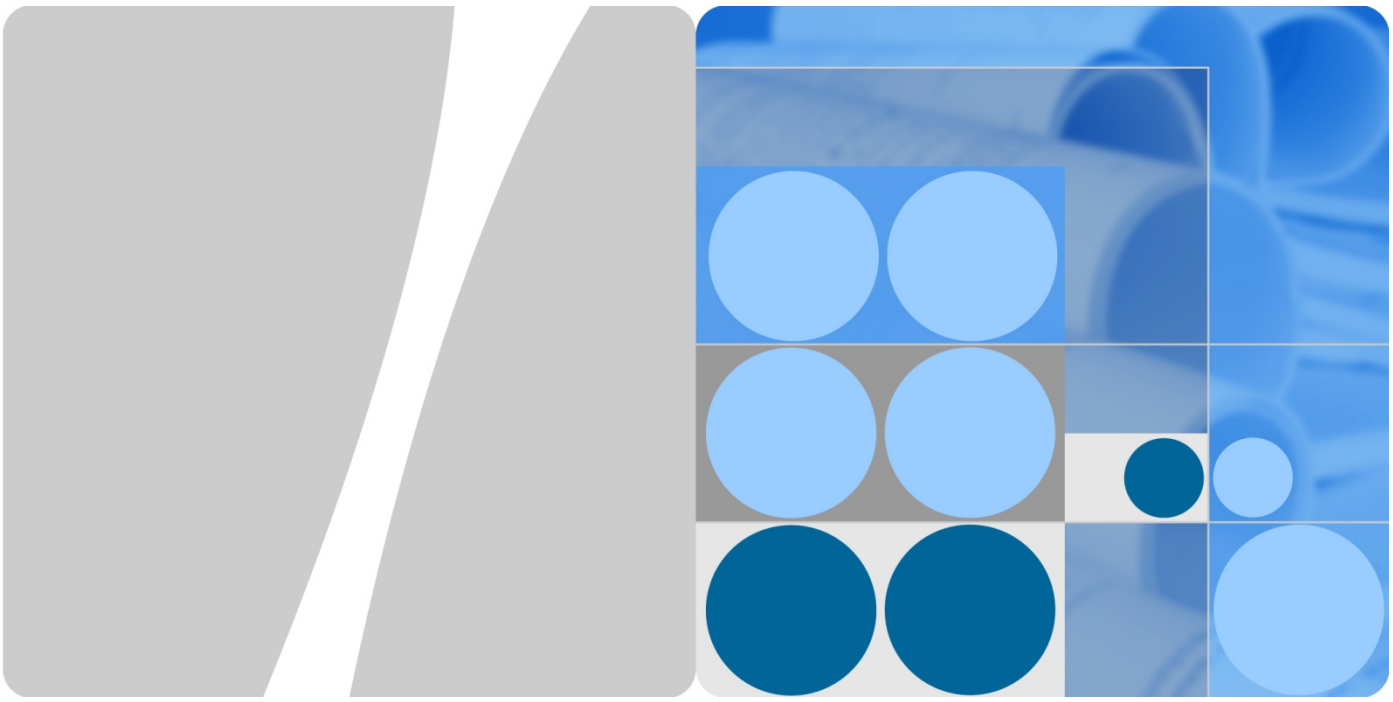


HUAWEI CDR Description (PS Domain, R9 V940)

Issue 14

Date 2018-10-19

HUAWEI TECHNOLOGIES CO., LTD.

Trademarks and Permissions


and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://www.huawei.com

Email: support@huawei.com

About This Document

Purpose

This document describes the format of HUAWEI CDRs.

Intended Audience

This document is intended for:

- Policy planning engineers
- Installation and commissioning engineers
- NM configuration engineers
- Technical support engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death.
	Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury.
	Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results.
	Provides a tip that may help you solve a problem or save time.
	Provides additional information to emphasize or supplement important points in the main text.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 14(2018-10-19)

Added listOfRANSecondaryRATUsageReports fields to the SGW-CDR field table in section 3.13 "IP CAN Bearer Charging Data in S-GW (SGW-CDR)."

Added listOfRANSecondaryRATUsageReports to the PGW-CDR field table in section 3.14 "BC IP CAN Bearer Charging Data in P-GW (PGW-CDR)."

Issue 13(2017-10-31)

This is the thirteenth official release, which incorporates the following changes:

- Added the following section to chapter 3 "Record Contents":
  - Combined S-CDR
  - Combined SGW-CDR
  - Combined PGW-CDR
- Added the following section to chapter 5 3 "Charging Data Record Structure (ASN.1 Description)":
  - ASN.1 Description of Uncombined CDRs
  - ASN.1 Description of Combined CDRs

Issue 12(2017-04-10)

This is the twelfth official release, which incorporates the following changes:

- Added lowPriorityIndicator, cPCIoTEPSOptimisationIndicator, uNIPDUCPOnlyFlag, servingPLMNRateControl, pDPPDNTypeExtension, and mOExceptionDataCounter fields to the SGW-CDR field table in section 3.13 "IP CAN Bearer Charging Data in S-GW (SGW-CDR)."
- Added lowPriorityIndicator, uNIPDUCPOnlyFlag, sGiPtPTunnellingMethod, servingPLMNRateControl, aPNRateControl, pDPPDNTypeExtension, and mOExceptionDataCounter to the PGW-CDR field table in section 3.14 "BC IP CAN Bearer Charging Data in P-GW (PGW-CDR)."
- Added Serving PLMN Rate Control and APN Rate Control field descriptions to section 4.28 "List of Service Data."
- Added CP CIoT EPS optimisation indicator and Serving PLMN Rate Control field descriptions to section 4.29 "List of Traffic Data Volumes."
- Added APN Rate Control, CP CIoT EPS Optimisation Indicator, Low Priority Indicator, MO Exception Data Counter, PDP/PDN Type Extension, Serving PLMN Rate Control, SGi PtP Tunnelling Method, and UNI PDU CP Only Flag field descriptions to chapter 4 "Description of Record Fields."

Issue 11(2016-07-30)

This issue is the eleventh official release, which incorporates the following changes:

- Added the pGWiPv6AddressUsed field to PGW-CDRs.

- Deleted the following section from chapter 3 "Record Contents" because the USN9810 does not support R9 S-MB-CDR:

  MBMS bearer context charging data in SGSN (S-MB-CDR)

- Deleted the following sections from chapter 3 "Record Contents" because the UGW9811 does not support R9 G-CDR or eG-CDR:
  - Charging data in GGSN (G-CDR)
  - FBC enhanced PDP context charging data in GGSN (eG-CDR)
- Added the following section to chapter 3 "Record Contents":

  MBMS bearer context charging data in MBMS GW (MBMS-GW-CDR)

- Modified chapter 5 "Charging Data Record Structure (ASN.1 Description)" so that you can obtain the **CDRF_R9_Org.asn** file from the **CDR ASN.1 Definitions** directory.

Issue 10(2015-01-30)

This issue is the tenth official release, which incorporates the following changes:

Added the sGWiPv6Address field to SGW-CDRs.

Issue 09 (2014-09-30)

This issue is the ninth official release, which incorporates the following changes:

Modified chapter 6 "Examples of CDR" so that you can download the CDR files in ASN.1 BER code from the **CDR Samples** directory.

Issue 08 (2013-05-23)

This issue is the eighth official release, which incorporates the following changes:

Updated the document version number.

The following table lists the mapping relationships between source version numbers and new version numbers.

Source Version Number	New Version Number
1.06	07
1.05	06
1.04	05
1.03	04
1.02	03
1.01	02
1.00	01

Issue 07 (2012-10-16)

This issue is the seventh official release, which incorporates the following changes:

- Modified the tag value of the field **userCSGInformation** from "0x9F23" to "0xBF23."
- Modified the tag value of the field **servedPDPPDNAddressExt** from "0x9F24" to "0xBF24."
- Modified the description of the field **servedPDPPDNAddressExt** from "List of SGSN/S-GW control plane IP" to "This field holds IPv4 address of the served IMSI, if available, when PDP/PDN type is IPv4v6."

Issue 06 (2012-04-16)

This issue is the sixth official release, which incorporates the following changes:

- Modified the category of the field **servedPDPPDNAddressExt** from O_M to O_C for SGW-CDR and PGW-CDR.
- Modified the description of the field **servedPDPPDNAddress** and **servedPDPPDNAddressExt**.
- Modified the tag value of the field **servedPDPPDNAddressExt**.

Issue 05 (2012-03-15)

This issue is the fifth official release, which incorporates the following changes:

- Modified the Category of the field **servedIMSI** from M to C for SGW-CDR and PGW-CDR.
- Modified the field name **pDNConnectionID** as **pDNConnectionChargingID** for SGW-CDR and PGW-CDR.
- Added **dynamicAddressFlagExt** field for SGW-CDR and PGW-CDR.
- Updated the ASN.1 description file for R9 V940.

