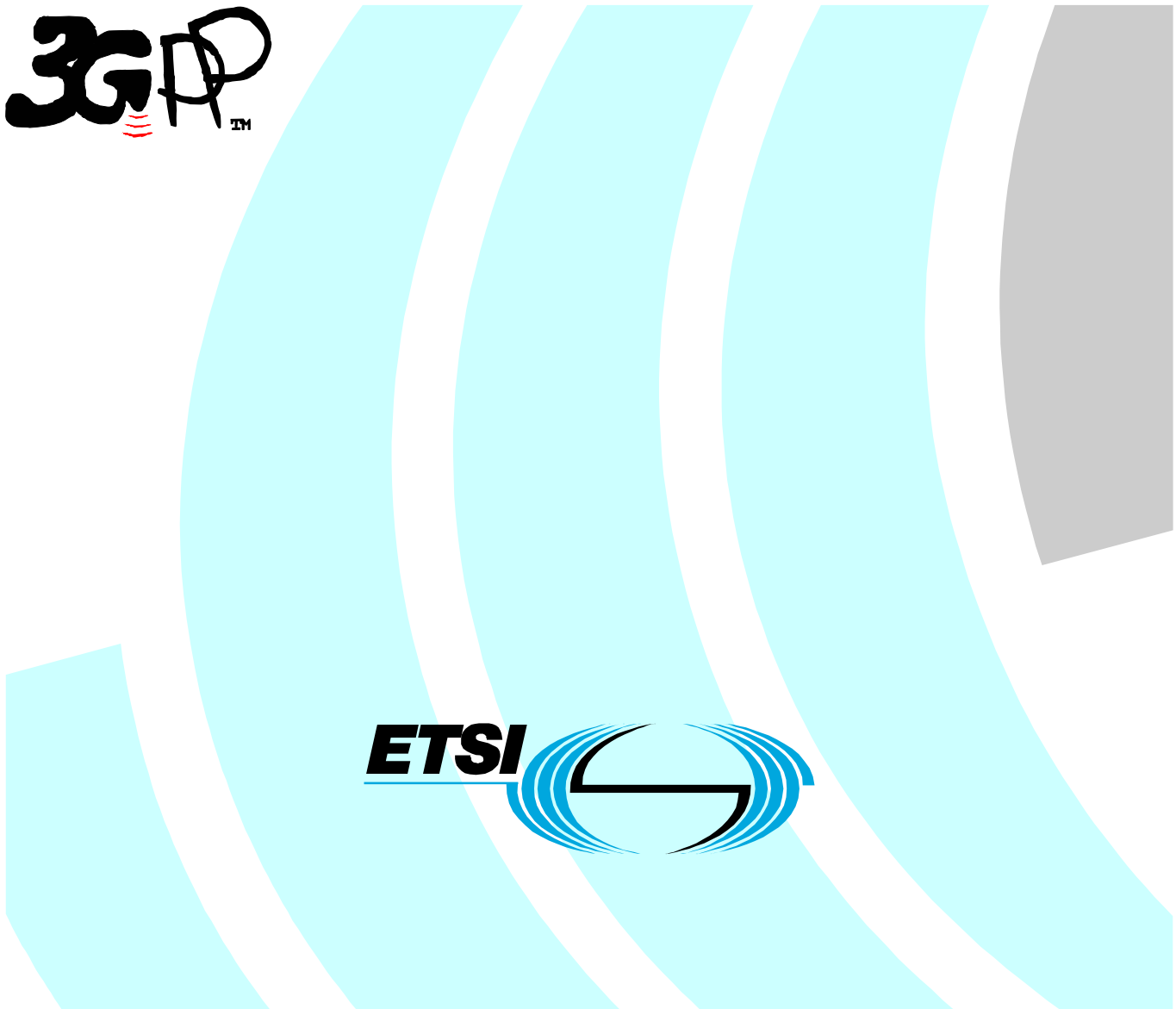
# ETSI TS 132 205 V4.5.0 (2003-09)

*Technical Specification*

**Universal Mobile Telecommunications System (UMTS);**
**Telecommunication management;**
**Charging management;**
**Charging data description for the**
**Circuit Switched (CS) domain**
**(3GPP TS 32.205 version 4.5.0 Release 4)**



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# Foreword

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# Contents

# Foreword

This Technical Specification (TS) 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 GSM and UMTS PLMNs support a wide range of circuit-based services. In order to enable operators the ability to provide a commercially viable service there is a need to provide charging functions.

The present document is part of a series of documents specifying charging functionality in UMTS networks. The UMTS charging architecture and principles are specified in TS 32.200 [22] which provides an umbrella for other charging documents that specify the structure and content of the CDRs and the interface protocol that is used to transfer them to the collecting node.

The present document specifies the structure and the contents of the CDRs that are collected by the relevant network elements for circuit switched services in 2G (GSM) and 3G (UMTS) networks. It also defines the syntax for the transfer of these CDRs from the collecting nodes to billing post-processing systems using standard file transfer protocols.

The CDRs content and transport within the PS domain are described in TS 32.215 [23] document, while CDRs used for application services are defined in document TS 32.235 [24].

The relationship among these charging specifications is illustrated in figure 1.

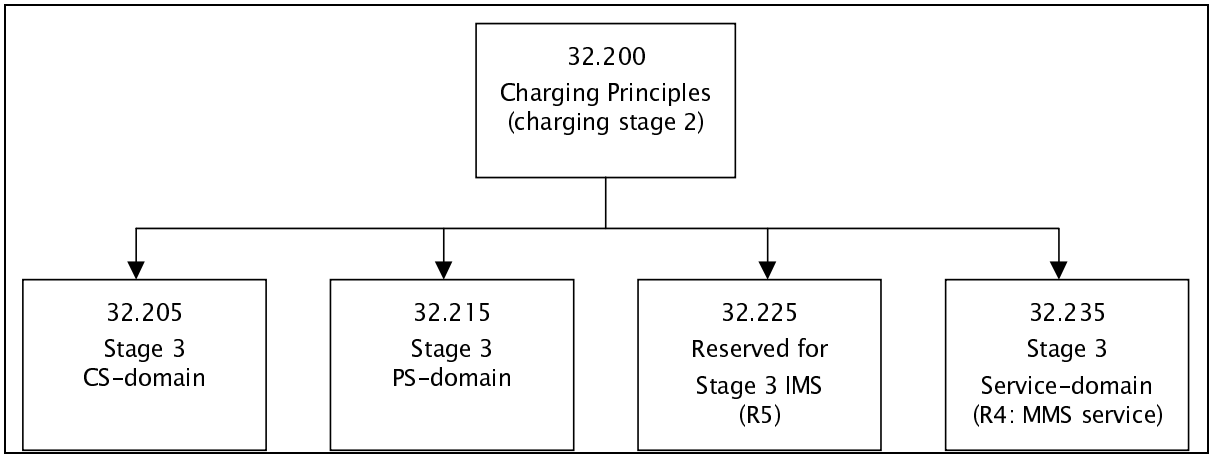



**Figure1: Charging Documents Structure**

The interface definitions of GSM 12.05 are maintained for 2G, in order to assure backward compatibility to earlier GSM releases.

The charging architecture and principles that the present document is based on are specified in TS 32.200 [22].

All references, abbreviations, definitions, descriptions, principles and requirements that are common to charging in UMTS domains or subsystems are provided in the umbrella document [22]. To avoid unnecessary duplications, they are not repeated in the present document unless it is essential.

# 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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.003: "Numbering, addressing and identification".

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

[4] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 3".

[5] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

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

[7] ISO 8824-1 (1994)/ITU-T Recommendation X.680 (1994): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[8] ITU-T Recommendation X.208: "Specification of Abstract Syntax Notation One (ASN.1)"

[9] ITU-T Recommendation X.209: "Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1)"

[10] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[11] 3GPP TS 22.086: "Advice of Charge (AoC) supplementary services - Stage 1".

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

[13] 3GPP TS 29.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3; CAMEL Application Part (CAP) specification".

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

[15] Void.

[16] Void.

[17] 3GPP TS 23.002: "Network Architecture".

[18] 3GPP TS 22.115: "Service aspects; Charging and billing".

[19] 3GPP TS 22.004: "General on Supplementary Services".

[20] 3GPP TS 22.003: "Circuit Teleservices Supported by a Public Land Mobile Network (PLMN)".

[21] 3GPP TS 22.002: "Circuit Bearer Services (BS) supported by a Public Land Mobile Network (PLMN)".

[22] 3GPP TS 32.200: "Telecommunication management; Charging management; Charging principles".

[23] 3GPP TS 32.215: "Telecommunication management; Charging management; Charging data description for the Packet Switched (PS) domain".

[24] 3GPP TS 32.235: "Telecommunication management; Charging management; Charging data description for application services".

[25] Void.

[26] IETF RFC 959 (1985): "File Transfer Protocol"; J. Postel, J. Reynolds, ISI.

[27] IETF RFC 783 (1981): "TFTP Protocol (revision 2)"; K.R. Sollins MIT.[28] GSM 05.01: "Physical layer on the radio path; General description".

[29] Void.

[30] ITU-T Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[31] 3GPP TS 49.031: "Location Services (LCS); Base Station System Application Part LCS Extension (BSSAP-LE)".

[32] 3GPP TS 24.080: "Mobile radio Layer 3 supplementary service specification; Formats and coding".

[33] 3GPP TS 27.001: "General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

# 3 Definitions, abbreviations and symbols

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**(GSM only):** indicates that this clause or paragraph applies only to a GSM system. For multi-system cases this is determined by the current serving radio access network.

**(UMTS only):** indicates that this clause or paragraph applies only to a UMTS system. For multi-system cases this is determined by the current serving radio access network.

**advice of charge:** real-time display of the network utilisation charges incurred by the Mobile Station. The charges are displayed in the form of charging units. If a unit price is stored by the MS then the display may also include the equivalent charge in the home currency.

**aoc service:** combination of one or more services, both basic and supplementary, together with a number of other charging relevant parameters to define a customised service for the purpose of advice of charge.

**CAMEL:** network feature that provides the mechanisms to support operator specific services even when roaming outside HPLMN.

**CAMEL subscription information:** identifies a subscriber as having CAMEL services.

**CDR (Charging Data Record):** record generated by a network element for the purpose of billing a subscriber for the provided service. It includes fields identifying the user, the session and the network elements as well as information on the network resources and services used to support a subscriber session. In the traditional circuit domain, CDR has been used to denote "Call Detail Record", which is subsumed by "Charging Data Record" hereafter.

**charging destination:** also referred to as a destination for charging, this is a nominal reference defining the point of termination of a connection for charging purposes.

**charging origin:** nominal reference defining the point of origin of a connection for charging purposes.

**observed IMEI ticket:** record used to describe an EIR relevant event e.g. a blacklisted IMEI.

**successful call:** connection that reaches the communication or data transfer phase e.g. the "answered" state for speech connections. All other connection attempts are regarded as unsuccessful.

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply. Additional applicable abbreviations can be found in TR 21.905 [1].

| | |
|---|---|
| AoC | Advice of Charge |
| BCSM | Basic Call State Model |
| CAI | Charge Advice Information |
| CAMEL | Customised Applications for Mobile network Enhanced Logic |
| CDR | Call Detail Record |
| DP | Detection Point |
| EDP | Event Detection Point |
| EIR | Equipment Identity Register |
| EMS-Digits | North American Emergency Service Routing Digits |
| EMS-Key | North American Emergency Service Routing Key |
| ETSI | European Telecommunications Standard Institute |
| FCI | Furnish Charging Information |
| FTAM | File Transfer, Access and Management |
| GMSC | Gateway MSC |
| gsmSCF | GSM Service Control Function |
| gsmSSF | GSM Service Switching Function |
| HLR | Home Location Register |
| HPLMN | Home PLMN |
| HSCSD | High Speed Circuit Switched Data |
| IMEI | International Mobile Equipment Identity |
| IMSI | International Mobile Subscriber Identity |
| ISDN | Integrated Services Digital Network |
| LAC | Location Area Code |
| LR | Location Request |
| MLC | Mobile Location Center |
| MOC | Mobile Originated Call (attempt) |
| MO-LR | Mobile Originated Location Request |
| MS | Mobile Station |
| MSC | Mobile Switching Centre |
| MSRN | Mobile Station Roaming Number |
| MTC | Mobile Terminated Call (attempt) |
| MT-LR | Mobile Terminated Location Request |
| NE | Network Element |
| NI-LR | Network Induced Location Request |
| O_CSI | Originating CAMEL Subscription Information |
| PLMN | Public Land Mobile Network |
| SAC | Service Area Code |
| SCF | Service Control Function |
| SCI | Subscriber Controlled Input or Send Charging Information |
| SMS | Short Message Service |
| SS7 | Signalling System No. 7 |
| T_CSI | Terminating CAMEL Subscription Information |
| TDP | Trigger Detection Point |
| TMN | Telecommunications Management Network |
| USIM | User Service Identity Module |
| USSD | Unstructured Supplementary Service Data |
| UTRAN | UMTS Terrestrial Radio Access Network |
| VAS | Value Added Service |
| VLR | Visitor Location Register |
| VMSC | Visited MSC |
| VPLMN | Visited PLMN |
| VT-CSI | Visited Terminating CAMEL Subscription Information |

## 3.3 Symbols

For the purposes of the present document, the symbols given in TS 32.200 [22] apply.

