter Node Change in SGW and ePDG offline charging	F		
		SP-140805	0500	1	Additional corrections for removal of compiler errors	F		
		SP-140804	0501	1	Additional corrections for removal of I-WLAN solution	F		
			0505	1	Correction of List of SDP media Component field definition- align with 32260	A		
		SP-140803	0508	-	Consistency correction of SDP information occurrence in BGCF CDR	A		
2015-03	SP-67	SP-150064	0513	1	Correction for unavailable fields in E-CSCF CDR	A	12.6.0	12.7.0
			0517	-	Corrections for IPv6 Address Usage in PGW and SGW CDRs	A		

		SP-150067	0518	-	Corrections for IPv6 Address Usage in ePDG and TDF CDRs	F		
		SP-150066	0520	-	Correction for charging based on MBMS Data Transfer Time	A		
		SP-150065	0523	1	Inconsistency correction of subscriber role	A		
		SP-150069	0524	1	Introduction of CDR parameters for Prose Charging	B		
2015-06	SP-68		0525	1	Alignment of Direct Communications CDR with PC3ch protocol	F	12.7.0	12.8.0
		SP-150332	0526	-	Addition of Prose Function ID description	F		
		SP-150318	0527	1	Introduction of multiple Release causes in EPC Charging	B	12.8.0	13.0.0
		SP-150326	0528	1	Correction for ProSe Charging	D		
2015-09	SP-69	SP-150428	0529	1	Parameter details on enhancements for IMS Service Continuity	B	13.0.0	13.1.0
		SP-150422	0532	1	Update of Reference RFC7315	A		
		SP-150417	0533	-	Introduction of multiple Release causes in ePDG offline charging	B		
		SP-150425	0538	1	Introduce ISUP release cause to MGCF CDR	B		
		SP-150458	0540	1	Correction of monitored PLMN Identifier parameter incorrect naming	A		
2015-12	SP-70	SP-150696	0543	1	Correction for Access Network Information fields due to update to RFC 7315	A	13.1.0	13.2.0
		SP-150707	0545	-	Correction on source code for ProSe Charging	A		
		SP-150698	0551	1	Correction on GPRS-Charging-Id value type	C		
		SP-150700	0553	1	Correction of Presence reporting area charging ASN.1 definition – alignement with 32.251	A		
		SP-150698	0554	1	Update NNI-Type ASN.1 for loopback	B		
		SP-150703	0555	1	Introduction of TWAG offline charging – charging information	B		
		SP-150701	0558	1	Introduction of ULI TZ Changes in IMS offline and online charging	B		
			0560	1	Charging support for Terminating Identification Presentation feature changes in terminating identity	B		
		SP-150698	0564	3	Correction on CS Location Information in SIP AS CDR	B		
		SP-150706	0566	1	Add NBIFOM related charging information	B		
		SP-150698	0568	1	Cell information received with untrusted WLAN access information	B		
2016-03	SP-71	SP-160040	0569	1	Charging Id assignment for NBIFOM	B	13.2.0	13.3.0
2016-03	SP-71	SP-160034	0570	-	Correction for UE identification associated with inter-UE transfer	F	13.2.0	13.3.0
2016-03	SP-71	SP-160040	0571	1	Correction for Access Availability Change Reason	F	13.2.0	13.3.0
2016-03	SP-71	SP-160037	0572	1	ULI for untrusted wireless access network correction	F	13.2.0	13.3.0
2016-03	SP-71	SP-160035	0574	1	Introduction of CDR parameters for MONTE Charging	B	13.2.0	13.3.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2016-06	SA#72	SP-160416	0575	-	F	Correction of cell information received with untrusted WLAN access information – alignment with TS 24.229	13.4.0
2016-06	SA#72	SP-160412	0576	1	F	Correction for the editor's notes about Monitoring-Type AVP	13.4.0
2016-06	SA#72	SP-160410	0582	1	A	Correction for Access Network Information in BGCF CDR – align with TS 32.260	13.4.0
2016-06	SA#72	SP-160416	0584	1	F	Corrections ASN.1 syntax errors for expanded source generation	13.4.0
2016-06	SA#72	SP-160420	0586	-	B	Completion of access change of service data flow for NBIFOM	13.4.0
2016-06	SA#72	SP-160420	0587	1	B	Completion of change of charging condition for NBIFOM	13.4.0
2016-06	SA#72	SP-160411	0588	3	B	Introduce CP Data transfer CDRs parameters and ASN.1	13.4.0
2016-06	SA#72	SP-160411	0590	1	B	Introduce non-IP PDN and CP CIoT opt in CDRs description	13.4.0
2016-09	SA#73	SP-160621	0593	1	F	Correction on APN Rate Control – Alignment with TS 23.401	13.5.0