Issue 04 (2012-02-14)

This issue is the fourth official release, which incorporates the following changes:

- Modified the name of 3GPP2UserLocationInformation field to threeGPP2UserLocationInformation.
- Added **iMSIunauthenticatedFlag** field on S-CDR table.
- Added **userCSGInformation** field on S-CDR table.
- Added **servedPDPPDNAddressExt** field on S-CDR table.
- Modified the data type of **servedIMSI** field on S-CDR table.
- Modified the data type of **servedIMEI** field on S-CDR table.
- Modified the data type of **listOfTrafficVolumes** field on S-CDR table.
- Modified the data type of **recordExtensions** field on S-CDR table.
- Modified the data type of **rNCUnsentDownlinkVolume** field on S-CDR table.
- Modified the data type of **servedIMSI** field on G-CDR table.
- Modified the data type of **sgsnAddress** field on G-CDR table.
- Modified the data type of **listOfTrafficVolumes** field on G-CDR table.
- Modified the data type of **servedIMSI** field on eG-CDR table.
- Modified the data type of **sgsnAddress** field on eG-CDR table.
- Modified the data type of **listOfTrafficVolumes** field on eG-CDR table.
- Modified the data type of **listOfServiceData** field on eG-CDR table.

- Modified the data type of **servedIMSI** field on M-CDR table.
- Modified the data type of **servedIMEI** field on M-CDR table.
- Modified the data type of **recordExtensions** field on M-CDR table.
- Modified the data type of **servedIMSI** field on S-SMO-CDR table.
- Modified the data type of **servedIMEI** field on S-SMO-CDR table.
- Modified the data type of **recordingEntity** field on S-SMO-CDR table.
- Modified the data type of **recordExtensions** field on S-SMO-CDR table.
- Modified the data type of **servedIMSI** field on S-SMT-CDR table.
- Modified the data type of **servedIMEI** field on S-SMT-CDR table.
- Modified the data type of **recordingEntity** field on S-SMT-CDR table.
- Modified the data type of **smsResult** field on S-SMT-CDR table.
- Modified the data type of **recordExtensions** field on S-SMT-CDR table.
- Modified the data type of **recordingEntity** field on LCS-MO-CDR table.
- Modified the data type of **servedIMSI** field on LCS-MO-CDR table.
- Modified the data type of **mlcNumber** field on LCS-MO-CDR table.
- Modified the data type of **localSequenceNumber** field on LCS-MO-CDR table.
- Modified the data type of **recordExtensions** field on LCS-MO-CDR table.
- Modified the data type of **recordingEntity** field on LCS-MT-CDR table.
- Modified the data type of **servedIMSI** field on LCS-MT-CDR table.
- Modified the data type of **mlcNumber** field on LCS-MT-CDR table.
- Modified the data type of **recordExtensions** field on LCS-MT-CDR table.
- Modified the data type of **recordingEntity** field on LCS-NI-CDR table.
- Modified the data type of **servedIMSI** field on LCS-NI-CDR table.
- Modified the data type of **servedIMEI** field on LCS-NI-CDR table.
- Modified the data type of **mlcNumber** field on LCS-NI-CDR table.
- Modified the data type of **recordExtensions** field on LCS-NI-CDR table.
- Modified the data type of **listofRAs** field on S-MB-CDR table.
- Modified the data type of **listOfTrafficVolumes** field on S-MB-CDR table.
- Modified the data type of **recordExtensions** field on S-MB-CDR table.
- Modified the data type of **listofDownstreamNodes** field on G-MB-CDR table.
- Modified the data type of **listOfTrafficVolumes** field on G-MB-CDR table.
- Modified the data type of **recordExtensions** field on G-MB-CDR table.
- Modified the name of **SGWRecord** field to sGWRecord on SGW-CDR table.
- Modified the name of **Serving Node Address** field to **servingNodeAddress** on SGW-CDR table.
- Modified the name of **p-GWAddressUsed** field to **pGWAddressUsed** on SGW-CDR table.
- Modified the name of **p-GWPLMNIdentifier** field to **pGWPLMNIdentifier** on SGW-CDR table.
- Modified the name of **IMSIunauthenticatedFlag** field to **iMSIunauthenticatedFlag** on SGW-CDR table.
- Modified the name of User CSG information field to **userCSGInformation** on SGW-CDR table.

- Modified the data type of **servedIMSI** field on SGW-CDR table.
- Modified the data type of **servingNodeAddress** field on SGW-CDR table.
- Modified the data type of **servedMSISDN** field on SGW-CDR table.
- Modified the data type of **userLocationInformation** field on SGW-CDR table.
- Modified the data type of **cAMELChargingInformation** field on SGW-CDR table.
- Modified the data type of **servingNodeType** field on SGW-CDR table.
- Modified the data type of **userCSGInformation** field on SGW-CDR table.
- Modified the name of **PGWRecord** field to **pGWRecord** on PGW-CDR table.
- Modified the name of **servinggNodePLMNIdentifier** field to **servingNodePLMNIdentifier** on PGW-CDR table.
- Modified the name of **p-GWPLMNIdentifier** field to **pGWPLMNIdentifier** on PGW-CDR table.
- Modified the name of **IMSIunauthenticatedFlag** field to **iMSIunauthenticatedFlag** on PGW-CDR table.
- Modified the name of User CSG information field to userCSGInformation on PGW-CDR table.
- Modified the data type of **servedIMSI** field on PGW-CDR table.
- Modified the data type of **servingNodeAddress** field on PGW-CDR table.
- Modified the data type of **servedPDPPDNAddress** field on PGW-CDR table.
- Modified the data type of **servedMSISDN** field on PGW-CDR table.
- Modified the data type of **externalChargingID** field on PGW-CDR table.
- Modified the data type of **pSFurnishChargingInformation** field on PGW-CDR table.
- Modified the data type of **userLocationInformation** field on PGW-CDR table.
- Modified the data type of **cAMELChargingInformation** field on PGW-CDR table.
- Modified the data type of **servingNodeType** field on PGW-CDR table.
- Modified the data type of **userCSGInformation** field on PGW-CDR table.

Issue 03 (2011-03-26)

This issue is the third official release, which incorporates the following changes:

- Added **IMSI Unauthenticated Flag** field to SGW-CDR.
- Added **User CSG information** field to SGW-CDR.
- Added **IMSI Unauthenticated Flag** field to PGW-CDR.
- Added **User CSG information** field to PGW-CDR.
- Modified the description of the **UserLocationInformation**.

Issue 02 (2010-11-22)

This issue is the second official release, which incorporates the following changes:

- Modified the type of **localSequenceNumber**.
- Added **servedPDPPDNAddressExt** field to SGW-CDR.
- Added **servedPDPPDNAddressExt** and **3GPP2UserLocationInformation** fields to PGW-CDR.

Issue 01 (2010-10-16)

This is the first official release.

Contents

1 Charging Data Record Store and Transfer

CDR storage involves storing original and final CDRs.

After receiving CDRs from the upstream NEs, the CG stores the CDRs as original CDR files on a hard disk.

After being decoded, sorted, converted, consolidated, and encoded, original CDRs are stored in files by channel on the hard disk as final CDR files.

The storage of original CDRs is frontsave storage, which means that the system stores original CDRs without changing their contents.

The storage of final CDRs is backsave storage, which means that the system stores original CDRs after changing their contents.

For the CG9812 based on the ATCA platform, both original and final CDR files are stored in the **/var/igwb** directory.

For the CloudCG, both the original and final CDR files are stored in the **/opt/CG_VNFC/1/VNFC serial number/vrpv8/product** directory.

2 Record Types

The following contents describe the types of each of the call and event records in UMTS system:

- S-CDR
- M-CDR
- S-SMO-CDR
- S-SMT-CDR
- LCS-MO-CDR
- LCS-MT-CDR
- LCS-NI-CDR

The following contents describe the types of each of the call and event records in LTE system:

- G-MB-CDR
- MBMS-GW-CDR
- SGW-CDR
- PGW-CDR

3 Record Contents

The following tables describe the contents of each of the call and event records defined in the present document. Each table contains the name of the field, a key indicating whether or not the field is mandatory, and a description of the contents.

The key field has the following meaning:

- **M**: This field is mandatory and always present. Any exceptions to this rule are explicitly described.
- **C**: This field is only available under certain conditions. If available the field is present.

  The conditions under which the field is available are individually described.
- **O**: This field is optional and configurable either via additional TMN management functions or manufacturer specific means. For the avoidance of doubt, optional does not mean that the parameter is not supported by the Network Element. Equipment manufacturers shall be capable of providing all of these fields in order to claim conformance with the present document.
  - **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.

3.1 Combined S-CDR

Table 3-1 Combined S-CDR

Field	Category	Tag	Data Type	Description
sgsnPDPRecord	M	0xB4	SET	GPRS SGSN PDP context record.
recordType	M	0x80	INTEGER	GPRS SGSN PDP context record.
networkInitiation	O_C	0x81	BOOLEAN	Present if this is a network initiated PDP context.
servedIMSI	M	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party.