# 4 Record types and contents

The following tables describe the contents of each of the call and event records generated in the CS domain, e.g. by the MSCs (see the example scenarios in TS 32.200 [22]). For each CDR type the field definition includes the field name, description and category.

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

A field category can have one of two primary values:

**M** This field is **M**andatory and shall always be present in the CDR.

**C** This field shall be present in the CDR only when certain Conditions are met.. These Conditions are specified as part of the field definition.

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

Those fields that the operator wishes to be present are further divided into a mandatory and conditional categories:

**$O_M$** This is a field that, if provisioned by the operator to be present, shall always be included in the CDRs. In other words, an $O_M$ parameter that is provisioned to be present is a mandatory parameter.

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

The content of the CDRs shall be specified on the interface from the core network to the billing system that are used for CDR transport. The rules governing the CDR specifications on these interfaces are summarised in the following clause.

During a long user session several *Partial CDRs* may be generated for the same session. In this case, some information can be eliminated rather than repeated in all the partial CDRs for that session. Only changes from one CDR to the next, in addition to mandatory information, can be reported. All the missing information can be reconstructed from fields in previous partial CDRs for the session. For instance, if the subscriber did not change location, the Reduced Partial CDR would not include any location information.

Two formats are considered for Partial CDRs:

- a *Full Qualified Partial CDR* that contains the Complete CDR Fields; and
- a *Reduced Partial CDR* that contains all the Mandatory fields (**M**) and ONLY the changes that occurred in any other field relative to the previous Partial CDR.

The first CDR generated when a session is opened shall be a Full Qualified Partial CDR. Subsequent partial CDRs may be *Reduced Partial CDRs.*

Thus, the convention is that when any non-mandatory field is missing from a Reduced Partial CDR, it should be interpreted that the same field as in the previous partial CDR could be used. Only Mandatory (**M)** fields MUST always be included.

The anchor MSC is the creator of the CDRs. The column "2G" indicates a qualifier for the presence of the parameter in a 2G anchor MSC. The column "3G" indicates a qualifier for the presence of the parameter in a 3G anchor MSC.

# 4.1 Mobile originated call attempt

If the generation of these records is enabled then an MOC record shall be created for each outgoing call attempt made by a mobile station. These MOC records shall be produced in the originating MSC.

**Table 1: MOC record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Mobile originated. |
| Served IMSI | M | M | IMSI of the calling party. |
| Served IMEI | C | C | IMEI of the calling ME, if available. |
| Served MSISDN | $O_M$ | $O_M$ | The primary MSISDN of the calling party. |
| Called Number | M | M | The address of the called party i.e. the number dialled by the calling subscriber. |
| Translated Number | $O_C$ | $O_C$ | The called number after digit translation within the MSC (if applicable) |
| Connected Number | $O_C$ | $O_C$ | The number of the connected party if different to the Called Number |
| Roaming Number | $O_C$ | $O_C$ | The Mobile Station Roaming Number employed to route this connection, if applicable. |
| Recording Entity | M | M | The E.164 number of the visited MSC producing the record. |
| Incoming TKGP | $O_M$ | $O_c$ | The MSC trunk group on which the call originated , usually from the BSS. If available in 3G, this parameter shall be supplied. |
| Outgoing TKGP | $O_M$ | $O_c$ | The trunk group on which the call left the MSC. If available in 3G, this parameter shall be supplied. |
| Location | M | M | The identity of the cell or the SAC at the time of CDR creation, including the location area code. |
| Change of Location | $O_C$ | $O_C$ | A list of changes in Location Area Code / Service Area Code / Cell Id. Each time-stamped. |
| Basic service | M | M | Bearer or teleservice employed. |
| Rate Indication | $O_C$ | $O_C$ | Present if "rate adaption" parameters for the basic service were signalled between the MS/UE and the network, see TS 24.008. |
| Transparency Indicator | C | C | Indicates whether the basic service was used in transparent or non-transparent mode. This parameter is provided only for those basic services which may be employed in both transparent and non-transparent mode. |
| Change Of Service | $O_C$ | $O_C$ | A list of changes of basic service during a connection each time-stamped. |
| Supp. Services | C | C | Supplementary services invoked as a result of this connection. This field shall be present when one or more supplementary services have been invoked. |
| AOC Parameters | $O_C$ | $O_C$ | The charge advice parameters sent to the MS on call set-up. This field shall be supplied only when AoC parameters have been sent. |
| Change of AOC Parameters | $O_C$ | $O_C$ | New AOC parameters sent to the MS e.g. as a result of a tariff switch over, including the time at which the new set was applied. This field shall be supplied only when AoC parameters have been sent. |
| MS Classmark | M | M | The mobile station classmark employed on call setup. |
| Change of Classmark | $O_C$ | $O_C$ | A list of changes to the classmark during the connection each time-stamped |
| Event time stamps: | C | C | Seizure time: time of incoming traffic channel seizure (for unsuccessful call attempts) |
| | C | C | Answer: time of answer (for successful calls) |
| | $O_M$ | $O_M$ | Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection for successful calls, the holding time for call attempts. |
| Data volume | C | - | The number of data segments transmitted if available at the MSC |
| Radio Chan. Requested | $O_M$ | - | The type of radio traffic channel (full / half etc.) requested by the MS. |
| Radio Chan. Used | M | - | The type of radio channel actually used (full or half rate). |
| Change of Rad. Chan. | $O_C$ | - | A list of changes each time stamped |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions on the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| | | | |
| Additional Chg. Info | $O_C$ | $O_C$ | Charge/no charge indicator and additional charging parameters, when available. |
| Record extensions | $O_C$ | $O_C$ | A set of network / manufacturer specific extensions to the record, when available. |

| Field | 2G | 3G | Description |
|---|---|---|---|
| GsmSCF address | C | C | Identifies the CAMEL server serving the subscriber. Shall be present only if CAMEL is applied. |
| Service key | C | C | The CAMEL service logic to be applied. Shall be present only if CAMEL is applied. |
| Network call reference | C | C | An identifier to correlate transactions on the same call taking place in different network nodes, shall be present if CAMEL is applied. |
| MSC Address | C | C | This field contains the E.164 number assigned to the MSC that generated the network call reference. Shall be present only if CAMEL is applied. |
| Default call handling | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling. This field shall be present only if default call handling has been applied. |
| Number of HSCSD Channels Requested | C | - | The maximum number of HSCSD channels requested as received from the MS at call set-up. Shall only be present for HSCSD connections. |
| Number of HSCSD Channels Allocated | C | - | The number of HSCSD channels allocated to the MS at call set-up. Shall only be present for HSCSD connections. |
| Change of HSCSD Parameters | C | - | A list of network or user initiated changes of number of HSCSD channels during a connection each timestamped. Shall only be present in case of an HSCSD call, if the basic HSCSD parameters are modified due the user or network initiated modification procedure. |
| Fixed Network User Rate | $O_C$ | $O_C$ | Indicates the user data rate applied for the connection in the fixed network. Shall only be present for 2G HSCSD connections and for UMTS data connections. |
| Air Interface User Rate Requested | C | - | The total Air Interface User Rate Requested by the MS at call setup. Shall only be present for non-transparent HSCSD connections. |
| Channel Coding Accepted | C | - | A list of the traffic channels codings accepted by the MS. Shall only be present for HSCSD connections. |
| Channel Coding Used | C | - | The traffic channels codings negotiated between the MS and the network at call setup. Shall only be present for HSCSD connections. |
| Guaranteed bit rate | - | Oc | Describes the bitrate the UMTS bearer service shall guarantee to the user or application. Guaranteed Bit Rate may be used to facilitate admission control based on available resources, and for resource allocation within UMTS. Shall only be present for UMTS data connections. |
| Maximum bit rate | - | Oc | Maximum Bit Rate can be used to make code reservations in the downlink of the radio interface. Its purpose is: 1) to limit the delivered bitrate to applications or external networks with such limitations, 2) to allow maximum wanted user bitrate to be defined for applications able to operate with different rates (e.g. applications with adapting codecs). Shall only be present for UMTS data connections. |
| Speech Version Supported | $O_M$ | - | Speech version supported by the MS with highest priority indicated by MS |
| Speech Version Used | $O_M$ | - | Speech version used for that call |
| Number of DP encountered | $O_C$ | $O_C$ | Number that counts how often armed detection points (TDP and EDP) were encountered. Shall be present only if CAMEL is applied. |
| Level of CAMEL service | $O_C$ | $O_C$ | Indicator for the complexity of the CAMEL feature used. Shall be present only if CAMEL is applied. |
| Free format Data | C | C | This field contains data sent by the gsmSCF in the Furnish Charging Information (FCI) message(s). The data can be sent either in one FCI message or several FCI messages with append indicator. Shall be present only if CAMEL is applied. |
| CAMEL call leg information | C | C | Set of CAMEL information IEs. Each of these Ies contains information related to one outgoing CAMEL call leg. Shall be present only if CAMEL is applied. |
| Free format data append indicator | C | C | Indicator if free format data from this CDR is to be appended to free format data in previous partial CDR. Shall be present only if CAMEL is applied. |
| Default call handling 2 | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling for $2^{nd}$ service such as dialled service. This field shall be present only if default call handling has been applied. |
| GsmSCF address 2 | C | C | Identifies the CAMEL server serving the subscriber for $2^{nd}$ service such as dialled service. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Service key 2 | C | C | The CAMEL service logic to be applied for $2^{nd}$ service such as dialled service. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Free format Data 2 | C | C | This field contains data sent by the gsmSCF in the FCI message(s) for $2^{nd}$ service such as dialled service. The data can be sent either in one FCI message or several FCI messages with append indicator. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Free format data append indicator 2 | C | C | Indicator if free format data for $2^{nd}$ service from this CDR is to be appended to free format data in previous partial CDR. Shall be present only if CAMEL is applied for $2^{nd}$ service. |

| Field | 2G | 3G | Description |
|---|---|---|---|
| System Type | - | M | 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 setup. 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. |

## 4.2 Mobile originated emergency call attempt

If the generation of MOC records is enabled then an MOC emergency record shall be created for each outgoing emergency call attempt made by a mobile station. These records shall be produced in the originating MSC.

**Table 2: MOC emergency record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Mobile originated. |
| Served IMSI | C | C | IMSI of the calling party in case of an emergency call with a SIM card. |
| Served IMEI | C | C | IMEI of the calling mobile equipment if available. |
| Served MSISDN | $O_C$ | $O_C$ | The primary MSISDN of the calling party, if supplied by the UE. |
| Translated Number | $O_C$ | $O_C$ | The called number after digit translation within the MSC (if applicable) |
| Recording Entity | M | M | The E.164 number of the visited MSC producing the record. |
| Incoming TKGP | $O_M$ | $O_C$ | The MSC trunk group on which the call originated, usually from the BSS. If available in 3G, this parameter shall be supplied. |
| Outgoing TKGP | $O_M$ | $O_C$ | The trunk group on which the call left the MSC. If available in 3G, this parameter shall be supplied. |
| Location | M | M | The identity of the cell or the SAC in which the call originated including the location area code. |
| Change of Location | $O_C$ | $O_C$ | A list of changes in Location Area Code / Service Area Code / Cell Id. Each time-stamped. |
| Basic service | M | M | Teleservice 'emergency call'. |
| AOC Parameters | $O_C$ | $O_C$ | The charge advice parameters sent to the MS on call set-up. This field shall be supplied only when AoC parameters have been sent. |
| Change of AOC Parameters | $O_C$ | $O_C$ | New AOC parameters sent to the MS e.g. as a result of a tariff switch over, including the time at which the new set was applied. This field shall be supplied only when AoC parameters have been sent. |
| MS Classmark | M | M | The mobile station classmark employed on call set-up. |
| Change of classmark | $O_C$ | $O_C$ | A list of changes to the classmark during the connection each time-stamped |
| Event time stamps: | C<br><br>C<br>$O_M$ | C<br><br>C<br>$O_M$ | Seizure time: time of incoming traffic channel seizure (for unsuccessful call attempts)<br>Answer time: time of answer (for successful calls)<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection for successful calls, the holding time for call attempts. |
| Radio Chan. Requested | $O_M$ | - | The type of radio traffic channel (full / half etc.) requested by the MS. |
| Radio Chan. Used | M | - | The type of radio channel used (full or half rate). |
| Change of Rad. Chan. | $O_C$ | - | A list of changes each time stamped |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions on the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| System Type | - | M | 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 setup. 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. |

## 4.3 Mobile originated call forwarding attempt

If the generation of MOC records is enabled in the forwarding MSC then the forwarding MSC shall produce an MOC record for the forwarded-leg of the call.