2016-09	SA#73	SP-160621	0595	1	F	Correction of trigger conditions description for NIDD submission	13.5.0
2016-09	SA#73	SP-160622	0596	-	F	Correction on ASN.1 syntax for IMS, SMS and MONTE CDRs	13.5.0
2016-09	SA#73	SP-160621	0597	1	F	Correction on Non-IP PDP type - alignement with TS 29.061	13.5.0
2016-09	SA#73	SP-160622	0598	-	F	Correction on CPDT CDRs ASN.1 description	13.5.0
2016-09	SA#73	SP-160621	0599	1	F	Correction on Control Plane CIoT EPS Optimisation Indicator in PGW - alignement with 23.401	13.5.0
2016-09	SA#73	SP-160621	0600	1	F	Correction on "MO exception data" RRC establishment cause in offline charging – alignement with TS 23.401	13.5.0
2016-09	SA#73	SP-160623	0592	1	F	Correction on the SubscriberEquipmentType – align with TS 32.299	14.0.0
2016-09	SA#73	SP-160623	0594	1	B	Complement of Charging per IP-CAN Session	14.0.0
2016-12	SA#74	SP-160847	0601	-	F	Correction on P-CSCF and IBCF for ATCF specific fields	14.1.0
2016-12	SA#74	SP-160858	0606	-	A	Correction on OMR attributes per media in IMS Charging	14.1.0
2016-12	SA#74	SP-160845	0612	-	A	Correction on Requested Party Address for Emergency IMS session	14.1.0
2016-12	SA#74	SP-160846	0614	1	A	Correction on ASN.1 in PS domain CDRs	14.1.0
2016-12	SA#74	SP-160844	0615	1	B	Addition of charging support for Mulitiple PRAs	14.1.0
2016-12	SA#74	SP-160847	0616	1	F	Correction of value in SM Message Type	14.1.0
2017-03	SA#75	SP-170144	0617	1	B	Charging enhancement for 3GPP PS Data off	14.2.0
2017-03	SA#75	SP-170133	0618	1	B	Addition of the fields for ProSe Charging	14.2.0
2017-03	SA#75	SP-170129	0619	1	B	Addition of multiple PRAs support for AULC	14.2.0
2017-03	SA#75	SP-170137	0621	1	A	Correction on the APN Rate Control and SCS/AS Address	14.2.0
2017-03	SA#75	SP-170132	0622	-	F	Correction of CauseForRecClosing and CauseForTerm	14.2.0
2017-03	SA#75	SP-170131	0623	1	A	Correction of RelatedChangeOfServiceCondition	14.2.0
2017-06	SA#76	SP-170501	0626	1	B	Introduction of 3GPP Data Off status indication in AS charging	14.3.0
2017-06	SA#76	SP-170514	0627	1	F	Correction in ASN.1	14.3.0
2017-06	SA#76	SP-170498	0630	1	B	Implement IMS visited network identifier for S8HR	14.3.0
2017-06	SA#76	SP-170497	0631	1	B	Addition of the fields for ProSe one-to-one communication Charging	14.3.0
2017-06	SA#76	SP-170499	0632	-	B	Deletion of the AULC support from TDF	14.3.0
2017-09	SA#77	SP-170649	0633	2	B	Introduce Device Trigger and SMS MO via T4 charging	14.4.0
2017-09	SA#77	SP-170648	0635	2	B	Addition of the fields for ProSe Direct discovery for public safety use	14.4.0
2017-09	SA#77	SP-170656	0640	2	A	Correction on handling of Private and Public user ID for IMS charging	14.4.0
2017-09	SA#77	SP-170647	0641	3	B	Addition of FE Identifier List to IMS Charging	14.4.0
2017-09	SA#77	SP-170650	0643	1	B	Charging enhancement for eFMSS	15.0.0
2018-01	SA#78	SP-171005	0646	1	A	Correction where rANNASCause is defined as a sequence	15.1.0
2018-01	SA#78	SP-170970	0647	1	D	Editorial modification for eFMSS	15.1.0
2018-01	SA#78	SP-170966	0648	1	B	EPC QoS update to support NR as a secondary RAT	15.1.0
2018-01	SA#78	SP-170970	0650	-	B	Update list of service data containers	15.1.0
2018-03	SA#79	SP-180067	0653	-	A	Correction ASN.1 syntax	15.2.0
2018-03	SA#79	SP-180068	0654	1	B	Add CDR parameter for WLAN-based ProSe direct discovery	15.2.0
2018-03	SA#79	SP-180066	0655	1	F	Definition of how IMEI is to be transported in SubscriberEquipmentNumber	15.2.0
2018-03	SA#79	SP-180062	0656	1	B	Support for secondary RAT reporting from RAN	15.2.0
2018-06	SA#80	SP-180430	0657	3	B	Introduce the NAPS API Charging	15.3.0
2018-06	SA#80	SP-180427	0658	3	B	Enhance location information in trusted and untrusted WLAN	15.3.0
2018-06	SA#80	SP-180427	0659	2	B	Introduce Emergency services over WLAN	15.3.0
2018-06	SA#80	SP-180431	0660	-	F	Correction on ASN.1 type for RAN Secondary RAT Usage Report	15.3.0
2018-06	SA#80	SP-180426	0661	1	B	Introduce IMS over 5GS	15.3.0