Field	Category	Tag	Data Type	Description
servedIMEI	O_C	0x84	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
sgsnAddress	O_M	0xA5	SEQUENCE OF GSNAddress	The IP address of the current SGSN.
msNetworkCapability	O_M	0x86	OCTET STRING (SIZE(1..8))	The mobile station Network Capability.
routingArea	O_M	0x87	OCTET STRING (SIZE(1))	Routing Area at the time of the record creation.
locationAreaCode	O_M	0x88	OCTET STRING (SIZE(2))	Location area code at the time of the record creation.
cellIdentifier	O_M	0x89	OCTET STRING (SIZE(2))	Cell identity or Service Area Code (SAC) at the time of the record creation.
chargingID	M	0x8A	INTEGER (0..4294967295)	PDP context identifier used to identify this PDP context in different records created by GSNs.
ggsnAddressUsed	M	0xAB	GSNAddress	The IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP.
accessPointNameNI	O_M	0x8C	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpType	O_M	0x8D	OCTET STRING (SIZE(2))	PDP type, i.e. IP, PPP, IHOSS:OSP.
servedPDPAddress	O_C	0xAE	PDPAddress	PDP address of the served IMSI, i.e. IPv4 or IPv6.
listOfTrafficVolumes	O_M	0xAF	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this PDP context, each time stamped. Charging conditions are used to categorise traffic volumes, such as per QoS/tariff period. Initial and subsequently changed QoS and corresponding data values are listed. In GSM, data volumes are in Octets above the SNDCP layer and are separated for uplink and downlink traffic. In 3G, data volumes are in octets above the GTP-U layer and are separated for uplink and downlink traffic.
recordOpeningTime	M	0x90	OCTET STRING (SIZE(9))	Time stamp when PDP context activation is created in this SGSN or record opening time on following partial records.

Field	Category	Tag	Data Type	Description
duration	M	0x91	INTEGER	Duration of this record in the SGSN.
sgsnChange	C	0x92	BOOLEAN	Present if this is first record after SGSN change.
causeForRecClosing	M	0x93	INTEGER	The reason for the release of record from this SGSN.
diagnostics	O_M	0xB4	Diagnostics	A more detailed reason for the release of the connection.
recSequenceNumList	C	0xB5	SEQUENCE OF SequenceList	Partial record sequence number in this SGSN.
nodeID	O_M	0x96	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB7	SET OF ManagementExtension	A set of network/ manufacturer specific extensions to the record.
localSequenceNumberList	O_M	0xB8	SEQUENCE OF LocalSequenceNumberList	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x99	ENUMERATED	An index indicating how the APN was selected.
accessPointNameOI	O_M	0x9A	IA5String (SIZE(1..37))	The Operator Identifier part of the APN.
servedMSISDN	O_M	0x9B	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
chargingCharacteristics	M	0x9C	OCTET STRING (SIZE(2))	The Charging Characteristics flag retrieved from subscriber's data.
rATType	O_C	0x9D	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
cAMELInformationPDP	O_C	0xBE	CAMELInformationPDP	Set of CAMEL information related to PDP context. For more information see Description of Record Fields.
rNCUnsentDownlinkVolumeList	O_C	0xBF1F	SEQUENCE OF RNCUnsentDownlinkVolumeList	The downlink data volume which the RNC has not sent to MS.
chChSelectionMode	O_M	0x9F20	ENUMERATED	Holds information about how Charging Characteristics were selected.
dynamicAddressFlag	O_C	0x9F21	BOOLEAN	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.

Field	Category	Tag	Data Type	Description
iMSIunauthenticatedFlag	O_C	0x9F22	NULL	This field indicates that provided **Served IMSI** is not authenticated, and relates to an emergency bearer established with IMSI as identifier (refer to TS 23.060 [202] and TS 29.274 [223]). This field is missing if IMSI is authenticated, or if IMSI is not provided as identifier.
userCSGInformation	O_C	0xBF23	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies.
servedPDPPDNAddressExt	O_C	0xBF24	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDP/PDN type is IPv4v6.
sgsnPLMNIdentifier	O_C	0x9F28	OCTET STRING (SIZE (3))	SGSN PLMN identifier (MCC and MNC) used during this record.
consolidationResult	M	0x9F32	ENUMERATED	ConsolidationResult.

3.2 Combined SGW-CDR

Table 3-2 Combined SGW-CDR

Field	Category	Tag	Data Type	Description
sGWRecord	M	0xBF4E	SET	S-GW IP CAN bearer record.
recordType	M	0x80	INTEGER	S-GW IP CAN bearer record.
networkInitiation	O_C	0x81	BOOLEAN	A flag that is present if this is a network initiated IP CAN bearer.
servedIMSI	C	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party, if available.
sGWAddress	M	0xA4	GSNAddress	The control plane IP address of the S-GW used.
chargingID	M	0x85	INTEGER (0..4294967295)	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs.
servingNodeAddress	O_C	0xA6	SEQUENCE OF GSNAddress	List of serving node control plane IP addresses (e.g. SGSN, MME) used during this record.

Field	Category	Tag	Data Type	Description
accessPointNameNI	O_M	0x87	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpPDNType	O_M	0x88	OCTET STRING (SIZE(2))	This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).
servedPDPPDNAddress	O_C	0xA9	PDPAddress	IP address allocated for the PDP context / PDN connection, if available, i.e. Ipv4 when PDN Type is IPv4 or Ipv6 when PDN Type is IPv6 or IPv4v6.
dynamicAddressFlag	O_C	0x8B	BOOLEAN	Indicates whether served PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity. This field is missing if address is static.
listOfTrafficVolumes	O_M	0xAC	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this QCI/ARP pair, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed.
recordOpeningTime	M	0x8D	OCTET STRING (SIZE(9))	Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.
duration	M	0x8E	INTEGER	Duration of this record in the S-GW.
causeForRecClosing	M	0x8F	INTEGER	The reason for the release of record from this S-GW.
diagnostics	O_M	0xB0	Diagnostics	A more detailed reason for the release of the connection.
recSequenceNumList	C	0xB1	SequenceList	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x92	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB3	SEQUENCE OF ContentInfo	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Field	Category	Tag	Data Type	Description
localSequenceNumberList	O_M	0xB4	LocalSequenceNumberList	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x95	ENUMERATED	An index indicating how the APN was selected.
servedMSISDN	O_M	0x96	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
chargingCharacteristics	M	0x97	OCTET STRING (SIZE(2))	The Charging Characteristics applied to the IP CAN bearer.
chChSelectionMode	O_M	0x98	ENUMERATED	Holds information about how Charging Characteristics were selected.
iMSsignalingContext	O_C	0x99	NULL	Included if the IM-CN Subsystem Signalling Flag is set, see PDP context is used for IMS signalling.
servingNodePLMNIdentifier	O_C	0x9B	OCTET STRING (SIZE (3))	Serving node PLMN Identifier (MCC and MNC) used during this record, if available.
servedIMEISV	O_C	0x9D	TBCD-STRING (SIZE (8))	IMEISV of the ME, if available. It is used for identifying the user in case Served IMSI is not present during emergency bearer service.
rATType	O_C	0x9E	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station as defined in TS 29.060 [204], if available.
mSTimeZone	O_C	0x9F1F	OCTET STRING (SIZE (2))	This field contains the MS Time Zone the MS is currently located as defined in TS 29.060 [203], if available.

Field	Category	Tag	Data Type	Description
userLocationInformation	O_C	0x9F20	OCTET STRING	The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification. For GTPv0 and GTPv1(29.060): This field includes two parts: Geographic Location Type and Geographic Location. Geographic Location could alternatively be CGI (PLMN+LAC+CI) or SAI (PLMN+LAC+SAC). Geographic Location Type = 0 means CGI will be included; Geographic Location Type = 1 means SAI will be included. In case of 2G RAN, CGI is used. In case of 3G RAN, SAI is used. Note: For GTPv0 and GTPv1, only value part is filled into CDR field. Type and Length part defined in 29.060 are not presented in CDR. For GTPv2(29.274): There is three access method for GTPv2: In case of 4G, TAI and ECGI are used. In case of 3G, SAI and RAI are used. In case of 2G, CGI and RAI are used. Note: For GTPv2, only value part is filled into CDR field. Type, Length and Instance part defined in 29.274 are not presented in CDR.
cAMELChargingInformation	O_C	0x9F21	OCTET STRING	Set of CAMEL information related to IP CAN bearer, if available.
sGWChange	O_C	0x9F22	BOOLEAN	Present if this is first record after S-GW change.
servingNodeType	O_C	0xBF23	SEQUENCE OF ENUMERATED	List of serving node types in control plane. The serving node types listed here map to the serving node addresses listed in the field **Serving node Address** in sequence.
pGWAddressUsed	O_C	0xBF24	GSNAddress	This field is the serving P-GW IP Address for the Control Plane. If both an Ipv4 and an Ipv6 address of the P-GW is available, the P-GW shall include the Ipv4 address in the CDR.