**Table 3: MOC, call forwarding record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Mobile originated. |
| Served IMSI | M | M | IMSI of the calling party. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the forwarding party. |
| Calling Number | $O_M$ | $O_M$ | The address of the calling party. |
| Called Number | M | M | The address of the "forwarded-to" party. |
| Translated Number | $O_C$ | $O_C$ | The called number after digit translation within the MSC (if applicable) |
| Connected Number | $O_C$ | $O_C$ | The number of the connected party if different to the Called Number |
| Roaming Number | $O_C$ | $O_C$ | The Mobile Station Roaming Number employed to route this connection, if applicable. |
| Recording Entity | M | M | The E.164 number of the forwarding MSC |
| Incoming TKGP | $O_M$ | $O_M$ | The MSC trunk group on which the call originated at the forwarding MSC. |
| Outgoing TKGP | $O_M$ | $O_M$ | The trunk group on which the call left the forwarding MSC |
| Basic service | C | C | Bearer or teleservice employed, not always available e.g. in case of call forwarding unconditional. |
| Rate Adaptation | $O_C$ | $O_C$ | Present if "rate adaption" parameters for the basic service were signalled between the MS/UE and the network, see TS 24.008. May not always be available in this CDR type. |
| Transparency Indicator | C | C | Indicates whether the basic service was used in transparent or non-transparent mode. This parameter is provided only for those basic services which may be employed in both transparent and non-transparent mode. |
| Fixed Network User Rate | $O_C$ | $O_C$ | Indicates the user data rate applied for the connection in the fixed network. Shall only be present for 2G HSCSD connections and for UMTS data connections. |
| ChangeOfService | $O_C$ | $O_C$ | A list of changes of basic service during a connection each time-stamped. |
| Supplementary Services | C | C | Supplementary services invoked as a result of this connection, if this information is available to the forwarding node. This field shall be present when one or more supplementary services have been invoked. |
| Event time stamps: | C<br>C<br>$O_M$ | C<br>C<br>$O_M$ | Seizure time: time of incoming traffic channel seizure (for unsuccessful call attempts)<br>Answer time: time of answer (for successful calls)<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection for successful calls, the holding time of call attempts. |
| Data volume | C | - | The number of data segments transmitted if available at the MSC |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions on the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| Additional Chg. Info | $O_C$ | O | Charge/no charge indicator and additional charging parameters, when available. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| GsmSCF address | C | C | Identifies the CAMEL server serving the subscriber. Shall be present only if CAMEL is applied. |
| Service key | C | C | The CAMEL service logic to be applied. Shall be present only if CAMEL is applied. |
| Network call reference | C | C | An identifier to correlate transactions on the same call taking place in different network nodes shall be present if CAMEL is applied. |
| MSC Address | C | C | This field contains the E.164 number assigned to the MSC that generated the network call reference. Shall be present only if CAMEL is applied. |
| CAMEL initiated CF indicator | C | C | Indicates that the CAMEL server initiated call forwarding. Shall be present only if CAMEL is applied. |
| Default call handling | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling. This field shall be present only if default call handling has been applied. |
| Number of DP encountered | $O_C$ | $O_C$ | Number that counts how often armed detection points (TDP and EDP) were encountered. Shall be present only if CAMEL is applied. |

| Field | 2G | 3G | Description |
|---|---|---|---|
| Level of CAMEL service | $O_C$ | $O_C$ | Indicator of the complexity of the CAMEL feature used. Shall be present only if CAMEL is applied. |
| Free format Data | C | C | This field contains data sent by the gsmSCF in the Furnish Charging Information (FCI) messages. The data can be sent either in one FCI message or several FCI messages with append indicator. Shall be present only if CAMEL is applied. |
| CAMEL call leg information | C | C | Set of CAMEL information IEs. Each of these Ies contains information related to one outgoing CAMEL call leg. Shall be present only if CAMEL is applied. |
| Free format data append indicator | C | C | Indicator if free format data from this CDR is to be appended to free format data in previous partial CDR. Shall be present only if CAMEL is applied. |
| Default call handling 2 | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling for $2^{nd}$ service such as dialled service. This field shall be present only if default call handling has been applied. |
| GsmSCF address 2 | C | C | Identifies the CAMEL server serving the subscriber for $2^{nd}$ service such as dialled service. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Service key 2 | C | C | The CAMEL service logic to be applied for $2^{nd}$ service such as dialled service. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Free format Data 2 | C | C | This field contains data sent by the gsmSCF in the FCI message(s) for $2^{nd}$ service such as dialled service. The data can be sent either in one FCI message or several FCI messages with append indicator. Shall be present only if CAMEL is applied for $2^{nd}$ service. |
| Free format data append indicator 2 | C | C | Indicator if free format data for $2^{nd}$ service from this CDR is to be appended to free format data in previous partial CDR. Shall be present only if CAMEL is applied for $2^{nd}$ service. |

## 4.4 Mobile terminated call attempt

If the generation of these records is enabled, then an MTC record shall be created for each incoming call attempt made for a mobile station. The MTC records shall be produced in the terminating MSC.

**Table 4: MTC record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Mobile Terminated. |
| Served IMSI | M | M | IMSI of the called party. |
| Served IMEI | C | C | IMEI of the called ME, if available. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the called party. |
| Calling Number | C | C | The number of the calling party if available. |
| Connected Number | $O_C$ | $O_C$ | Only relevant in case of call forwarding where the "forwarded-to" number is recorded. |
| Recording Entity | M | M | The E.164 number of the visited (terminating) MSC |
| Incoming TKGP | $O_M$ | $O_M$ | The MSC trunk group on which the call originated. |
| Outgoing TKGP | $O_M$ | $O_C$ | The trunk group on which the call left the MSC, usually to the BSS. If available in 3G, this parameter shall be supplied. |
| Location | C | C | The identity of the cell or the SAC occupied by the called party when the call was set up, including the location area code. |
| Change of Location | $O_C$ | $O_C$ | A list of changes in Location Area Code / Service Area Code / Cell Id. Each time-stamped. |
| Basic Service | M | M | Bearer or teleservice employed |
| Rate Adaptation | $O_C$ | $O_C$ | Present if "rate adaption" parameters for the basic service were signalled between the MS/UE and the network, see TS 24.008. |
| Transparency Indicator | C | C | Indicates whether the basic service was used in transparent or non-transparent mode. This parameter is provided only for those basic services, which may be employed in both transparent and non-transparent mode. |
| Change of Service | $O_C$ | $O_C$ | A list of changes of basic service during a connection each time-stamped. |
| Supplementary services | C | C | Supplementary services invoked as a result of this connection. This field shall be present when one or more supplementary services have been invoked. |
| AOC Parameters | $O_C$ | $O_C$ | The charge advice parameters sent to the MS on call set-up. This field shall be supplied only when AoC parameters have been sent. |
| Change of AOC Parameters. | $O_C$ | $O_C$ | New AOC parameters sent to the MS e.g. as a result of a tariff switch-over, including the time at which the new set was applied. This field shall be supplied only when AoC parameters have been sent. |
| MS Classmark | M | M | The mobile station class mark. |
| Change of Classmark | $O_C$ | $O_C$ | A list of changes to the classmark during the connection each time-stamped |
| Event time stamps: | C<br>C<br>$O_M$ | C<br>C<br>$O_M$ | Seizure time: time of traffic channel seizure for unsuccessful call attempts<br>Answer time: time of answer for successful calls<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection if successful, the holding time of the call if unsuccessful. |
| Data volume | C | - | The number of data segments transmitted, if available at the MSC |
| Radio Chan. Requested | $O_M$ | - | The type of radio traffic channel (full / half etc.) requested by the MS. |
| Radio Chan. Used | M | - | The type of radio channel used (full or half rate). |
| Change of Rad. Chan | $O_C$ | - | A list of changes each time stamped |
| Cause for termination | M | M | The reason for the release of the call. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions at the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| Additional Chg. Info | $O_C$ | $O_C$ | Charge/no charge indicator and additional charging parameters, when available. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| Network call reference | C | C | An identifier to correlate transactions on the same call taking place in different network nodes shall be present if CAMEL is applied. |
| MSC Address | C | C | This field contains the E.164 number assigned to the MSC that generated the network call reference. Shall be present only if CAMEL is applied. |
| Number of HSCSD Channels Requested | $O_C$ | - | The maximum number of HSCSD channels requested as received from the MS at call set-up. Shall only be present for HSCSD connections. |
| Number of HSCSD Channels Allocated | $O_C$ | - | The number of HSCSD channels allocated to the MS at call set-up. Shall only be present for HSCSD connections. |

| Field | 2G | 3G | Description |
|---|---|---|---|
| Change of HSCSD Parameters | $O_C$ | - | A list of network or user initiated changes of number of HSCSD channels during a connection each timestamped. Shall only be present in case of an HSCSD call, if the basic HSCSD parameters are modified due the user or network initiated modification procedure. |
| Fixed Network User Rate | $O_C$ | - | Indicates the user data rate applied for the connection in the fixed network. Shall only be present for 2G HSCSD connections and for UMTS data connections. |
| Air Interface User Rate Requested | C | C | The total Air Interface User Rate Requested by the MS at call setup. Shall only be present for non-transparent HSCSD connections. |
| Channel Coding Accepted | C | - | A list of the traffic channels codings accepted by the MS. Shall only be present for HSCSD connections. |
| Channel Coding Used | C | - | The traffic channels codings negotiated between the MS and the network at call setup. Shall only be present for HSCSD connections. |
| Guaranteed bit rate | - | Oc | Describes the bitrate the UMTS bearer service shall guarantee to the user or application. Guaranteed Bit Rate may be used to facilitate admission control based on available resources, and for resource allocation within UMTS. Shall only be present for UMTS data connections. |
| Maximum bit rate | - | Oc | Maximum Bit Rate can be used to make code reservations in the downlink of the radio interface. Its purpose is: 1) to limit the delivered bitrate to applications or external networks with such limitations, 2) to allow maximum wanted user bitrate to be defined for applications able to operate with different rates (e.g. applications with adapting codecs). Shall only be present for UMTS data connections. |
| Speech Version Used | $O_M$ | - | Speech version used for that call |
| Speech Version Supported | $O_M$ | - | Speech version supported by the MS with highest priority indicated by MS |
| System Type | - | M | 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 setup. 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. |

## 4.5 Roaming call attempt

If the generation of these records is enabled then, a roaming record shall be created for each call redirected to a mobile subscriber roaming outside the HPLMN. These roaming records shall be produced in the GMSC of the roaming subscriber's HPLMN.

**Table 5: Roaming record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Roaming record. |
| Served IMSI | M | M | IMSI of the called (roaming) party. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the called (roaming) party. |
| Calling Number | C | C | The address of the calling party, if available. |
| Roaming Number | M | M | The Mobile Station Roaming Number employed to route this connection. |
| Recording Entity | M | M | The E.164 number of the GMSC |
| Incoming TKGP | $O_M$ | $O_M$ | The GMSC trunk group on which the call originated. |
| Outgoing TKGP | $O_M$ | $O_M$ | The trunk group on which the call left the GMSC |
| Basic service | M | M | Bearer or teleservice employed. |
| Transparency Indicator | C | C | Indicates whether the basic service was used in transparent or non-transparent mode. This parameter is provided only for those basic services, which may be employed in both transparent and non-transparent mode. |
| ChangeOfService | $O_C$ | $O_C$ | A list of changes of basic service during a connection each time-stamped. |
| Supplementary Services | C | C | Supplementary services invoked as a result of this connection. This field shall be present when one or more supplementary services have been invoked. |
| Event time stamps | C<br>C<br>$O_M$ | C<br>C<br>$O_M$ | Seizure time: time of incoming traffic channel seizure (for unsuccessful call attempts)<br>Answer time: time of answer (for successful calls)<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection for successful calls, the holding time of call attempts. |
| Data volume | C | C | The number of data segments transmitted if available at the GMSC |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions on the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| Network call reference | C | C | An identifier to correlate transactions on the same call taking place in different network nodes shall be present if CAMEL is applied. |
| MSC Address | C | C | This field contains the E.164 number assigned to the MSC that generated the network call reference. Shall be present only if CAMEL is applied. |

## 4.6 Incoming gateway call attempt

If generation of these records is enabled, an incoming gateway record shall be created for each incoming call attempt received by a gateway MSC from another network. These records, produced in the gateway MSC, may be used to settle accounts with other networks. The generation of gateway records shall not be influenced by the production of MTC records i.e. even if the GMSC and terminating MSC are co-located a gateway record shall still be produced.