2018-06	SA#80	SP-180427	0662	1	B	Enhance UE location description for IMS charging when over WLAN	15.3.0
2018-09	SA#81	SP-180834	0665	-	F	Update the value of secondary RAT type	15.4.0
2018-09	SA#81	SP-180834	0666	1	F	Add ChargingID to RAN Secondary RAT Usage Report	15.4.0
2018-09	SA#81	SP-180833	0667	1	B	Introduction of CHF-CDR	15.4.0
2018-09	SA#81	SP-180832	0668	1	B	Addition of DataVolumeOctets in generic CDR part	15.4.0
2018-09	SA#81	SP-180832	0669	1	B	Introduce new Charging Function record type	15.4.0

2018-09	SA#81	SP-180832	0670	1	B	Upgrade ASN1 modules version	15.4.0
2018-12	SA#82	SP-181041	0671	1	F	Correction on multiple PRA(s) in offline charging	15.5.0
2018-12	SA#82	SP-181057	0672	-	F	Correction of session priority values description	15.5.0
2018-12	SA#82	SP-181060	0676	1	A	Correction on wrong references	15.5.0
2018-12	SA#82	SP-181058	0677	1	F	Solve Editor's Note on Access Network charging Identifier	15.5.0
2018-12	SA#82	SP-181041	0678	1	F	Correction on the TTRL and TLTRL	15.5.0
2018-12	SA#82	SP-181057	0679	1	F	Correction of NetworkFunctionID in CHF CDR	15.5.0
2018-12	SA#82	SP-181052	0680	1	B	Addition of SMS Charging to CHF CDR	15.5.0
2018-12	SA#82	SP-181157	0681	1	F	Correct PDU Session level trigger in CHF CDR	15.5.0
2018-12	SA#82	SP-181052	0682	1	B	Addition of SMS info to CHF CDR	15.5.0
2018-12	SA#82	SP-181057	0683	1	B	Introduction Data Volume Reporting for Option 4&7	15.5.0
2018-12	SA#82	SP-181052	0684	-	B	Introduction of 5GS for SMS charging via Ro Rf	15.5.0
2018-12	SA#82	SP-181052	0685	1	B	Introduction of offline charging for IP-SM-GW	15.5.0
2018-12	SA#82	SP-181054	0688	2	A	Correction of Data Volume Uplink and Downlink definition	15.5.0
2018-12	SA#82					Incorporates CR0680 that had the wrong spec on the cover page.	15.5.1
2019-03	SA#83	SP-190115	0689	1	F	Correction of of NSSAI	15.6.0
2019-03	SA#83	SP-190115	0690	-	F	Correction of subscriber equipment number	15.6.0
2019-03	SA#83	SP-190116	0691	-	F	Correction of NF Consumer Information	15.6.0
2019-03	SA#83	SP-190117	0692	-	F	Correction of SMSF as NF Consumer	15.6.0
2019-03	SA#83	SP-190195	0693	1	F	Correction of PresenceReportingAreaNode ASN1 syntax	15.6.0
2019-03	SA#83	SP-190115	0694	2	F	Correction of Qos Information	15.6.0
2019-03	SA#83	SP-190130	0698	1	A	Correction for multiple recipients in SC-SMO CDR	15.6.0
2019-03	SA#83	SP-190116	0699	1	F	Correct usedUnitContainer to sequence of	15.6.0
2019-03	SA#83	SP-190116	0700	1	F	Correct missing Session Identifier	15.6.0
2019-03	SA#83	SP-190116	0701	1	F	Corrections on ASN.1 syntax and charging modules version	15.6.0
2019-03	SA#83	SP-190115	0703	1	F	Correction of serving network function	15.6.0
2019-03	SA#83	SP-190115	0704	1	F	Correction of PDU session Id	15.6.0
2019-03	SA#83	SP-190115	0705	-	F	Correction of missing fields in PDU Information	15.6.0
2019-03	SA#83	SP-190115	0706	2	F	Correction on Multiple Unit Information in charging data for CHF CDR	15.6.0
2019-03	SA#83	SP-190115	0707	1	F	Correction of User Information	15.6.0
2019-03	SA#83	SP-190115	0708	1	F	Correcting of Used Unit Container definition	15.6.0
2019-03	SA#83	SP-190115	0709	-	F	Correcting spelling of timeOfFirstUsage	15.6.0
2019-03	SA#83	SP-190115	0710	1	F	Correction of UE IP Addresses	15.6.0
2019-03	SA#83	SP-190115	0711	-	F	Correcting of Quota management Indicator in CDR	15.6.0
2019-03	SA#83	SP-190115	0712	-	F	Correcting of User Location Information definition	15.6.0
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2019-09	SA#85	SP-190759	0734	1	A	Add the selection mode in PDU session information	16.2.0
2019-09	SA#85	SP-190759	0737	1	A	Correct inconsistent CHF CDR parameter	16.2.0
2019-09	SA#85	SP-190840	0740	1	F	Correction of AF Charging Identifier naming	16.2.0
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2020-09	SA#89e	SP-200740	0828	-	F	Add ePDG as serving node	16.6.0
2020-09	SA#89e					Correction of CR implementation that caused compilation issues	16.6.1

History

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