Field	Category	Tag	Data Type	Description
pGWPLMNIdentifier	O_C	0x9F25	OCTET STRING (SIZE (3))	This field is the P-GW PLMN Identifier (Mobile Country Code and Mobile Network Code). The MCC and MNC are coded as described for **User Location Info** in TS 29.274 [91].
startTime	O_C	0x9F26	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session starts at the S-GW/P-GW, available in the CDR for the first bearer in an IP-CAN session.
stopTime	O_C	0x9F27	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW, available in the CDR for the last bearer in an IP-CAN session.
pDNConnectionChargingID	O_M	0x9F28	INTEGER (0..4294967295)	This field holds the Charging Id of the EPS default bearer in GTP case, or the unique Charging Id of the IP-CAN session in PMIP case: it is used to identify different records belonging to same PDN connection.
iMSIunauthenticatedFlag	O_C	0x9F29	NULL	This field indicates that provided **Served IMSI** is not authenticated, and relates to an emergency bearer established with IMSI as identifier (refer to TS 23.060 [202] and TS 29.274 [223]). This field is missing if IMSI is authenticated, or if IMSI is not provided as identifier. (for protocol revolution)
userCSGInformation	O_C	0xBF2A	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies. (for protocol revolution)
servedPDPPDNAddressExt	O_C	0xBF2B	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDN type is IPv4v6.
lowPriorityIndicator	O_C	0x9F2C	NULL	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.

Field	Category	Tag	Data Type	Description
dynamicAddressFlagExt	O_C	0x9F2F	BOOLEAN	Indicates whether served IPv4 PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity with PDP/PDN type IPv4v6. This field is missing if IPv4 address is static.
sGWiPv6Address	O_C	0xBF30	GSNAddress	The control plane IPv6 address, in case of IPv4v6 dual stack, of the S-GW.
consolidationResult	M	0x9F32	ENUMERATED	ConsolidationResult.
cPCIoTEPSOptimisationIndicator	O_C	0x9F3B	BOOLEAN	This field indicates whether CP CIoT EPS Optimisation is used (S1-U direct between SGW and eNB, or S11-U via MME) is used for data transfer with the UE, if available.
uNIPDUCPOnlyFlag	O_C	0x9F3C	BOOLEAN	This field indicates whether this PDN connection is applied with "Control Plane Only Flag" for UNI PDU transfer, i.e. using only S11-U in Control Plane CIoT EPS optimisation.
servingPLMNRateControl	O_C	0xBF3D	ServingPLMNRateControl	This field holds the Serving PLMN Rate Control used by the MME during this record.
pDPPDNTypeExtension	O_M	0x9F3E	INTEGER	This field defines the PDN type as per TS 29.061 [216] for Non-IP PDN Type.
mOExceptionDataCounter	O_C	0xBF3F	MOExceptionDataCounter	MO exception data counter.

3.3 Combined PGW-CDR

Table 3-3 Combined PGW-CDR

Field	Category	Tag	Data Type	Description
pGWRecord	M	0xBF4F	SET	P-GW IP CAN bearer record.
recordType	M	0x80	INTEGER	P-GW IP CAN bearer record.
servedIMSI	C	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party, if available.

Field	Category	Tag	Data Type	Description
pGWAddress	M	0xA4	GSNAddress	The control plane IP address of the P-GW used.
chargingID	M	0x85	INTEGER (0..4294967295)	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs.
servingNodeAddress	M	0xA6	SEQUENCE OF GSNAddress	List of SGSN/S-GW control plane IP addresses used during this record.
accessPointNameNI	O_M	0x87	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpPDNType	O_M	0x88	OCTET STRING (SIZE(2))	PDP type, i.e. IP, PPP, or IHOSS:OSP.
servedPDPPDNAddress	O_C	0xA9	PDPAddress	IP address allocated for the PDP context / PDN connection, i.e. Ipv4 when PDP/PDN Type is Ipv4 or Ipv6 when PDP/PDN Type is Ipv6 or Ipv4v6. This parameter shall be present except when both the PDP type is PPP and dynamic IP CAN bearer address assignment is used.
dynamicAddressFlag	O_C	0x8B	BOOLEAN	Indicates whether served IP CAN bearer address is dynamic, which is allocated during IP CAN bearer activation. This field is missing if address is static.
listOfTrafficVolumes	O_M	0xAC	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this IP CAN bearer, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed.
recordOpeningTime	M	0x8D	OCTET STRING (SIZE(9))	Time stamp when IP CAN bearer is activated in this P-GW or record opening time on subsequent partial records.
duration	M	0x8E	INTEGER	Duration of this record in the P-GW.
causeForRecClosing	M	0x8F	INTEGER	The reason for the release of record from this P-GW.
diagnostics	O_M	0xB0	Diagnostics	A more detailed reason for the release of the connection.

Field	Category	Tag	Data Type	Description
recSequenceNumList	C	0xB1	SequenceList	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x92	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB3	SEQUENCE OF ContentInfo	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
localSequenceNumberList	O_M	0xB4	LocalSequenceNumberList	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x95	ENUMERATED	An index indicating how the APN was selected.
servedMSISDN	O_M	0x96	OCTET STRING (SIZE (1..9))	This field contains the MSISDN of the served party. In case of multi-numbering the MSISDN stored in a PGW CDR will be the primary MSISDN of the calling party.
chargingCharacteristics	M	0x97	OCTET STRING (SIZE(2))	The Charging Characteristics applied to the IP CAN bearer.
chChSelectionMode	O_M	0x98	ENUMERATED	Holds information about how Charging Characteristics were selected.
iMSsignalingContext	O_C	0x99	NULL	Included if the IP CAN bearer IM-CN Subsystem Signalling Flag is set, see [201] is used for IMS character.
externalChargingID	O_C	0x9A	OCTET STRING	A Charging Identifier received from a non-EPC, external network entity e.g ICID.
servingNodePLMNIdentifier	O_M	0x9B	OCTET STRING (SIZE (3))	Serving node PLMN Identifier (MCC and MNC) used during this record.
pSFurnishChargingInformation	O_C	0xBC	PSFurnishChargingInformation	Online charging session specific information.
servedIMEISV	O_C	0x9D	TBCD-STRING (SIZE (8))	IMEISV of the ME, if available. It is used for identifying the user in case Served IMSI is not present during emergency bearer service.
rATType	O_C	0x9E	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station as defined in TS 29.060 [204], if available.
mSTimeZone	O_C	0x9F1F	OCTET STRING (SIZE (2))	This field contains the MS Time Zone the MS is currently located as defined in TS 29.060 [203], if available.

Field	Category	Tag	Data Type	Description
userLocationInformation	O_C	0x9F20	OCTET STRING	The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification. For GTPv0 and GTPv1(29.060): This field includes two parts: Geographic Location Type and Geographic Location. Geographic Location could alternatively be CGI (PLMN+LAC+CI) or SAI (PLMN+LAC+SAC). Geographic Location Type = 0 means CGI will be included; Geographic Location Type = 1 means SAI will be included. In case of 2G RAN, CGI is used. In case of 3G RAN, SAI is used. Note: For GTPv0 and GTPv1, only value part is filled into CDR field. Type and Length part defined in 29.060 are not presented in CDR. For GTPv2(29.274): There is three access method for GTPv2: In case of 4G, TAI and ECGI are used. In case of 3G, SAI and RAI are used. In case of 2G, CGI and RAI are used. Note: For GTPv2, only value part is filled into CDR field. Type, Length and Instance part defined in 29.274 are not presented in CDR.
cAMELChargingInformation	O_C	0x9F21	OCTET STRING	Set of CAMEL information related to IP CAN bearer.

Field	Category	Tag	Data Type	Description
listOfServiceData	O_M	0xBF22	SEQUENCE OF ChangeOfServiceConditions	A list of changes in charging conditions for all service data flows within this IP CAN bearer categorized per rating group or per combination of the rating group and service id. Each change is time stamped. Charging conditions are used to categorize traffic volumes, elapsed time and number of events, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed. Online charging information (PS Furnish Charging Information) may be added per each service data flow container in case it is sent by the OCS. Failure-Handling: This field shall be present in case P-GW triggers the Failure-Handling procedure. It shall indicate the Failure Handling scenario and the instant the Failure Action is triggered (see annex B). Scenarios: Continue/New Session; Continue/Ongoing Session; Retry&Terminate/Ongoing Session; Terminate/Ongoing Session.
servingNodeType	O_C	0xBF23	SEQUENCE OF ENUMERATED	List of serving node types in control plane. The serving node types listed here map to the serving node addresses listed in the field **Serving node Address** in sequence.
servedMNNAI	O_C	0xBF24	SubscriptionID	Mobile Node Identifier in NAI format (based on IMSI), if available.
pGWPLMNIdentifier	O_C	0x9F25	OCTET STRING (SIZE (3))	This field is the P-GW PLMN Identifier (Mobile Country Code and Mobile Network Code). The MCC and MNC are coded as described for **User Location Info** in TS 29.274 [91].
startTime	O_C	0x9F26	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session starts at the S-GW/P-GW, available in the CDR for the first bearer in an IP-CAN session.
stopTime	O_C	0x9F27	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW, available in the CDR for the last bearer in an IP-CAN session.