**Table 6: Incoming gateway record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Incoming gateway record |
| Calling Number | C | C | The number of the calling party if available at this node. |
| Called Number | M | M | The address of the called party as seen by the GMSC. This is the number employed by the GMSC for routing. |
| Recording Entity | M | M | The E.164 number of the GMSC |
| Incoming TKGP | M | M | The incoming GMSC trunk group on which the call originated. |
| Outgoing TKGP | $O_M$ | $O_C$ | The trunk group on which the call left the GMSC. If available in 3G, this parameter shall be supplied. |
| Event time stamps: | M<br>C<br>$O_M$ | M<br>C<br>$O_M$ | Seizure time: time of incoming trunk seizure<br>Answer time: time of answer (successful calls only)<br>Release time: time of incoming trunk release |
| Call duration | M | M | The accountable duration (answer -> release of incoming trunk) of the connection if successful, the call holding time of the incoming trunk for call attempts. |
| Data Volume | C | - | If applicable and known at the GMSC |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call Reference | M | M | A local identifier distinguishing between transactions. |
| Sequence no. | C | C | Partial record sequence number, if applicable. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

## 4.7 Outgoing gateway call attempt

If generation of these records is enabled, an outgoing gateway record shall be created for each outgoing call attempt from a gateway MSC to another network. These records, produced in the gateway MSC, may be used to settle accounts with other networks. The generation of gateway records shall not be influenced by the production of MOC records i.e. even if the GMSC and originating MSC are co-located a gateway record shall still be produced.

**Table 7: Outgoing gateway record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Outgoing gateway record |
| Calling Number | C | C | The number of the calling party if available at this node. |
| Called Number | M | M | The address of the called party as seen by the GMSC. This is the number employed by the GMSC for routing. |
| Recording Entity | M | M | The E.164 number of the GMSC |
| Incoming TKGP | $O_M$ | $O_C$ | The incoming GMSC trunk group on which the call originated. If available in 3G, this parameter shall be supplied. |
| Outgoing TKGP | M | M | The trunk group on which the call left the GMSC. |
| Event time stamps: | M<br>C<br>$O_M$ | M<br>C<br>$O_M$ | Seizure time: time of outgoing trunk seizure<br>Answer time: time of answer (successful calls only)<br>Release time: time of outgoing trunk release |
| Call duration | M | M | The accountable duration (answer -> release of outgoing trunk) of the connection if successful, the call holding time of the outgoing trunk for call attempts. |
| Data Volume | C | - | If applicable and known at the GMSC |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call Reference | M | M | A local identifier distinguishing between transactions. |
| Sequence no. | C | C | Partial record sequence number, if applicable. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

## 4.8 Transit call attempt

If generation of these records is enabled then a transit record may be generated for each incoming call attempt received by a Transit MSC i.e. neither originating nor terminating. For the avoidance of doubt, a transit record shall only be produced if no MOC or MTC record is produced for this call attempt by this MSC. The transit records, produced in the TMSC, may be used to record traffic from particular origins or to particular destinations.

**Table 8: Transit record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Transit. |
| Recording Entity | M | M | The E.164 number of the transit MSC |
| Incoming TKGP | M | M | The TMSC trunk group on which the call originated. |
| Outgoing TKGP | M | M | The trunk group on which the call left the TMSC. |
| Calling Number | C | C | The number of the calling party if available at this node. |
| Called Number | M | M | The address of the called party as seen by the TMSC. |
| ISDN Basic Service | $O_M$ | $O_M$ | The ISDN basic service employed |
| Event time stamps: | C<br>C<br>$O_M$ | C<br>C<br>$O_M$ | Seizure time: time of incoming trunk seizure for unsuccessful call attempts<br>Answer time: time of answer (successful calls only)<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection if successful, the call holding time for call attempts. |
| Data Volume | C | - | If applicable and known at the transit MSC |
| Cause for term. | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call Reference | M | M | A local identifier distinguishing between transactions. |
| Sequence no. | C | C | Partial record sequence number, if applicable. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

# 4.9 Supplementary service actions

A supplementary service record may be produced in the NEF of the appropriate MSC or HLR for each supplementary service action (activation, deactivation, invocation etc.) performed or initiated by the subscriber.

- There are two fundamental types of SS-actions: Call related i.e. as a result of a connection e.g. Invocation of CLIP / CLIR / AOC etc.

- Non-call related i.e. as a result of subscriber controlled input (SCI) e.g. Registration of call forwarding.

Each supplementary service action shall be performed on one or more basic service groups. If the action applies to all teleservices and all bearer services (i.e. to all basic services) then the basic services field shall be omitted.

SCI actions may be recorded in individual SS-action records. Call related actions may be recorded in either the appropriate call record (MOC/MTC) or in separate SS-action records.

Additional non-standard supplementary service actions may be made available within some networks in the form of Unstructured Supplementary Service Data (USSD). These actions may also be recorded in SS-action records. However, as these actions are non-standard they may not include an appropriate action type, supplementary service code or basic service code.

**Table 9: SS-action record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Supplementary service action. |
| Served IMSI | M | M | The IMSI of the MS performing the action. |
| Served IMEI | $O_C$ | $O_C$ | The IMEI of the ME performing the action. |
| Served MSISDN | $O_M$ | $O_M$ | The primary MSISDN of the party performing the action. |
| MS Classmark | M | M | The mobile station classmark. |
| Recording Entity | M | M | The E.164 number of the visited MSC / HLR. |
| Location | $O_M$ | $O_M$ | The identity of the cell or the SAC, including the location area code, from which the request originated. |
| Basic Services | C | C | The basic service group(s) to which the supplementary service applies. This field is not provided if the action applies to all basic services. |
| Supplementary Service | C | C | The supplementary service or group of supplementary services for which the request was made. May not be available in case of USSD. |
| SS Action | C | C | Activation, deactivation, interrogation etc. May not be available in case of USSD. |
| SS Action time stamp | M | M | The time at which the action was requested. |
| SS Parameters | C | C | Service dependent parameters or unstructured supplementary service data, if defined for the SS action recorded in this CDR. |
| SS Action Result | C | C | Result of the requested transaction if unsuccessful. |
| Call Reference | M | M | A local identifier distinguishing between transactions at the same MS. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| System Type | - | M | This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface |

## 4.10 HLR interrogation

If enabled, a HLR interrogation record shall be created for each interrogation performed for a mobile subscriber. These records may be produced in either the HLR itself or the interrogating MSC.

**Table 10: HLR interrogation record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | HLR interrogation. |
| Served IMSI | C | C | The IMSI of the party being interrogated, if successful |
| Served MSISDN | M | M | The MSISDN of the subscriber being interrogated. |
| Recording Entity | M | M | The E.164 Number of the HLR / MSC. |
| Basic Service | $O_C$ | $O_C$ | Only for teleservice 21 (SMS-MT). |
| Routing Number | C | C | Routing number (MSRN, forwarding no.) provided by the HLR if the interrogation was successful. |
| Interrogation time stamp | M | M | Time at which the interrogation was invoked. |
| Number of Forwarding | C | C | The number of times the call has been forwarded if provided by ISUP. |
| Interrogation Result | C | C | The result of the interrogation request if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

## 4.11 Location update (VLR)

If enabled, a VLR location update record shall be produced in the VLR for each location registration or location update received by the VLR for a mobile subscriber.

**Table 11: Location update (VLR) record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Location update. |
| Served IMSI | M | M | IMSI of the served MS. |
| Served MSISDN | $O_M$ | $O_M$ | The primary MSISDN of the party performing the location update |
| Recording Entity | M | M | The E.164 number of the entity (VLR or MSC/VLR) generating the record. |
| Old location | <br>C<br>C | <br>C<br>C | Not present for registration:<br>VMSC E.164 Number<br>Location Area Code |
| New location | M<br>M<br>$O_M$ | M<br>M<br>$O_M$ | VMSC E.164 Number<br>Location Area Code<br>Cell Identification or Service Area Code |
| MS Classmark | M | M | The mobile station classmark. |
| Update time stamp | M | M | Time at which the update was invoked. |
| Update Result | C | C | The result of the location update if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

## 4.12 Location update (HLR)

If enabled, an HLR location update record shall be produced in the HLR for each location registration or location update received by the HLR for a mobile subscriber including location updates received from subscribers roaming in foreign PLMNs.

**Table 12: Location Update (HLR) record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Location update. |
| Served IMSI | M | M | IMSI of the served MS. |
| Recording Entity | M | M | The E.164 Number of the HLR. |
| Old location | $O_C$<br>$O_C$ | $O_C$<br>$O_C$ | VMSC E.164 Number<br>VLR E.164 Number |
| New location | M<br>M | M<br>M | VMSC E.164 Number<br>VLR E.164 Number |
| Update time stamp | M | M | Time at which the update was invoked. |
| Update Result | C | C | The result of the location update if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

## 4.13 Short message service, mobile originated

If enabled, an SMS-MO record shall be produced, within the originating MSC, for each short message sent by a mobile subscriber.

**Table 13: SMS-MO record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | SMS-Mobile originated. |
| Served IMSI | M | M | The IMSI of the subscriber sending the short message. |
| Served IMEI | $O_C$ | $O_C$ | The IMEI of the ME sending the message, if available. |
| Served MSISDN | $O_M$ | $O_M$ | The primary MSISDN of the subscriber sending the message. |
| MS Classmark | M | M | The mobile station classmark. |
| Service Centre | M | M | The address (E.164) of the SMS-service centre. |
| Recording Entity | M | M | The E.164 number of the visited MSC |
| Location | $O_M$ | $O_M$ | The Location Area Code and Cell Identity / Service Area Code from which the message originated. |
| Event Time stamp | M | M | Origination time: The time at which the message was received by the MSC from the subscriber. |
| Message Reference | M | M | A reference, provided by the MS uniquely identifying this message. |
| SMS Result | C | C | The result of the attempted delivery if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| Destination number | $O_M$ | $O_M$ | The destination number dialled by the MS sending the short message. |
| CAMELSMSInformation | C | C | Set of CAMEL information IEs. Each of these Ies contains information related to CAMEL call leg related for the SMS. Shall be present only if CAMEL is applied. |
| System Type | - | M | 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 setup. 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. |

## 4.14 Short message service, mobile terminated

If enabled, an SMS-MT record shall be produced, within the terminating MSC, for each short message received by a mobile subscriber.

**Table 14: SMS-MT record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | SMS-Mobile Terminated. |
| Service Centre | M | M | The E.164 address of the SMS centre. |
| Served IMSI | M | M | The IMSI of the receiving party. |
| Served IMEI | $O_C$ | $O_C$ | The IMEI of the receiving party, if available. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the receiving party. |
| MS Classmark | M | C | The mobile station classmark. |
| Recording Entity | M | M | The E.164 number of the visited MSC. |
| Location | $O_M$ | $O_M$ | The Location Area Code and Cell Identity /Service Area Code to which the message was delivered. |
| Event time stamp | M | M | Delivery time: time at which message was sent to the MS by the MSC. |
| SMS Result | C | C | The result of the attempted delivery if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| System Type | C | M | This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface |

## 4.15 SMS-MO interworking record

If enabled, an SMS-MO interworking record shall be produced, within the interworking MSC, for each short message generated by a mobile subscriber. These records may be used to settle accounts between PLMNs and SMS service centres. Where the Interworking MSC is also the originating MSC, an SMS-MO CDR will also be generated.

**Table 15: SMS-MO interworking record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | SMS-MO interworking record. |
| Service Centre | M | M | The E.164 address of the SMS service centre. |
| Served IMSI | M | M | The IMSI of the sending party. |
| Recording Entity | M | M | The E.164 number of the visited MSC. |
| Event Time stamp | M | M | The time at which the message was received by the interworking function. |
| SMS Result | C | C | The result of the attempted delivery if unsuccessful, when available. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record. |

## 4.16 SMS-MT gateway record

If enabled, an SMS-MT gateway record shall be produced, within the gateway MSC, for each short message sent to a mobile subscriber. Where the Gateway MSC is also the terminating MSC, an SMS-MT CDR will also be generated.

**Table 16: SMS-MT gateway record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | SMS-MT gateway record. |
| Service Centre | M | M | The E.164 address of the SMS service centre. |
| Served IMSI | M | M | The IMSI of the receiving party. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the receiving party. |
| Recording Entity | M | M | The E.164 number of the visited MSC. |
| Event Time stamp | M | M | The time at which the message was received by the gateway. |
| SMS Result | C | C | The result of the attempted delivery if unsuccessful. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

# 4.17 Common equipment usage record

If enabled, a common equipment usage record shall be created in the VMSC to record the usage (duration) of common equipment, e.g. conference circuits, employed by a mobile subscriber.

**Table 17: Common equipment usage record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Common equipment usage record. |
| Equipment type | M | M | e.g. Conference circuit. |
| Equipment Id. | C | C | The local id. Of the equipment employed. |
| Served IMSI | M | M | The IMSI of the party responsible for the seizure of the equipment.. |
| Served MSISDN | $O_M$ | $O_M$ | The primary MSISDN of the served party.. |
| Recording Entity | M | M | The E.164 number of the MSC in which the equipment is located. |
| Basic service | C | C | Bearer or teleservice employed, if appropriate. |
| Rate Adaptation | $O_C$ | $O_C$ | Present if "rate adaption" parameters for the basic service were signalled between the MS/UE and the network, see TS 24.008. |
| Fixed Network User Rate | $O_C$ | $O_C$ | Indicates the user data rate applied for the connection in the fixed network. Shall only be present for 2G HSCSD connections and for UMTS data connections. |
| ChangeOfService | $O_C$ | $O_C$ | A list of changes of basic service during a connection each time-stamped. |
| Supp. Services | C | C | Supplementary services invoked in connection with this equipment. |
| Event Time Stamp | M<br>$O_M$ | M<br>$O_M$ | Seizure time: the time at which the equipment was seized.<br>Release time: the time at which the equipment was released. |
| Call Duration | M | M | The total duration of the usage of the equipment. |
| Call Reference | M | M | A local identifier distinguishing between transactions. |
| Sequence no. | C | C | Partial record sequence number if applicable. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| System Type | - | M | 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 setup. 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. |

# 4.18 Terminating CAMEL call attempt

If the generation of these records is enabled, a terminating CAMEL call attempt record shall be generated for each call toward a subscriber with a T-CSI or VT-CSI and if the terminating trigger criteria are met. The record is generated in the GMSC/gsmSSF carrying out the terminating CAMEL call handling and in the MSC server/gsmSSF carrying out the visited terminating CAMEL call attempt.

**Table 18: Terminating CAMEL record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | Terminating CAMEL interrogation. |
| Served IMSI | M | M | IMSI of the called party |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the called party. |
| Recording Entity | M | M | The E.164 number of the GMSC. |
| Interrogation time stamp | M | M | Time at which the interrogation was invoked. |
| CAMEL Destination Number | M | M | The number available for routing after the CAMEL server enquiry. |
| GsmSCF Address | M | M | The CAMEL server serving the subscriber. |
| Service key | M | M | The CAMEL service logic to be applied. |
| Network call reference | M | M | An identifier to correlate transactions on the same call taking place in different network nodes. |
| MSC Address | M | M | This field contains the E.164 number assigned to the MSC that generated the network call reference. |
| Default call handling | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling. This field shall be present only if default call handling has been applied. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |
| Called Number | M | M | The address of the called party as received by the GMSC/gsmSSF. |
| Calling Number | C | C | The address of the calling party, if available. |
| Incoming TKGP | $O_M$ | $O_C$ | The GMSC trunk group on which the call originated. If available in 3G, this parameter shall be supplied. |
| Outgoing TKGP | $O_M$ | $O_C$ | The trunk group on which the call left the GMSC. If available in 3G, this parameter shall be supplied. |
| Event time stamps: | C<br>C<br>$O_M$ | C<br>C<br>$O_M$ | Seizure time: time of incoming traffic channel seizure (for unsuccessful call attempts)<br>Answer time: time of answer (for successful calls)<br>Release time: time of traffic channel release |
| Call duration | M | M | The chargeable duration of the connection for successful calls, the holding time of call attempts. |
| Data volume | C | - | The number of data segments transmitted if available at the GMSC |
| Cause for termination | M | M | The reason for the release of the connection. |
| Diagnostics | $O_M$ | $O_M$ | A more detailed reason for the release of the connection. |
| Call reference | M | M | A local identifier distinguishing between transactions on the same MS |
| Sequence no. | C | C | Partial record sequence number, only present in case of partial records. |
| Number of DP encountered | $O_C$ | $O_C$ | Number that counts how often armed detection points (TDP and EDP) were encountered. |
| Level of CAMEL service | $O_C$ | $O_C$ | Indicator of the complexity of the CAMEL feature used. |
| Free format Data | C | C | This field contains data sent by the gsmSCF in the Furnish Charging Information (FCI) message(s). The data can be sent either in one FCI message or several FCI messages with append indicator. |
| CAMEL call leg information | C | C | Set of CAMEL information IEs. Each of these Ies contains information related to one outgoing CAMEL call leg. |
| Free format data append indicator | C | C | Indicator if free format data from this CDR is to be appended to free format data in previous partial CDR. |
| MSC server indication | C | C | Indication if the CAMEL call handling is active in the MSC server. |
| Default call handling 2 | $O_C$ | $O_C$ | Indicates whether or not a CAMEL call encountered default call handling for 2nd service such as dialled service. This field shall be present only if default call handling has been applied. |
| GsmSCF address 2 | C | C | Identifies the CAMEL server serving the subscriber for 2nd service such as dialled service. Shall be present only if CAMEL is applied for 2nd service. |
| Service key 2 | C | C | The CAMEL service logic to be applied for 2nd service such as dialled service. Shall be present only if CAMEL is applied for 2nd service. |

| Field | 2G | 3G | Description |
|---|---|---|---|
| Free format Data 2 | C | C | This field contains data sent by the gsmSCF in the FCI message(s) for 2nd service such as dialled service. The data can be sent either in one FCI message or several FCI messages with append indicator. Shall be present only if CAMEL is applied for 2nd service. |
| Free format data append indicator 2 | C | C | Indicator if free format data for 2nd service from this CDR is to be appended to free format data in previous partial CDR. Shall be present only if CAMEL is applied for 2nd service. |

# 4.19 IMEI observation ticket

An observed IMEI ticket is generated whenever greylisted, blacklisted or non-whitelisted mobile equipment is detected during an IMEI check. The purpose of the ticket is to link the mobile equipment under observation with its current user (IMSI). The ticket also includes information describing when and where the equipment was used to enable the tracking of such equipment. Finally, if the ticket was triggered by a call attempt, a call reference is provided in order to locate the corresponding call record.

The IMEI tickets are generated by the NEF of the MSC performing the IMEI check.

**Table 19: IMEI ticket**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Served IMEI | M | M | IMEI of the observed mobile equipment |
| IMEI Status | M | M | The result of the IMEI check e.g. blacklisted, greylisted, unknown. |
| Served IMSI | M | M | The IMSI of the subscriber currently using the mobile equipment. |
| Served MSISDN | C | C | The MSISDN of the subscriber currently using the observed mobile equipment, only available if the event that triggered the IMEI check was an MOC, MTC, SMS-MO or SMS-MT |
| Recording Entity | M | M | The E.164 number of the recording MSC. |
| Event Time Stamp | M | M | The time at which the IMEI check was performed. |
| Location | M | M | The location area code and cell identity of the cell from which the mobile equipment was used. |
| IMEI Check Event | $O_M$ | $O_M$ | The event that caused IMEI checking to take place |
| Call Reference | $O_C$ | $O_C$ | Only available if the IMEI check was related to an MOC or MTC |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record, when available. |

# 4.20 Mobile terminated location request (MT-LR)

If enabled, an LCS-MT record shall be produced, within the visited MSC, for each mobile a terminated location request is performed for.

**Table 20: LCS-MT record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | LCS-MT record. |
| Recording Entity | M | M | The E.164 number of the visited MSC producing the record. |
| LCS Client Type | M | M | The type of the LCS client that invoked the LR. |
| LCS Client Identity | M | M | Further identification of the LCS client . |
| Served IMSI | M | M | The IMSI of the subscriber the LR is invoked for. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the subscriber the LR is invoked for. |
| Location Type | M | M | The type of the location request. |
| LCS QoS | C | C | QoS of the LR, if available. |
| LCS Priority | C | C | Priority of the LR, if available. |
| MLC Number | M | M | The E.164 address of the requesting GMLC. |
| Event Time Stamp | M | M | The time at which the LR was received by the MSC. |
| MeasureDuration | $O_M$ | $O_M$ | The duration of proceeding the location request . |
| Notification To MS User | C | C | The privacy notification to MS user that was applicable when the LR was invoked, if available. |
| Privacy Override | C | C | This parameter indicates if MS privacy was overridden by the LCS client, if available. |
| Location | $O_M$ | - | The LAC and CI when the LR is received. |
| Location Estimate | $O_C$ | $O_C$ | The location estimate for the subscriber if contained in geographic position and the LR was successful. |
| Positioning Data | C | C | The positioning method used or attempted, if available. |
| LCS Cause | C | C | The result of the LR if any failure or partial success happened as known at the radio interface. |
| Cause for Termination | M | M | The reason for the termination of the location service. |
| Diagnostics | C | C | A more detailed information about the Cause for Termination if any failure or partial success happened. |
| System Type | - | M | This field indicates the use of GERAN or UTRAN at the time of the LCS request. This field is present when either the UTRAN or GERAN air-interface is used on call setup. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record. |

# 4.21 Mobile originated location request (MO-LR)

If enabled, an LCS-MO record shall be produced, within the visited MSC, for each mobile an originated location request is performed for.

**Table 21: LCS-MO record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | LCS-MO record. |
| Recording Entity | M | M | The E.164 number of the visited MSC producing the record. |
| LCS Client Type | C | C | The type of the LCS client that invoked the LR, if available. |
| LCS Client Identity | C | C | Further identification of the LCS client, if available. |
| Served IMSI | M | M | The IMSI of the subscriber the LR is invoked for. |
| Served MSISDN | $O_M$ | $O_M$ | The MSISDN of the subscriber the LR is invoked for. |
| MOLR Type | M | M | The type of the LR. |
| LCS QoS | C | C | QoS of the LR, if available. |
| LCS Priority | $O_C$ | $O_C$ | Priority of the LR, if available. |
| MLC Number | C | C | The E.164 address of the involved GMLC, if available. |
| Event Time Stamp | M | M | The time at which the LR was received by the MSC. |
| MeasureDuration | $O_M$ | $O_M$ | The duration of proceeding the location request . |
| Location Estimate | $O_C$ | $O_C$ | The location estimate for the subscriber if contained in geographic position and the LR was successful. |
| Positioning Data | C | C | The positioning method used or attempted, if available. |
| LCS Cause | C | C | The result of the LR if any failure or partial success happened as known at the radio interface. |
| Cause for Termination | M | M | The reason for the termination of the location service. |
| Diagnostics | C | C | A more detailed information about the Cause for Termination if any failure or partial success happened. |
| System Type | - | M | This field indicates the use of GERAN or UTRAN at the time of the LCS request. This field is present when either the UTRAN or GERAN air-interface is used on call setup. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record. |

## 4.22 Network induced location request (NI-LR)

If enabled, an LCS-NI record shall be produced, within the visited MSC, for each network induced location request performed for a MS e.g. in case of emergency call.

**Table 22: LCS-NI record**

| Field | 2G | 3G | Description |
|---|---|---|---|
| Record Type | M | M | LCS-NI record. |
| Recording Entity | M | M | The E.164 number of the visited MSC producing the record. |
| LCS Client Type | C | C | The type of the LCS client that invoked the LR, if available. |
| LCS Client Identity | C | C | Further identification of the LCS client, if available. |
| Served IMSI | C | C | The IMSI of the calling party the LR is executed for if supplied by the UE. |
| Served MSISDN | C | C | The MSISDN of the calling party the LR is executed for if supplied by the UE. |
| Served IMEI | C | C | The IMEI of the calling party the LR is executed for if available. |
| EMS-Digits | $O_C$ | $O_C$ | The emergency service routing digits, if emergency call. |
| EMS-Key | $O_C$ | $O_C$ | The emergency service routing key, if emergency call. |
| LCS QoS | C | C | QoS of the LR, if available. |
| LCS Priority | C | C | Priority of the LR, if available. |
| MLC Number | C | C | The E.164 address of the involved GMLC, if available. |
| Event Time Stamp | M | M | The time at which the LR was received by the MSC. |
| MeasureDuration | $O_M$ | $O_M$ | The duration of proceeding the location request . |
| Location Estimate | $O_C$ | $O_C$ | The location estimate for the subscriber if contained in geographic position and the LR was successful. |
| Positioning Data | C | C | The positioning method used or attempted, if available. |
| LCS Cause | C | C | The result of the LR if any failure or partial success happened as known at the radio interface. |
| Cause for Termination | M | M | The reason for the termination of the location service. |
| Diagnostics | C | C | A more detailed information about the Cause for Termination if any failure or partial success happened. |
| System Type | - | M | This field indicates the use of GERAN or UTRAN at the time of the LCS request. This field is present when either the UTRAN or GERAN air-interface is used on call setup. |
| Record extensions | $O_C$ | $O_C$ | A set of network/ manufacturer specific extensions to the record. |

# 5 Description of Record Fields

This clause contains a brief description of each field of the CDRs described in the previous clause.

## 5.1 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.

## 5.2 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 [10].

## 5.3 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 [5].

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.