Field	Category	Tag	Data Type	Description
served3gpp2MEID	O_C	0x9F28	OCTET STRING	This field contains the Mobile Equipment Identity of the user's terminal in 3GPP2 access, and the content is defined in 3GPP TS 29.272 [93].
pDNConnectionChargingID	O_M	0x9F29	INTEGER (0..4294967295)	This field holds the Charging Id of the EPS default bearer in GTP case, or the unique Charging Id of the IP-CAN session in PMIP case: it is used to identify different records belonging to same PDN connection.
iMSIunauthenticatedFlag	O_C	0x9F2A	NULL	This field indicates the provided served IMSI is not authenticated (emergency bearer service situation).
userCSGInformation	O_C	0xBF2B	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies.
threeGPP2UserLocationInformation	O_C	0x9F2C	OCTET STRING	This field contains the User Location Information of the MS as defined in TS 29.212 [71] for 3GPP2 access, if available.
servedPDPPDNAddressExt	O_C	0xBF2D	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDP/PDN type is IPv4v6.
lowPriorityIndicator	O_C	0x9F2E	NULL	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.
dynamicAddressFlagExt	O_C	0x9F2F	BOOLEAN	Indicates whether served IPv4 PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity with PDP/PDN type IPv4v6. This field is missing if IPv4 address is static.
consolidationResult	M	0x9F32	ENUMERATED	ConsolidationResult.
sGiPtPTunnellingMethod	O_C	0x9F40	ENUMERATED	This field indicates whether SGi PtP tunnelling method based on UDP/IP or other methods are used for this PDN connection when a non-IP PDN type.

Field	Category	Tag	Data Type	Description
uNIPDUCPOnlyFlag	O_C	0x9F41	BOOLEAN	This field indicates whether this PDN connection is applied with "Control Plane Only Flag" for UNI PDU transfer, i.e. using only S11-U in Control Plane CIoT EPS optimisation.
servingPLMNRateControl	O_C	0xBF42	ServingPLMNRateControl	This field holds the Serving PLMN Rate Control used by the MME during this record
aPNRateControl	O_C	0xBF43	APNRateControl	This field holds the APN Rate Controls enforced in the PGW during this record.
pDPPDNTypeExtension	O_M	0x9F44	INTEGER	This field defines the PDN type as per TS 29.061 [216] for Non-IP PDN Type.
mOExceptionDataCounter	O_C	0xBF45	MOExceptionDataCounter	MO exception data counter.

3.4 Charging Data in SGSN (S-CDR)

If the collection of CDR data is enabled then the SGSN data specified in Table 3-4 can be available for each PDP context.

Table 3-4 S-CDR

Field	Category	Tag	Data Type	Description
sgsnPDPRecord	M	0xB4	SET	GPRS SGSN PDP context record.
recordType	M	0x80	INTEGER	GPRS SGSN PDP context record.
networkInitiation	O_C	0x81	BOOLEAN	Present if this is a network initiated PDP context.
servedIMSI	M	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party.
servedIMEI	O_C	0x84	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
sgsnAddress	O_M	0xA5	GSNAddress	The IP address of the current SGSN.
msNetworkCapability	O_M	0x86	OCTET STRING (SIZE(1..8))	The mobile station Network Capability.
routingArea	O_M	0x87	OCTET STRING (SIZE(1))	Routing Area at the time of the record creation.

Field	Category	Tag	Data Type	Description
locationAreaCode	O_M	0x88	OCTET STRING (SIZE(2))	Location area code at the time of the record creation.
cellIdentifier	O_M	0x89	OCTET STRING (SIZE(2))	Cell identity or Service Area Code (SAC) at the time of the record creation.
chargingID	M	0x8A	INTEGER (0..4294967295)	PDP context identifier used to identify this PDP context in different records created by GSNs.
ggsnAddressUsed	M	0xAB	GSNAddress	The IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP.
accessPointNameNI	O_M	0x8C	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpType	O_M	0x8D	OCTET STRING (SIZE(2))	PDP type, i.e. IP, PPP, IHOSS:OSP.
servedPDPAddress	O_C	0xAE	PDPAddress	PDP address of the served IMSI, i.e. IPv4 or IPv6.
listOfTrafficVolumes	O_M	0xAF	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this PDP context, each time stamped. Charging conditions are used to categorise traffic volumes, such as per QoS/tariff period. Initial and subsequently changed QoS and corresponding data values are listed. In GSM, data volumes are in Octets above the SNDCP layer and are separated for uplink and downlink traffic. In 3G, data volumes are in octets above the GTP-U layer and are separated for uplink and downlink traffic.
recordOpeningTime	M	0x90	OCTET STRING (SIZE(9))	Time stamp when PDP context activation is created in this SGSN or record opening time on following partial records.
duration	M	0x91	INTEGER	Duration of this record in the SGSN.
sgsnChange	C	0x92	BOOLEAN	Present if this is first record after SGSN change.
causeForRecClosing	M	0x93	INTEGER	The reason for the release of record from this SGSN.
diagnostics	O_M	0xB4	Diagnostics	A more detailed reason for the release of the connection.

Field	Category	Tag	Data Type	Description
recordSequenceNumber	C	0x95	INTEGER	Partial record sequence number in this SGSN.
nodeID	O_M	0x96	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB7	SET OF ManagementExtension	A set of network/ manufacturer specific extensions to the record.
localSequenceNumber	O_M	0x98	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x99	ENUMERATED	An index indicating how the APN was selected.
accessPointNameOI	O_M	0x9A	IA5String (SIZE(1..37))	The Operator Identifier part of the APN.
servedMSISDN	O_M	0x9B	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
chargingCharacteristics	M	0x9C	OCTET STRING (SIZE(2))	The Charging Characteristics flag retrieved from subscriber's data.
rATType	O_C	0x9D	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
cAMELInformationPDP	O_C	0xBE	CAMELInformationPDP	Set of CAMEL information related to PDP context. For more information see Description of Record Fields.
rNCUnsentDownlinkVolume	O_C	0x9F1F	INTEGER (-9223372036854775808..92233720368547 75807)	The downlink data volume which the RNC has not sent to MS.
chChSelectionMode	O_M	0x9F20	ENUMERATED	Holds information about how Charging Characteristics were selected.
dynamicAddressFlag	O_C	0x9F21	BOOLEAN	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.

Field	Category	Tag	Data Type	Description
iMSIunauthenticatedFlag	O_C	0x9F22	NULL	This field indicates that provided **Served IMSI** is not authenticated, and relates to an emergency bearer established with IMSI as identifier (refer to TS 23.060 [202] and TS 29.274 [223]). This field is missing if IMSI is authenticated, or if IMSI is not provided as identifier.
userCSGInformation	O_C	0xBF23	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies.
servedPDPPDNAddressExt	O_C	0xBF24	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDP/PDN type is IPv4v6.
sgsnPLMNIdentifier	O_C	0x9F28	OCTET STRING (SIZE (3))	SGSN PLMN identifier (MCC and MNC) used during this record.

3.5 Mobile Station Mobility Management Data in SGSN (M-CDR)

If the collection of MS mobility management data is enabled then the SGSN can start collecting the information specified in Table 3-5 each time the mobile is attached to the SGSN.

Table 3-5 M-CDR

Field	Category	Tag	Data Type	Description
sgsnMMRecord	M	0xB6	SET	GPRS SGSN mobility management record.
recordType	M	0x80	INTEGER	GPRS SGSN mobility management record.
servedIMSI	M	0x81	TBCD-STRING (SIZE (3..8))	IMSI of the MS.
servedIMEI	O_C	0x82	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
sgsnAddress	O_M	0xA3	GSNAddress	The IP address of the current SGSN.

Field	Category	Tag	Data Type	Description
msNetworkCapability	O_M	0x84	OCTET STRING (SIZE(1..8))	The mobile station network capability.
routingArea	O_M	0x85	OCTET STRING (SIZE(1))	Routing Area at the time of the record creation.
locationAreaCode	O_M	0x86	OCTET STRING (SIZE(2))	Location Area Code at the time of record creation.
cellIdentifier	O_M	0x87	OCTET STRING (SIZE(2))	The Cell Identity or Service Area Code (SAC) at the time of the record creation.
changeLocation	O_C	0xA8	SEQUENCE OF ChangeLocation	A list of changes in Routing Area Identity, each time stamped.
recordOpeningTime	M	0x89	OCTET STRING (SIZE(9))	Timestamp when this record was opened.
duration	O_M	0x8A	INTEGER	Duration of this record.
sgsnChange	C	0x8B	BOOLEAN	Present if this is first record after SGSN change.
causeforRecClosing	M	0x8C	INTEGER	The reason for the release of the record in this SGSN.
diagnostics	O_M	0xAD	Diagnostics	A more detailed reason for the release of the connection.
recordSequenceNumber	C	0x8E	INTEGER	Partial record sequence number.
nodeID	O_M	0x8F	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB0	SET OF ManagementExtension	A set of network/ manufacturer specific extensions to the record.
localSequenceNumber	O_M	0x91	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
servedMSISDN	O_M	0x92	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
chargingCharacteristics	M	0x93	OCTET STRING (SIZE(2))	The Charging Characteristics flag set used by the SGSN.
cAMELInformationMM	O_C	0xB4	CAMELInformationMM	Set of CAMEL related to Attach/Detach session. For more information see Description of Record Fields.

Field	Category	Tag	Data Type	Description
rATType	O_C	0x95	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
chChSelectionMode	O_M	0x96	ENUMERATED	Holds information about how Charging Characteristics were selected.
cellPLMNId	O_M	0x97	OCTET STRING (SIZE (3))	The MCC and MNC of the Cell at the time of Record Opening Time.

3.6 SMS-MO Data in SGSN (S-SMO-CDR)

If enabled, an S-SMO-CDR can be produced for each short message sent by a mobile subscriber via the SGSN. The S-SMO-CDR includes the following contents:

Table 3-6 S-SMO-CDR

Field	Category	Tag	Data Type	Description
sgsnSMORecord	M	0xB7	SET	SGSN Mobile Originated SMS.
recordType	M	0x80	INTEGER	SGSN Mobile Originated SMS.
servedIMSI	M	0x81	TBCD-STRING (SIZE (3..8))	The IMSI of the subscriber.
servedIMEI	O_C	0x82	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
servedMSISDN	O_M	0x83	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
msNetworkCapability	O_M	0x84	OCTET STRING (SIZE(1..8))	The mobile station network capability.
serviceCentre	O_M	0x85	OCTET STRING (SIZE (1..20))	The address (E.164) of the SMS-service centre.
recordingEntity	O_M	0x86	OCTET STRING (SIZE (1..20))	The E.164 number of the SGSN.
locationArea	O_M	0x87	OCTET STRING (SIZE(2))	The Location Area Code from which the message originated.
routingArea	O_M	0x88	OCTET STRING (SIZE(1))	The Routing Area Code from which the message originated.
cellIdentifier	O_M	0x89	OCTET STRING (SIZE(2))	The Cell Identity or Service Area Code (SAC) from which the message originated.

Field	Category	Tag	Data Type	Description
messageReference	M	0x8A	OCTET STRING	A reference provided by the MS uniquely identifying this message.
eventTimeStamp	M	0x8B	OCTET STRING (SIZE(9))	The time at which the message was received by the SGSN from the subscriber.
smsResult	C	0xAC	Diagnostics	The result of the attempted delivery if unsuccessful.
recordExtensions	O_C	0xAD	SET OF ManagementExtension	A set of network/ manufacturer specific extensions to the record.
nodeID	O_M	0x8E	IA5String (SIZE(1..20))	Name of the recording entity.
localSequenceNumber	O_M	0x8F	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
chargingCharacteristics	M	0x90	OCTET STRING (SIZE(2))	The Charging Characteristics flag set used by the SGSN.
rATType	O_C	0x91	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
destinationNumber	O_M	0x92	OCTET STRING (SIZE(12))	The destination short message subscriber number.
cAMELInformationSMS	O_C	0xB3	CAMELInformationSMS	Set of CAMEL information related to SMS session. For more information see Description of Record Fields.
chChSelectionMode	O_M	0x94	ENUMERATED	Holds information about how Charging Characteristics were selected.

3.7 SMS-MT Data in SGSN (S-SMT-CDR)

If enabled, an S-SMT-CDR can be produced for each short message received by a mobile subscriber via the SGSN. The S-SMT-CDR includes the following contents:

Table 3-7 S-SMT-CDR

Field	Category	Tag	Data Type	Description
sgsnSMTRecord	M	0xB8	SET	SGSN Mobile terminated SMS.
recordType	M	0x80	INTEGER	SGSN Mobile terminated SMS.
servedIMSI	M	0x81	TBCD-STRING (SIZE (3..8))	The IMSI of the subscriber.
servedIMEI	O_C	0x82	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
servedMSISDN	O_M	0x83	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
msNetworkCapability	O_M	0x84	OCTET STRING (SIZE(1..8))	The mobile station network capability.
serviceCentre	O_M	0x85	OCTET STRING (SIZE (1..20))	The address (E.164) of the SMS-service centre.
recordingEntity	O_M	0x86	OCTET STRING (SIZE (1..20))	The E.164 number of the SGSN.
locationArea	O_M	0x87	OCTET STRING (SIZE(2))	The Location Area Code to which the message was delivered.
routingArea	O_M	0x88	OCTET STRING (SIZE(1))	The Routing Area Code to which the message was delivered.
cellIdentifier	O_M	0x89	OCTET STRING (SIZE(2))	The Cell Identity or Service Area Code (SAC) to which the message was delivered.
eventTimeStamp	M	0x8A	OCTET STRING (SIZE(9))	Delivery time stamp, time at which message was sent to the MS by the SGSN.
smsResult	C	0xAB	Diagnostics	The result of the attempted delivery if unsuccessful.
recordExtensions	O_C	0xAC	SET OF ManagementExtension	A set of network/ manufacturer specific extensions to the record.
nodeID	O_M	0x8D	IA5String (SIZE(1..20))	Name of the recording entity.
localSequenceNumber	O_M	0x8E	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
chargingCharacteristics	M	0x8F	OCTET STRING (SIZE(2))	The Charging Characteristics flag set used by the SGSN.

Field	Category	Tag	Data Type	Description
rATType	O_C	0x90	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
chChSelectionMode	O_M	0x91	ENUMERATED	Holds information about how Charging Characteristics were selected.
cAMELInformationSMS	O_C	0xB2	CAMELInformationSMS	Set of CAMEL information related to SMS session. For more information see Description of Record Fields.

3.8 Mobile Originated Location Request (LCS-MO-CDR)

If enabled, an LCS-MO-CDR can be produced for each mobile when an originated location request is performed via the SGSN. The LCS-MO-CDR includes the following contents:

Table 3-8 LCS-MO-CDR

Field	Category	Tag	Data Type	Description
sgsnLCORecord	M	0xBA	SET	SGSN Mobile Originated LCS.
recordType	M	0x80	INTEGER	SGSN Mobile Terminated LCS.
recordingEntity	M	0x81	OCTET STRING (SIZE (1..20))	The E.164 number of the SGSN.
lcsClientType	C	0x82	ENUMERATED	The type of the LCS client that invoked the LR.
lcsClientIdentity	C	0xA3	LCSClientIdentity	Further identification of the LCS client.
servedIMSI	M	0x84	TBCD-STRING (SIZE (3..8))	The IMSI of the subscriber.
servedMSISDN	O_M	0x85	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
sgsnAddress	O_M	0xA6	GSNAddress	The IP address of the current SGSN.
locationMethod	M	0x87	ENUMERATED	The type of the estimated location.
lcsQos	C	0x88	OCTET STRING (SIZE(4))	QoS of the LR, if available.
lcsPriority	O_C	0x89	OCTET STRING (SIZE (1))	Priority of the LR, if available.
mlcNumber	C	0x8A	OCTET STRING (SIZE (1..9))	The E.164 address of the requesting GMLC.

Field	Category	Tag	Data Type	Description
eventTimeStamp	M	0x8B	OCTET STRING (SIZE(9))	The time at which the Perform_Location_Request is sent by the SGSN.
measurementDuration	O_M	0x8C	INTEGER	The duration of proceeding the location request.
location	O_M	0xAD	LocationAreaAndCell	The LAC and CI when the LR is received.
routingArea	O_M	0x8E	OCTET STRING (SIZE(1))	The Routing Area Code to which the LCS terminated.
locationEstimate	O_C	0x8F	OCTET STRING (SIZE (1..20))	The location estimate for the subscriber if contained in geographic position and the LR was successful.
positioningData	C	0x90	OCTET STRING (SIZE(1..33))	The positioning method used or attempted, if available.
lcsCause	C	0x91	OCTET STRING (SIZE(1))	The result of the LR if any failure or partial success happened as known at radio interface.
diagnostics	C	0xB2	Diagnostics	A more detailed information about the Cause for Record Closing if any failure or partial success happened.
nodeID	O_M	0x93	IA5String (SIZE(1..20))	Name of the recording entity.
localSequenceNumber	O_M	0x94	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
chargingCharacteristics	M	0x95	OCTET STRING (SIZE(2))	The Charging Characteristics used by the SGSN. (always use the subscribed CC).
chChSelectionMode	O_M	0x96	ENUMERATED	Holds information about how Charging Characteristics were selected. (only subscribed/home default/visited default)
rATType	O_C	0x97	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
recordExtensions	O_C	0xB8	SET OF ManagementExtension	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Field	Category	Tag	Data Type	Description
causeForRecClosing	M	0x99	INTEGER	The reason for closure of the record from this SGSN.

3.9 Mobile Terminated Location Request (LCS-MT-CDR)

If enabled, an LCS-MT-CDR can be produced for each mobile when a terminated location request is performed via the SGSN. The LCS-MT-CDR includes the following contents:

Table 3-9 LCS-MT-CDR

Field	Category	Tag	Data Type	Description
sgsnLCTRecord	M	0xB9	SET	SGSN Mobile Terminated LCS.
recordType	M	0x80	INTEGER	SGSN Mobile Terminated LCS.
recordingEntity	M	0x81	OCTET STRING (SIZE (1..20))	The E.164 number of the SGSN.
lcsClientType	M	0x82	ENUMERATED	The type of the LCS client that invoked the LR.
lcsClientIdentity	M	0xA3	LCSClientIdentity	Further identification of the LCS client.
servedIMSI	M	0x84	TBCD-STRING (SIZE (3..8))	The IMSI of the subscriber.
servedMSISDN	O_M	0x85	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
sgsnAddress	O_M	0xA6	GSNAddress	The IP address of the current SGSN.
locationType	M	0xA7	LocationType	The type of the estimated location.
lcsQos	C	0x88	OCTET STRING (SIZE(4))	QoS of the LR, if available.
lcsPriority	C	0x89	OCTET STRING (SIZE (1))	Priority of the LR, if available.
mlcNumber	M	0x8A	OCTET STRING (SIZE (1..9))	The E.164 address of the requesting GMLC.
eventTimeStamp	M	0x8B	OCTET STRING (SIZE(9))	The time at which the Perform_Location_Request is sent by the SGSN.
measurementDuration	O_M	0x8C	INTEGER	The duration of proceeding the location request.