## 5.4 Call duration

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

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

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

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

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

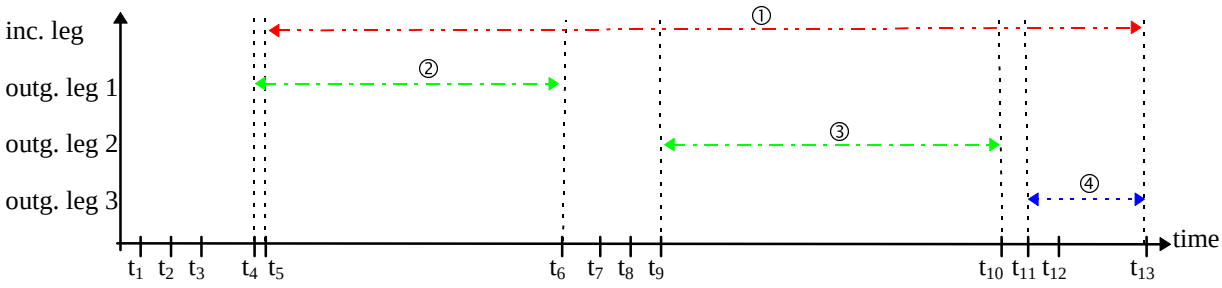
If CAMEL is invoked for the call and a control relationship is existing, the call might continue after a RELEASE or a DISCONNECT from the called party side received by the gsmSSF. The call duration of the incoming leg is stored in

the main body of the call record. For each outgoing leg the call duration is stored in the respective 'CAMELInformation' module. If a call leg does not reach answer status and attempt charging is enabled a 'CAMELInformation' module containing the holding time is generated.

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

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

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




| 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<br>start of holding time (outg. leg 3) |
| $t_{12}$ | ACM | |
| $t_{13}$ | RELEASE; EDP(control) | stop of holding time (outg. leg 3) |

**Figure 2: Call duration measurement in follow-on scenarios**

## 5.5 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 [4]. 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.

## 5.6 Calling / called / connected / translated number

In general a CCITT E.164 [12] number but may also include other numbering plans e.g. ITU-T Recommendation X.121. Each of these fields includes the type of number and number plan as specified in detail in TS 24.008 [4]. Where appropriate, these fields may also contain the presentation and screening information also specified in TS 24.008 [4].

The called number is the number received from the mobile station on mobile originated call set-up as defined in TS 24.008 [4]. 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 [4]. 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.

## 5.7 Calling Party Number

This field contains Calling Party Number modified by CAMEL service.

## 5.8 CAMEL call leg information

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

## 5.9 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.

## 5.10 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.

## 5.11 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.

## 5.12 CAMEL SMS Information

This field contains following CAMEL information for mobile originated 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 5.22.

- 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.

- CAMEL Destination Subscriber Number

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

- SMS Reference Number

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

## 5.13 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.

## 5.14 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.

## 5.15 Data volume

This field includes the number of 64 octet segments transmitted during the use of data services if known (see clause B.1.3).

## 5.16 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.

## 5.17 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.

## 5.18 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 [5];
- a Cause from TS 24.008 [4];
- a Cause from TS 29.078 [13];
- a Cause from ITU-T Recommendation Q.767 [14];
- a LCS diagnostics according TS 29.002 [5];

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

## 5.19 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 [5].

## 5.20 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 [5].

## 5.21 Entity number

This field contains the ITU-T Recommendation E.164 [12] 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 3GPP TS 23.003 [2].

## 5.22 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.

## 5.23 Equipment type

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

## 5.24 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.

## 5.25 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. In GSM, this parameter is part of the HSCSD connection parameters, see clause 5.29.

## 5.26 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 [13]. 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.

## 5.27 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 postprocessing 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.

## 5.28 GsmSCF address

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

## 5.29 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 [33]. The Guaranteed Bit Rate may be used to facilitate admission control based on available resources, and for resource allocation within UMTS. The bitrate of the UMTS bearer service shall guarantee to the user or applications refer TS 22.002 [21].

Operator may choose any of the possible values less or equal to wanted air interface user rate (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).

## 5.30 HSCSD parameters / Change of HSCSD parameters

The basic HSCSD parameters are negotiated between the MS and the network at call setup 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.

## 5.31 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.

## 5.32 Interrogation result

This field contains the result of the HLR interrogation attempt as defined in the MAP (TS 29.002 [5]).

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

## 5.33 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.

## 5.34 IMEI Status

This field contains the result of the IMEI checking procedure:

- Greylisted;
- Blacklisted;
- Non-whitelisted.

## 5.35 LCS Cause

The LCS Cause parameter provides the reason for an unsuccessful location request according TS 49.031 [31].

## 5.36 LCS Client Identity

This field contains further information on the LCS Client identity:

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

## 5.37 LCS Client Type

This field contains the type of the LCS Client as defined in TS 29.002 [5]

## 5.38 LCS Priority

This parameter gives the priority of the location request as defined in TS 49.031 [31]

## 5.39 LCS QoS

This information element defines the Quality of Service for a location request as defined in TS 49.031 [31]

## 5.40 Level of CAMEL service

This field describes briefly the complexity of CAMEL invocation.

- 'Basic' means that CAMEL feature is invoked during the setup 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).

## 5.41 Location / change of location

The location field contains a combination of the location area code (LAC) and cell identity (CI) 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 [4].

## 5.42 Location Estimate

The Location Estimate field is providing an estimate of a geographic location of a target MS according to TS 29.002 [5].

## 5.43 Location Type

This field contains the type of the location as defined in TS 29.002 [5]

## 5.44 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 3GPP TS 27.001 [33]. 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 3GPP TS 22.002 [21]. Its purpose is:

a) to limit the delivered bitrate to applications or external networks with such limitations,

b) to allow maximum wanted user bitrate 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).

## 5.45 Measure Duration

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

## 5.46 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 [3].

## 5.47 MLC Number

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

## 5.48 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 [4] (see mobile station classmark 2). Any alteration in the classmark during the connection may be recorded in the change of classmark field and will include the time at which the change took place.

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

## 5.49 MOLR Type

The MOLR-Type identifier refers to the type of MO-LR that was invoked as defined in TS 24.080 [32]

## 5.50 MSC Address

This field contains the ITU-T Recommendation E.164 [12] number assigned to the MSC that produced the record. For further details concerning the structure of MSC numbers see TS 23.003 [2].

## 5.51 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.

## 5.52 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.

## 5.53 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 [5]

## 5.54 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.

## 5.55 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 [5].

## 5.56 Old /new location

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

## 5.57 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 [31].

## 5.58 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 [5]

## 5.59 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. 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.

## 5.60 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 adaption" and "other rate adaption" signalled between the MS/UE and the network, see TS 24.008.

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

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

## 5.61 Record extensions

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

## 5.62 Record type

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

## 5.63 Recording Entity

This field contains the ITU-T E.164 [12] 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 3GPP TS 23.003 [2].

## 5.64 Roaming number

The roaming number field of the MOC record contains the mobile station roaming number as defined in TS 23.003 [2] and coded according to TS 29.002 [5].

## 5.65 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.

## 5.66 Sequence number

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

## 5.67 Served IMEI

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

The structure of the IMEI is defined in TS 23.003 [2].

## 5.68 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 [2].

## 5.69 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 [2].

## 5.70 Service centre address

This field contains a ITU-T Recommendation E.164 [12] number identifying a particular service centre e.g. short message service centre (see TS 23.040 [3]).

## 5.71 Service key

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

## 5.72 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 [5]). Note that this field is only provided if the attempted delivery was unsuccessful.

## 5.73 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 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.

## 5.74 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 setup. 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.

## 5.75 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 [5].

## 5.76 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 [19].

## 5.77 Supplementary service action result

This field contains the result of an attempted supplementary service action (see TS 29.002 [5]). Note that this field is only provided if the SS-action was at least partially unsuccessful.

## 5.78 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.

## 5.79 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 3GPP TS 29.002 [5].

## 5.80 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.

## 5.81 Update result

This field contains the result of the location update request as defined in the MAP (TS 29.002 [5]). Note that this field is only provided if the attempted update was unsuccessful.

# 6 Charging Data Record Structure

## 6.1 ASN.1 definitions for CDR information

Within the current 3GPP TS 32-series of specifications the ASN.1 definitions are based on ITU-T Recommendation X.208 [8], which has been superseded by ITU-T Recommendation X.680. This newer version not only includes new features but also removes some that were present in ITU-T Recommendation X.208. It was agreed that where possible, the GPRS work would be based on those ASN.1 features that were common to both. However, where necessary, the new features in ITU-T Recommendation X.680 [7] be used in some places. ITU-T Recommendation X.208 [8] feature that are no longer in ITU-T Recommendation X.680 [7] will not be used.

```
TS32205-DataTypes {itu-t (0) identified-organization (4) etsi(0) mobileDomain (0) umts-Operation-
Maintenance (3) ts-32-205 (205) informationModel (0) asn1Module (2) version1 (1)}


DEFINITIONS IMPLICIT TAGS   ::=

BEGIN

-- EXPORTS everything

-- Note that use of more recent module versions is allowed as long as the imported parameters are
identical the ones in the module versions specified below.

IMPORTS

NumberOfForwarding, CallReferenceNumber
FROM MAP-CH-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-CH-DataTypes (13) version6 (6) }

AddressString, ISDN-AddressString, BasicServiceCode, IMSI, IMEI, LCSClientExternalID,
LCSClientInternalID
FROM MAP-CommonDataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network
(1) modules (3) map-CommonDataTypes (18) version6 (6) }

DestinationRoutingAddress
FROM CAP-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) cap-datatypes (52) version1 (0) }

ServiceKey, DefaultCallHandling, DefaultSMS-Handling, NotificationToMSUser
FROM MAP-MS-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6) }

MOLR-Type
FROM SS-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2)
modules (3) ss-DataTypes (2) version7 (7)}

BearerServiceCode
FROM MAP-BS-Code { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-BS-Code (20) version6 (6) }

TeleserviceCode
FROM MAP-TS-Code { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-TS-Code (19) version2 (2) }

SS-Code
FROM MAP-SS-Code { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-SS-Code (15) version6 (6) }

Ext-GeographicalInformation, LCSClientType, LCS-Priority, LocationType
FROM MAP-LCS-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-LCS-DataTypes (25) version7 (7)}

PositionMethodFailure-Diagnostic, UnauthorizedLCSClient-Diagnostic
FROM MAP-ER-DataTypes { ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1)
modules (3) map-ER-DataTypes (17) version7 (7)}

BasicService
FROM Basic-Service-Elements { ccitt identified-organization (4) etsi (0)
196 basic-service-elements (8) }
--
-- See "Digital Subscriber Signalling System No. one (DSS1) protocol"
```

```
-- ETS 300 196
--

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

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

SystemType
FROM TS32215-DataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) umts-
Operation-Maintenance (3) ts-32-215 (215) informationModel (0) asn1Module (2) version1 (1)}

SGSNPDPRecord, GGSNPDPRecord, SGSNMMRecord, SGSNSMORecord, SGSNSMTRecord, SGSNMTLCSRecord,
SGSNMOLCSRecord, SGSNNILCSRecord
FROM TS32215-DataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) umts-
Operation-Maintenance (3) ts-32-215 (215) informationModel (0) asn1Module (2) version1 (1)}


MMO1SRecord, MMO4FRqRecord, MMO4FRsRecord, MMO4DRecord, MMO1DRecord, MMO4RRecord, MMO1RRecord,
MMOMDRecord, MMR4FRecord, MMR1NRqRecord, MMR1NRsRecord, MMR1RtRecord, MMR1ARecord, MMR4DRqRecord,
MMR4DRsRecord, MMR1RRRecord, MMR4RRqRecord, MMR4RRsRecord, MMRMDRecord, MMFRecord
FROM TS32235-DataTypes {itu-t (0) identified-organization (4) etsi (0) mobileDomain (0) umts-
Operation-Maintenance (3) ts-32-235 (235) informationModel (0) asn1Module (2) version1 (1)}

AE-title
FROM ACSE-1 {joint-iso-ccitt association-control (2) abstract-syntax (1) apdus (0) version (1) };
--
-- Note that the syntax of AE-title to be used is from
-- CCITT Rec. X.227 / ISO 8650 corrigendum and not "ANY"
--------------------------------------------------------------------------------
--
--  CALL AND EVENT RECORDS
--
--------------------------------------------------------------------------------

CallEventRecord ::= CHOICE
{
    --
    -- Record values 0..19 are 3G circuit switch specific
    --              20..27 are 3G packet switch specific
    --              30..50 are application 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,

    sgsnPDPRecord           [20] SGSNPDPRecord,
    ggsnPDPRecord           [21] GGSNPDPRecord,
    sgsnMMRecord            [22] SGSNMMRecord,
    sgsnSMORecord           [23] SGSNSMORecord,
    sgsnSMTRecord           [24] SGSNSMTRecord,
    sgsnLCTRecord           [25] SGSNMTLCSRecord,
    sgsnLCORecord           [26] SGSNMOLCSRecord,
    sgsnLCNRecord           [27] SGSNNILCSRecord,

    mmO1SRecord             [30] MMO1SRecord,
    mmO4FRqRecord           [31] MMO4FRqRecord,
    mmO4FRsRecord           [32] MMO4FRsRecord,
    mmO4DRecord             [33] MMO4DRecord,
    mmO1DRecord             [34] MMO1DRecord,
```