Field	Category	Tag	Data Type	Description
notificationToMSUser	C	0x8D	ENUMERATED	The privacy notification to MS user that was applicable when the LR was invoked, if available.
privacyOverride	C	0x8E	NULL	This parameter indicates the override MS privacy by the LCS client, if available.
location	O_M	0xAF	LocationAreaAndCell	The location estimate for the subscriber if contained in geographic position and the LR was successful.
routingArea	O_M	0x90	OCTET STRING (SIZE(1))	The Routing Area Code to which the LCS terminated.
locationEstimate	O_C	0x91	OCTET STRING (SIZE (1..20))	The location estimate for the subscriber if contained in geographic position and the LR was successful.
positioningData	C	0x92	OCTET STRING (SIZE(1..33))	The positioning method used or attempted, if available.
lcsCause	O_C	0x93	OCTET STRING (SIZE(1))	The result of the LR if any failure or partial success happened as known at radio interface.
diagnostics	C	0xB4	Diagnostics	A more detailed information about the Cause for Record Closing if any failure or partial success happened.
nodeID	O_M	0x95	IA5String (SIZE(1..20))	Name of the recording entity.
localSequenceNumber	O_M	0x96	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
chargingCharacteristics	M	0x97	OCTET STRING (SIZE(2))	The Charging Characteristics used by the SGSN. (always use the subscribed CC)
chChSelectionMode	O_M	0x98	ENUMERATED	Holds information about how Charging Characteristics were selected. (only subscribed/home default/visited default)
rATType	O_C	0x99	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
recordExtensions	O_C	0xBA	SET OF ManagementExtension	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Field	Category	Tag	Data Type	Description
causeForRecClosing	M	0x9B	INTEGER	The reason for closure of the record from this SGSN.

3.10 Network Induced Location Request (LCS-NI-CDR)

If enabled, an LCS-NI-CDR can be produced for each mobile when a network induced location request is performed via the SGSN. The LCS-NI-CDR includes the following contents:

Table 3-10 LCS-NI-CDR

Field	Category	Tag	Data Type	Description
sgsnLCNRecord	M	0xBB	SET	SGSN Network Induced LCS.
recordType	M	0x80	INTEGER	SGSN Mobile Terminated LCS.
recordingEntity	M	0x81	OCTET STRING (SIZE (1..20))	The E.164 number of the SGSN.
lcsClientType	C	0x82	ENUMERATED	The type of the LCS client that invoked the LR.
lcsClientIdentity	C	0xA3	LCSClientIdentity	Further identification of the LCS client.
servedIMSI	C	0x84	TBCD-STRING (SIZE (3..8))	The IMSI of the subscriber.
servedMSISDN	C	0x85	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
sgsnAddress	O_M	0xA6	GSNAddress	The IP address of the current SGSN.
servedIMEI	O_C	0x87	TBCD-STRING (SIZE (8))	The IMEI of the ME, if available.
lcsQos	C	0x88	OCTET STRING (SIZE(4))	QoS of the LR, if available.
lcsPriority	C	0x89	OCTET STRING (SIZE (1))	Priority of the LR, if available.
mlcNumber	C	0x8A	OCTET STRING (SIZE (1..9))	The E.164 address of the requesting GMLC.
eventTimeStamp	M	0x8B	OCTET STRING (SIZE(9))	The time at which the Perform_Location_Request is sent by the SGSN.
measurementDuration	O_M	0x8C	INTEGER	The duration of proceeding the location request.

Field	Category	Tag	Data Type	Description
location	O_M	0xAD	LocationAreaAndCell	The location estimate for the subscriber if contained in geographic position and the LR was successful.
routingArea	O_M	0x8E	OCTET STRING (SIZE(1))	The Routing Area Code to which the LCS terminated.
locationEstimate	O_C	0x8F	OCTET STRING (SIZE (1..20))	The location estimate for the subscriber if contained in geographic position and the LR was successful.
positioningData	C	0x90	OCTET STRING (SIZE(1..33))	The positioning method used or attempted, if available.
lcsCause	C	0x91	OCTET STRING (SIZE(1))	The result of the LR if any failure or partial success happened as known at radio interface.
diagnostics	C	0xB2	Diagnostics	A more detailed information about the Cause for Record Closing if any failure or partial success happened.
nodeID	O_M	0x93	IA5String (SIZE(1..20))	Name of the recording entity.
localSequenceNumber	O_M	0x94	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
chargingCharacteristics	M	0x95	OCTET STRING (SIZE(2))	The Charging Characteristics used by the SGSN. (always use the subscribed CC)
chChSelectionMode	O_M	0x96	ENUMERATED	Holds information about how Charging Characteristics were selected. (only subscribed/home default/visited default)
rATType	O_C	0x97	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type, e.g. UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.
recordExtensions	O_C	0xB8	SET OF ManagementExtension	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
causeForRecClosing	M	0x99	INTEGER	The reason for closure of the record from this SGSN.

3.11 MBMS Bearer Context Charging Data in GGSN (G-MB-CDR)

If the collection of CDR data is enabled then the GGSN data specified in the following table shall be available for each MBMS bearer context.

Table 3-11 G-MB-CDR

Field	Category	Tag	Data Type	Description
ggsnMBMSRecord	M	0xBF4D	SET	GGSN MBMS bearer context record.
recordType	M	0x80	INTEGER	GGSN MBMS bearer context record.
ggsnAddress	M	0xA1	GSNAddress	The control plane IP address of the GGSN used.
chargingID	M	0x82	INTEGER (0..4294967295)	Bearer context identifier used to identify this MBMS bearer context in different records created by GSNs.
listofDownstreamNodes	M	0xA3	SEQUENCE OF GSNAddress	List of SGSN addresses used during this record. Equivalent to the list of downstream nodes defined in TS 23.246.
accessPointNameNI	O_M	0x84	IA5String (SIZE(1..63))	The logical name of the connected access point to the BM-SC (network identifier part of APN).
servedPDPAddress	O_C	0xA5	PDPAddress	Indicates the IP Multicast address used for the MBMS bearer context.
listOfTrafficVolumes	O_M	0xA6	SEQUENCE OF ChangeOfMBMSCondition	A list of changes in charging conditions for this MBMS bearer context, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. It shall include the required bearer capabilities (QoS Negotiated).
recordOpeningTime	M	0x87	OCTET STRING (SIZE(9))	Time stamp when MBMS bearer context is activated in this GGSN or record opening time on subsequent partial records.
duration	M	0x88	INTEGER	Duration of this record in the GGSN.
causeForRecClosing	M	0x89	INTEGER	The reason for the release of record from this GGSN.
diagnostics	O_M	0xAA	Diagnostics	A more detailed reason for the release of the connection.

Field	Category	Tag	Data Type	Description
recordSequenceNumber	C	0x8B	INTEGER	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x8C	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xAD	SET OF ManagementExtension	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
localSequenceNumber	O_M	0x8E	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
mbmsInformation	O_M	0xAF	MBMSInformation	MBMS related information related to MBMS bearer context being charged, defined in TS 32.273.

3.12 MBMS Bearer Context Charging Data in MBMS GW (MBMS-GW-CDR)

If the collection of CDR data is enabled then the MBMS GW data specified in the following table shall be available for each MBMS bearer context when MBMS GW does not locate in MB-SC.

Table 3-12 MBMS-GW-CDR

Field	Category	Tag	Data Type	Description
gwMBMSRecord	M	0xBF56	SET	MBMS GW MBMS bearer context record.
recordType	M	0x80	INTEGER	MBMS GW MBMS bearer context record.
mbmsGWAddress	M	0xA1	GSNAddress	The control plane IP address of the MBMS GW used.
chargingID	M	0x82	INTEGER (0..4294967295)	Bearer context identifier used to identify this MBMS bearer context in different records created by Evolved Packet System core network elements.
listofDownstream Nodes	M	0xA3	SEQUENCE OF GSNAddress	List of SGSN/MME addresses used during this record. equivalent to the list of downstream nodes defined in TS 23.246 [207].