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    mmO4RRecord             [35] MMO4RRecord,
    mmO1RRecord             [36] MMO1RRecord,
    mmOMDRecord             [37] MMOMDRecord,
    mmR4FRecord             [38] MMR4FRecord,
    mmR1NRqRecord           [38] MMR1NRqRecord,
    mmR1NRsRecord           [40] MMR1NRsRecord,
    mmR1RtRqRecord          [41] MMR1RtRecord,
    mmR1AFRecord            [43] MMR1ARecord,
    mmR4DRqRecord           [44] MMR4DRqRecord,
    mmR4DRsRecord           [45] MMR4DRsRecord,
    mmR1RRRecord            [46] MMR1RRRecord,
    mmR4RRqRecord           [47] MMR4RRqRecord,
    mmR4RRsRecord           [48] MMR4RRsRecord,
    mmRMDRecord             [49] MMRMDRecord,
    mmFRecord               [50] MMFRecord
}

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

```
    freeFormatData-2        [59] FreeFormatData OPTIONAL,
    freeFormatDataAppend-2  [60] BOOLEAN OPTIONAL,
    systemType              [61] SystemType OPTIONAL,
    rateIndication          [62] RateIndication OPTIONAL,
    guaranteedBitRate       [69] GuaranteedBitRate OPTIONAL,
    maximumBitRate          [70] MaximumBitRate OPTIONAL
}

MTCallRecord            ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI,
    servedIMEI              [2] IMEI OPTIONAL,
    servedMSISDN            [3] CalledNumber OPTIONAL,
    callingNumber           [4] CallingNumber OPTIONAL,
    connectedNumber         [5] ConnectedNumber OPTIONAL,
    recordingEntity         [6] RecordingEntity,
    mscIncomingTKGP         [7] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [8] TrunkGroup OPTIONAL,
    location                [9] LocationAreaAndCell OPTIONAL,
    changeOfLocation        [10] SEQUENCE OF LocationChange OPTIONAL,
    basicService            [11] BasicServiceCode OPTIONAL,
    transparencyIndicator   [12] TransparencyInd OPTIONAL,
    changeOfService         [13] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed       [14] SEQUENCE OF SuppServiceUsed OPTIONAL,
    aocParameters           [15] AOCParameters OPTIONAL,
    changeOfAOCParms        [16] SEQUENCE OF AOCParmChange OPTIONAL,
    msClassmark             [17] Classmark OPTIONAL,
    changeOfClassmark       [18] ChangeOfClassmark OPTIONAL,
    seizureTime             [19] TimeStamp OPTIONAL,
    answerTime              [20] TimeStamp OPTIONAL,
    releaseTime             [21] TimeStamp OPTIONAL,
    callDuration            [22] CallDuration,
    dataVolume              [23] DataVolume OPTIONAL,
    radioChanRequested      [24] RadioChanRequested OPTIONAL,
    radioChanUsed           [25] TrafficChannel OPTIONAL,
    changeOfRadioChan       [26] ChangeOfRadioChannel OPTIONAL,
    causeForTerm            [27] CauseForTerm,
    diagnostics             [28] Diagnostics OPTIONAL,
    callReference           [29] CallReference,
    sequenceNumber          [30] INTEGER OPTIONAL,
    additionalChgInfo       [31] AdditionalChgInfo OPTIONAL,
    recordExtensions        [32] ManagementExtensions OPTIONAL,
    networkCallReference    [33] NetworkCallReference OPTIONAL,
    mSCAddress              [34] MSCAddress OPTIONAL,
    hSCSDChanRequested      [35] NumOfHSCSDChanRequested OPTIONAL,
    hSCSDChanAllocated      [36] NumOfHSCSDChanAllocated OPTIONAL,
    changeOfHSCSDParms      [37] SEQUENCE OF HSCSDParmsChange OPTIONAL,
    fnur                    [38] Fnur OPTIONAL,
    aiurRequested           [39] AiurRequested OPTIONAL,
    chanCodingsAcceptable   [40] SEQUENCE OF ChannelCoding OPTIONAL,
    chanCodingUsed          [41] ChannelCoding OPTIONAL,
    speechVersionSupported  [42] SpeechVersionIdentifier OPTIONAL,
    speechVersionUsed       [43] SpeechVersionIdentifier OPTIONAL,
    gsm-SCFAddress          [44] Gsm-SCFAddress OPTIONAL,
    serviceKey              [45] ServiceKey OPTIONAL,
    systemType              [61] SystemType OPTIONAL,
    rateIndication          [53] RateIndication OPTIONAL,
    guaranteedBitRate       [54] GuaranteedBitRate OPTIONAL,
    maximumBitRate          [55] MaximumBitRate OPTIONAL
}

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
}

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
     mBR64000BitsPerSecond (7)      -- BS30 transparent and multimedia
}

RoamingRecord           ::= SET
{
    recordType              [0] CallEventRecordType,
    servedIMSI              [1] IMSI,
    servedMSISDN            [2] MSISDN OPTIONAL,
    callingNumber           [3] CallingNumber OPTIONAL,
    roamingNumber           [4] RoamingNumber OPTIONAL,
    recordingEntity         [5] RecordingEntity,
    mscIncomingTKGP         [6] TrunkGroup OPTIONAL,
    mscOutgoingTKGP         [7] TrunkGroup OPTIONAL,
    basicService            [8] BasicServiceCode OPTIONAL,
    transparencyIndicator   [9] TransparencyInd OPTIONAL,
    changeOfService         [10] SEQUENCE OF ChangeOfService OPTIONAL,
    supplServicesUsed       [11] SEQUENCE OF  SuppServiceUsed OPTIONAL,
    seizureTime             [12] TimeStamp OPTIONAL,
    answerTime              [13] TimeStamp OPTIONAL,
    releaseTime             [14] TimeStamp OPTIONAL,
    callDuration            [15] CallDuration,
    dataVolume              [16] DataVolume OPTIONAL,
    causeForTerm            [17] CauseForTerm,
    diagnostics             [18] Diagnostics OPTIONAL,
    callReference           [19] CallReference,
    sequenceNumber          [20] INTEGER OPTIONAL,
    recordExtensions        [21] ManagementExtensions OPTIONAL,
    networkCallReference    [22] NetworkCallReference OPTIONAL,
    mSCAddress              [23] MSCAddress OPTIONAL
}

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

IncGatewayRecord        ::= SET
{
```

```
    recordType          [0] CallEventRecordType,
    callingNumber       [1] CallingNumber OPTIONAL,
    calledNumber        [2] CalledNumber,
    recordingEntity     [3] RecordingEntity,
    mscIncomingTKGP     [4] TrunkGroup OPTIONAL,
    mscOutgoingTKGP     [5] TrunkGroup OPTIONAL,
    seizureTime         [6] TimeStamp OPTIONAL,
    answerTime          [7] TimeStamp OPTIONAL,
    releaseTime         [8] TimeStamp OPTIONAL,
    callDuration        [9] CallDuration,
    dataVolume          [10] DataVolume OPTIONAL,
    causeForTerm        [11] CauseForTerm,
    diagnostics         [12] Diagnostics OPTIONAL,
    callReference       [13] CallReference,
    sequenceNumber      [14] INTEGER OPTIONAL,
    recordExtensions    [15] ManagementExtensions OPTIONAL
}

OutGatewayRecord        ::= SET
{
    recordType          [0] CallEventRecordType,
    callingNumber       [1] CallingNumber OPTIONAL,
    calledNumber        [2] CalledNumber,
    recordingEntity     [3] RecordingEntity,
    mscIncomingTKGP     [4] TrunkGroup OPTIONAL,
    mscOutgoingTKGP     [5] TrunkGroup OPTIONAL,
    seizureTime         [6] TimeStamp OPTIONAL,
    answerTime          [7] TimeStamp OPTIONAL,
    releaseTime         [8] TimeStamp OPTIONAL,
    callDuration        [9] CallDuration,
    dataVolume          [10] DataVolume OPTIONAL,
    causeForTerm        [11] CauseForTerm,
    diagnostics         [12] Diagnostics OPTIONAL,
    callReference       [13] CallReference,
    sequenceNumber      [14] INTEGER OPTIONAL,
    recordExtensions    [15] ManagementExtensions OPTIONAL
}

TransitCallRecord       ::= SET
{
    recordType          [0] CallEventRecordType,
    recordingEntity     [1] RecordingEntity,
    mscIncomingTKGP     [2] TrunkGroup OPTIONAL,
    mscOutgoingTKGP     [3] TrunkGroup OPTIONAL,
    callingNumber       [4] CallingNumber OPTIONAL,
    calledNumber        [5] CalledNumber,
    isdnBasicService    [6] BasicService OPTIONAL,
    seizureTimestamp    [7] TimeStamp OPTIONAL,
    answerTimestamp     [8] TimeStamp OPTIONAL,
    releaseTimestamp    [9] TimeStamp OPTIONAL,
    callDuration        [10] CallDuration,
    dataVolume          [11] DataVolume OPTIONAL,
    causeForTerm        [12] CauseForTerm,
    diagnostics         [13] Diagnostics OPTIONAL,
    callReference       [14] CallReference,
    sequenceNumber      [15] INTEGER OPTIONAL,
    recordExtensions    [16] ManagementExtensions OPTIONAL
}

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

```
MTSMSRecord             ::= SET
{
    recordType          [0] CallEventRecordType,
    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
}

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

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

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

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

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

ObservedIMEITicket      ::= SET
{
    servedIMEI          [0] IMEI,
    imeiStatus          [1] IMEIStatus,
    servedIMSI          [2] IMSI,
    servedMSISDN        [3] MSISDN OPTIONAL,
    recordingEntity     [4] RecordingEntity,
    eventTime           [5] TimeStamp,
    location            [6] LocationAreaAndCell ,
    imeiCheckEvent      [7] IMEICheckEvent OPTIONAL,
    callReference       [8] CallReference OPTIONAL,
    recordExtensions    [9] ManagementExtensions OPTIONAL
}

-------------------------------------------------------------------------------
--
--  LOCATION SERICE TICKETS
--
-------------------------------------------------------------------------------

MTLCSRecord             ::= SET
{
    recordType              [0] CallEventRecordType,
    recordingEntity         [1] RecordingEntity,
    lcsClientType           [2] LCSClientType,
    lcsClientIdentity       [3] LCSClientIdentity,
    servedIMSI              [4] IMSI,
    servedMSISDN            [5] MSISDN OPTIONAL,
    locationType            [6] LocationType,
```

```
    lcsQos                  [7] LCSQoSInfo OPTIONAL,
    lcsPriority             [8] LCS-Priority OPTIONAL,
    mlc-Number              [9] ISDN-AddressString,
    eventTimeStamp          [10] TimeStamp,
    measureDuration         [11] CallDuration OPTIONAL,
    notificationToMSUser    [12] NotificationToMSUser OPTIONAL,
    privacyOverride         [13] NULL OPTIONAL,
    location                [14] LocationAreaAndCell OPTIONAL,
    locationEstimate        [15] Ext-GeographicalInformation OPTIONAL,
    positioningData         [16] PositioningData OPTIONAL,
    lcsCause                [17] LCSCause OPTIONAL,
    diagnostics             [18] Diagnostics OPTIONAL,
    systemType              [19] SystemType OPTIONAL,
    recordExtensions        [20] ManagementExtensions OPTIONAL,
    causeForTerm            [21] CauseForTerm
}

MOLCSRecord             ::= SET
{
    recordType              [0] CallEventRecordType,
    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] CallEventRecordType,
    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
}

-------------------------------------------------------------------------------
--
--  FTAM / FTP / TFTP FILE CONTENTS
--
-------------------------------------------------------------------------------

CallEventDataFile       ::= SEQUENCE
{
    headerRecord        [0] HeaderRecord,
    callEventRecords    [1] SEQUENCE OF CallEventRecord,
    trailerRecord       [2] TrailerRecord,
```

```
    extensions          [3] ManagementExtensions
}

ObservedIMEITicketFile  ::= SEQUENCE
{
    productionDateTime      [0] TimeStamp,
    observedIMEITickets     [1] SEQUENCE OF ObservedIMEITicket,
    noOfRecords             [2] INTEGER,
    extensions              [3] ManagementExtensions
}

HeaderRecord            ::= SEQUENCE
{
    productionDateTime      [0] TimeStamp,
    recordingEntity         [1] RecordingEntity,
    extensions              [2] ManagementExtensions
}

TrailerRecord           ::= SEQUENCE
{
    productionDateTime      [0] TimeStamp,
    recordingEntity         [1] RecordingEntity,
    firstCallDateTime       [2] TimeStamp,
    lastCallDateTime        [3] TimeStamp,
    noOfRecords             [4] INTEGER,
    extensions              [5] ManagementExtensions
}

-------------------------------------------------------------------------------
--
--  COMMON DATA TYPES
--
-------------------------------------------------------------------------------

AdditionalChgInfo       ::= SEQUENCE
{
    chargeIndicator     [0] ChargeIndicator OPTIONAL,
    chargeParameters    [1] OCTET STRING OPTIONAL
}

AiurRequested           ::= ENUMERATED
{
    --
    -- See Bearer Capability TS 24.008
    -- (note that value "4" is intentionally missing
    --  because it is not used in TS 24.008)
    --
    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.
    --
    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

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.
    -- 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 in seconds.
    -- For successful calls this is the chargeable duration.
    -- For call attempts this is the call holding time.
    --

CallEventRecordType     ::= INTEGER
{
    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),
    mtTraceRecord       (16),
    termCAMELRecord     (17),
--
--  Record values 18..22 are GPRS specific.
--  The contents are defined in TS 32.015
--
    sgsnPDPRecord       (18),
    ggsnPDPRecord       (19),
    sgsnMMRecord        (20),
    sgsnSMORecord       (21),
    sgsnSMTRecord       (22),

--
--  Record values 23..25 are CS-LCS specific.
--  The contents are defined in this specification
--
    mtLCSRecord         (23),
    moLCSRecord         (24),
    niLCSRecord         (25),
--
--  Record values 26..28 are PS-LCS specific.
--  The contents are defined in  TS 32.215
--
    sgsnMtLCSRecord     (26),
    sgsnMoLCSRecord     (27),
    sgsnNiLCSRecord     (28),
--
----  Record values 29..49  are MMS specific.
--  The contents are defined in TS 32.235
--
    mmO1SRecord         (29),
    mmO4FRqRecord       (30),
    mmO4FRsRecord       (31),
```

```
    mmO4DRecord         (32),
    mmO1DRecord         (33),
    mmO4RRecord         (34),
    mmO1RRecord         (35),
    mmOMDRecord         (36),
    mmR4FRecord         (37),
    mmR1NRqRecord       (38),
    mmR1NRsRecord       (39),
    mmR1RtRecord        (40),
    mmR1ARecord         (42),
    mmR4DRqRecord       (43),
    mmR4DRsRecord       (44),
    mmR1RRRecord        (45),
    mmR4RRqRecord       (46),
    mmR4RRsRecord       (47),
    mmRMDRecord         (48),
    mmFRecord           (49)
}

CalledNumber            ::= BCDDirectoryNumber

CallingNumber           ::= BCDDirectoryNumber

CallingPartyCategory    ::= Category

CallReference           ::= INTEGER

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 CCITT Rec Q.763.
    --

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

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

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)
}

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

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

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)
}

Diagnostics                     ::= CHOICE
{
    gsm0408Cause                [0] INTEGER,
    -- See TS 24.008
    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.
    ccittQ767Cause              [2] INTEGER,
    -- See CCITT Q.767
    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
    unauthorizedLCSClientCause  [6] UnauthorizedLCSClient-Diagnostic
    -- see TS 29.002
}

Destinations            ::= SET OF AE-title

EmergencyCallIndEnable  ::= BOOLEAN

EmergencyCallIndication ::= SEQUENCE
{
    cellId              [0] CellId,
    callerId            [1] IMSIorIMEI
}

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

EquipmentId             ::= INTEGER

EquipmentType           ::= INTEGER
{
    conferenceBridge    (0)
}

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

Fnur                    ::= ENUMERATED
{
   --
   -- See Bearer Capability TS 24.008
   --
   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
    --

GenericNumber           ::= BCDDirectoryNumber

GenericNumbers          ::= SET OF GenericNumber

Gsm-SCFAddress          ::= ISDN-AddressString
    --
    -- See TS 29.002
    --

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)
}

LCSCause                ::= OCTET STRING (SIZE(1))
    --
    -- See LCS Cause Value, 3GPP TS 49.031
    --

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

LCSQoSInfo              ::= OCTET STRING (SIZE(4))
    --
    -- See LCS QoS IE, 3GPP TS 49.031
    --

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

LocationAreaAndCell     ::= SEQUENCE
{
    locationAreaCode    [0] LocationAreaCode,
    cellId              [1] CellId
}

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

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

Location-info           ::= SEQUENCE
{
    mscNumber           [1] MscNo OPTIONAL,
    location-area       [2] LocationAreaCode,
```

```
    cell-identification [3] CellId OPTIONAL
}

LocUpdResult            ::= Diagnostics

ManagementExtensions    ::= SET OF ManagementExtension

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

MessageReference        ::= OCTET STRING

Month                   ::= INTEGER (1..12)

MSCAddress              ::= AddressString

MscNo                   ::= ISDN-AddressString
    --
    -- See TS 23.003
    --

MSISDN                  ::= ISDN-AddressString
    --
    -- See TS 23.003
    --

MSPowerClasses          ::= SET OF RFPowerCapability

NetworkCallReference    ::= CallReferenceNumber
    --
    -- See TS 29.002
    --

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

NetworkSpecificServices ::= SET OF NetworkSpecificCode

NumOfHSCSDChanRequested     ::= INTEGER

NumOfHSCSDChanAllocated     ::= INTEGER

ObservedIMEITicketEnable    ::= BOOLEAN

OriginalCalledNumber        ::= BCDDirectoryNumber

OriginDestCombinations      ::= SET OF OriginDestCombination

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

PartialRecordTimer      ::= INTEGER

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

```
PartialRecordTypes      ::= SET OF PartialRecordType

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

RadioChannelsRequested  ::= SET OF RadioChanRequested

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

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

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

RecordClassDestinations ::= SET OF RecordClassDestination

RecordingEntity         ::= AddressString

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 expressed as an integer.
    --

RoamingNumber           ::= ISDN-AddressString
    --
    -- See TS 23.003
    --

RoutingNumber           ::= CHOICE
{
    roaming             [1] RoamingNumber,
    forwarded           [2] ForwardToNumber
}

Service                     ::= CHOICE
{
    teleservice                 [1] TeleserviceCode,
    bearerService               [2] BearerServiceCode,
    supplementaryService        [3] SS-Code,
    networkSpecificService      [4] NetworkSpecificCode
}

ServiceDistanceDependencies ::= SET OF ServiceDistanceDependency

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

```
SimpleIntegerName           ::= INTEGER

SimpleStringName            ::= GraphicString

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

SpeechVersionIdentifier ::= OCTET STRING (SIZE(1))
    --
    --  see GSM 08.08
    --
    --  000 0001    GSM speech full rate version 1
    --  001 0001    GSM speech full rate version 2   used for enhanced full rate
    --  010 0001    GSM speech full rate version 3   for future use
    --  000 0101    GSM speech half rate version 1
    --  001 0101    GSM speech half rate version 2  for future use
    --  010 0101    GSM speech half rate version 3  for future use

SSActionResult              ::= Diagnostics

SSActionType                ::= ENUMERATED
{
    registration            (0),
    erasure                 (1),
    activation              (2),
    deactivation            (3),
    interrogation           (4),
    invocation              (5),
    passwordRegistration    (6)
}

SSParameters                ::= CHOICE
{
    forwardedToNumber       [0] ForwardToNumber,
    unstructuredData        [1] OCTET STRING
}

SupplServices               ::= SET OF SS-Code

SuppServiceUsed             ::= SEQUENCE
{
    ssCode                  [0] SS-Code,
    ssTime                  [1] TimeStamp OPTIONAL
}

SwitchoverTime              ::= SEQUENCE
{
    hour                    INTEGER (0..23),
    minute                  INTEGER (0..59),
    second                  INTEGER (0..59)
}

TariffId                    ::= INTEGER

TariffPeriod                ::= SEQUENCE
{
    switchoverTime          [0] SwitchoverTime,
    tariffId                [1] INTEGER
    --
    -- Note that the value of tariffId corresponds
    -- to the attribute tariffId.
    --
}

TariffPeriods               ::= SET OF TariffPeriod

TariffSystemStatus          ::= ENUMERATED
{
    available               (0),    -- available for modification
```

```
    checked                 (1),    -- "frozen" and checked
    standby                 (2),    -- "frozen" awaiting activation
    active                  (3) -- "frozen" and active
}

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
    --

TrafficChannel          ::= ENUMERATED
{
    fullRate            (0),
    halfRate            (1)
}

TranslatedNumber        ::= BCDDirectoryNumber

TransparencyInd         ::= ENUMERATED
{
    transparent         (0),
    nonTransparent      (1)
}

TrunkGroup              ::=  CHOICE
{
    tkgpNumber          [0] INTEGER,
    tkgpName            [1] GraphicString
}

TSChangeover            ::= SEQUENCE
{
    newActiveTS         [0] INTEGER,
    newStandbyTS        [1] INTEGER,
    changeoverTime      [2] GeneralizedTime OPTIONAL,
    authkey             [3] OCTET STRING OPTIONAL,
    checksum            [4] OCTET STRING OPTIONAL,
    versionNumber       [5] OCTET STRING OPTIONAL
    --
    -- Note that if the changeover time is not
    -- specified then the change is immediate.
    --
}

TSCheckError            ::= SEQUENCE
{
    errorId             [0] TSCheckErrorId,
    fail                [1] ANY DEFINED BY errorId OPTIONAL
}

TSCheckErrorId          ::= CHOICE
{
    globalForm          [0] OBJECT IDENTIFIER,
    localForm           [1] INTEGER
}

TSCheckResult           ::= CHOICE
{
    success             [0] NULL,
    fail                [1] SET OF TSCheckError
}

TSCopyTariffSystem      ::= SEQUENCE
{
```

```
    oldTS               [0] INTEGER,
    newTS               [1] INTEGER
}

TSNextChange            ::= CHOICE
{
    noChangeover        [0] NULL,
    tsChangeover        [1] TSChangeover
}

TypeOfSubscribers       ::= ENUMERATED
{
    home                (0),    -- HPLMN subscribers
    visiting            (1),    -- roaming subscribers
    all (2)
}

TypeOfTransaction       ::= ENUMERATED
{
    successful          (0),
    unsuccessful        (1),
    all                 (2)
}

Visited-Location-info   ::= SEQUENCE
{
    mscNumber           [1] MscNo,
    vlrNumber           [2] VlrNo
}

VlrNo                   ::= ISDN-AddressString
    --
    -- See TS 23.003
    --

END
```

# 7 Charging Data Record Transfer

## 7.1 Bulk Data Transfer

The charging data records shall be transferred from the NEF to the OSF by the use of FTAM protocol on ITU-T Recommendation X.25 or TCP/IP, FTP over TCP/IP, or TFTP over TCP/IP services. For further details of the use of FTAM see GSM 12.01 [25], for the use of FTP see [26], and for the use of TFTP see [27].

# Annex A (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| Mar 2001 | S_11 | SP-010025 | -- | -- | Replaces Release 99 of 3GPP 32.005, which will be discontinued from Release 4 onwards. | - | 1.0.0 |
| Jun 2001 | S_12 | SP-010236 | -- | -- | Re-submitted to SA#12 for Information | 1.1.0 | 1.1.1 |
| Sep 2001 | S_13 | SP-010464 | -- | -- | Submitted to TSG SA #13 for Approval | 2.0.0 | 4.0.0 |
| Mar 2002 | S_15 | SP-020022 | 001 | -- | Addition of CAMEL phase 3 extensions in SMS-MO CDR | 4.0.0 | 4.1.0 |
| Mar 2002 | -- | -- | -- | -- | Cosmetics (title, styles, formatting, etc.) | 4.1.0 | 4.1.1 |
| Jun 2002 | S_16 | SP-020285 | 004 | -- | Corrections of parameter CallEventRecord | 4.1.1 | 4.2.0 |
| Dec 2002 | S_18 | SP-020734 | 006 | -- | Corrections on parameter Destination Number | 4.2.0 | 4.3.0 |
| Dec 2002 | S_18 | SP-020736 | 008 | -- | Alignment of LCS charging | 4.2.0 | 4.3.0 |
| Dec 2002 | S_18 | SP-020808 | 011 | -- | Corrections on MMS records ASN.1 definition | 4.2.0 | 4.3.0 |
| Mar 2003 | S_19 | SP-030054 | 013 | -- | CDR correction for data services over Iu-interface - alignment with SA1's 22.002 | 4.3.0 | 4.4.0 |
| Sep 2003 | S_21 | SP-030407 | 019 | -- | Correction to positioning data in ASN.1. | 4.4.0 | 4.5.0 |
| Sep 2003 | S_21 | SP-030407 | 020 | -- | Correction of ASN.1 code errors in LCS definitions | 4.4.0 | 4.5.0 |
| | | | | | | | |
| | | | | | | | |

# History

| Document history | | |
|---|---|---|
| V4.0.0 | September 2001 | Publication |
| V4.1.1 | March 2002 | Publication |
| V4.2.0 | June 2002 | Publication |
| V4.3.0 | December 2002 | Publication |
| V4.4.0 | March 2003 | Publication |
| V4.5.0 | September 2003 | Publication |