Field	Category	Tag	Data Type	Description
accessPointNameNI	O_M	0x84	IA5String (SIZE(1..63))	The logical name of the connected access point to the BM-SC (network identifier part of APN).
pdpPDNType	O_M	0x85	OCTET STRING (SIZE(2))	This field indicates PDN type (i.e IPv4 or IPv6).
servedPDPPDNAddress	O_C	0xA6	PDPAddress	Indicates the IP Multicast address used for the MBMS bearer context. (i.e IPv4 or IPv6).
listOfTrafficVolumes	O_M	0xA7	SEQUENCE OF ChangeOfMBMSCondition	A list of changes in charging conditions for this MBMS bearer context, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. It shall include the required bearer capabilities (QoS Negotiated).
recordOpeningTime	M	0x88	OCTET STRING (SIZE(9))	Time stamp when MBMS bearer context is activated in this MBMS GW or record opening time on subsequent partial records.
duration	M	0x89	INTEGER	Duration of this record in the MBMS GW.
causeForRecClosing	M	0x8A	INTEGER	The reason for the release of record from this MBMS GW.
diagnostics	O_M	0xAB	Diagnostics	A more detailed reason for the release of the connection.
recordSequenceNumber	C	0x8C	INTEGER	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x8D	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xAE	SET OF ManagementExtension	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Field	Category	Tag	Data Type	Description
localSequenceNumber	O_M	0x8F	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
mbmsInformation	O_M	0xB0	MBMSInformation	MBMS related information related to MBMS bearer context being charged, defined in TS 32.273 [32].
commonTeid	O_C	0x91	OCTET STRING (SIZE(4))	Common Tunnel Endpoint Identifier of MBMS GW for user plane, defined in TS23.246 [207].
iPMulticastSourceAddress	O_C	0xB2	PDPAddress	IP addresses identifying the SSM channel used for user plane distribution on the backbone network defined in TS 23.246 [207].

3.13 IP CAN Bearer Charging Data in S-GW (SGW-CDR)

If FBC is disabled and the collection of CDR data is enabled then the S-GW data specified in the following table shall be available for each IP CAN bearer.

Table 3-13 SGW-CDR

Field	Category	Tag	Data Type	Description
sGWRecord	M	0xBF4E	SET	S-GW IP CAN bearer record.
recordType	M	0x80	INTEGER	S-GW IP CAN bearer record.
networkInitiation	O_C	0x81	BOOLEAN	A flag that is present if this is a network initiated IP CAN bearer.
servedIMSI	C	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party, if available.
sGWAddress	M	0xA4	GSNAddress	The control plane IP address of the S-GW used.
chargingID	M	0x85	INTEGER (0..4294967295)	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs.
servingNodeAddress	O_C	0xA6	SEQUENCE OF GSNAddress	List of serving node control plane IP addresses (e.g. SGSN, MME) used during this record.

Field	Category	Tag	Data Type	Description
accessPointNameNI	O_M	0x87	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpPDNType	O_M	0x88	OCTET STRING (SIZE(2))	This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).
servedPDPPDNAddress	O_C	0xA9	PDPAddress	IP address allocated for the PDP context / PDN connection, if available, i.e. Ipv4 when PDN Type is IPv4 or Ipv6 when PDN Type is IPv6 or IPv4v6.
dynamicAddressFlag	O_C	0x8B	BOOLEAN	Indicates whether served PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity. This field is missing if address is static.
listOfTrafficVolumes	O_M	0xAC	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this QCI/ARP pair, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed.
recordOpeningTime	M	0x8D	OCTET STRING (SIZE(9))	Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.
duration	M	0x8E	INTEGER	Duration of this record in the S-GW.
causeForRecClosing	M	0x8F	INTEGER	The reason for the release of record from this S-GW.
diagnostics	O_M	0xB0	Diagnostics	A more detailed reason for the release of the connection.
recordSequenceNumber	C	0x91	INTEGER	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x92	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	O_C	0xB3	ContentInfo	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.

Field	Category	Tag	Data Type	Description
localSequenceNumber	O_M	0x94	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x95	ENUMERATED	An index indicating how the APN was selected.
servedMSISDN	O_M	0x96	OCTET STRING (SIZE (1..9))	The primary MSISDN of the subscriber.
chargingCharacteristics	M	0x97	OCTET STRING (SIZE(2))	The Charging Characteristics applied to the IP CAN bearer.
chChSelectionMode	O_M	0x98	ENUMERATED	Holds information about how Charging Characteristics were selected.
iMSsignalingContext	O_C	0x99	NULL	Included if the IM-CN Subsystem Signalling Flag is set, see PDP context is used for IMS signalling.
servingNodePLMNIdentifier	O_C	0x9B	OCTET STRING (SIZE (3))	Serving node PLMN Identifier (MCC and MNC) used during this record, if available.
servedIMEISV	O_C	0x9D	TBCD-STRING (SIZE (8))	IMEISV of the ME, if available. It is used for identifying the user in case Served IMSI is not present during emergency bearer service.
rATType	O_C	0x9E	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station as defined in TS 29.060 [204], if available.
mSTimeZone	O_C	0x9F1F	OCTET STRING (SIZE (2))	This field contains the MS Time Zone the MS is currently located as defined in TS 29.060 [203], if available.

Field	Category	Tag	Data Type	Description
userLocationInformation	O_C	0x9F20	OCTET STRING	The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification. For GTPv0 and GTPv1(29.060): This field includes two parts: Geographic Location Type and Geographic Location. Geographic Location could alternatively be CGI (PLMN+LAC+CI) or SAI (PLMN+LAC+SAC). Geographic Location Type = 0 means CGI will be included; Geographic Location Type = 1 means SAI will be included. In case of 2G RAN, CGI is used. In case of 3G RAN, SAI is used. Note: For GTPv0 and GTPv1, only value part is filled into CDR field. Type and Length part defined in 29.060 are not presented in CDR. For GTPv2(29.274): There is three access method for GTPv2: In case of 4G, TAI and ECGI are used. In case of 3G, SAI and RAI are used. In case of 2G, CGI and RAI are used. Note: For GTPv2, only value part is filled into CDR field. Type, Length and Instance part defined in 29.274 are not presented in CDR.
cAMELChargingInformation	O_C	0x9F21	OCTET STRING	Set of CAMEL information related to IP CAN bearer, if available.
sGWChange	O_C	0x9F22	BOOLEAN	Present if this is first record after S-GW change.
servingNodeType	O_C	0xBF23	SEQUENCE OF ENUMERATED	List of serving node types in control plane. The serving node types listed here map to the serving node addresses listed in the field **Serving node Address** in sequence.
pGWAddressUsed	O_C	0xBF24	GSNAddress	This field is the serving P-GW IP Address for the Control Plane. If both an Ipv4 and an Ipv6 address of the P-GW is available, the P-GW shall include the Ipv4 address in the CDR.

Field	Category	Tag	Data Type	Description
pGWPLMNIdentifier	O_C	0x9F25	OCTET STRING (SIZE (3))	This field is the P-GW PLMN Identifier (Mobile Country Code and Mobile Network Code). The MCC and MNC are coded as described for **User Location Info** in TS 29.274 [91].
startTime	O_C	0x9F26	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session starts at the S-GW/P-GW, available in the CDR for the first bearer in an IP-CAN session.
stopTime	O_C	0x9F27	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW, available in the CDR for the last bearer in an IP-CAN session.
pDNConnectionChargingID	O_M	0x9F28	INTEGER (0..4294967295)	This field holds the Charging Id of the EPS default bearer in GTP case, or the unique Charging Id of the IP-CAN session in PMIP case: it is used to identify different records belonging to same PDN connection.
iMSIunauthenticatedFlag	O_C	0x9F29	NULL	This field indicates that provided **Served IMSI** is not authenticated, and relates to an emergency bearer established with IMSI as identifier (refer to TS 23.060 [202] and TS 29.274 [223]). This field is missing if IMSI is authenticated, or if IMSI is not provided as identifier. (for protocol revolution)
userCSGInformation	O_C	0xBF2A	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies. (for protocol revolution)
servedPDPPDNAddressExt	O_C	0xBF2B	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDN type is IPv4v6.
lowPriorityIndicator	O_C	0x9F2C	NULL	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.

Field	Category	Tag	Data Type	Description
dynamicAddressFlagExt	O_C	0x9F2F	BOOLEAN	Indicates whether served IPv4 PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity with PDP/PDN type IPv4v6. This field is missing if IPv4 address is static.
sGWiPv6Address	O_C	0xBF30	GSNAddress	The control plane IPv6 address, in case of IPv4v6 dual stack, of the S-GW.
cPCIoTEPSOptimisationIndicator	O_C	0x9F3B	BOOLEAN	This field indicates whether CP CIoT EPS Optimisation is used (S1-U direct between SGW and eNB, or S11-U via MME) is used for data transfer with the UE, if available.
uNIPDUCPOnlyFlag	O_C	0x9F3C	BOOLEAN	This field indicates whether this PDN connection is applied with "Control Plane Only Flag" for UNI PDU transfer, i.e. using only S11-U in Control Plane CIoT EPS optimisation.
servingPLMNRateControl	O_C	0xBF3D	ServingPLMNRateControl	This field holds the Serving PLMN Rate Control used by the MME during this record.
pDPPDNTypeExtension	O_M	0x9F3E	INTEGER	This field defines the PDN type as per TS 29.061 [216] for Non-IP PDN Type.
mOExceptionDataCounter	O_C	0xBF3F	MOExceptionDataCounter	MO exception data counter.
listOfRANSecondaryRATUsageReports	O_C	0xBF40	SEQUENCE OF RANSecondaryRATUsageReport	This list applicable in SGW-CDR, includes one or more containers reported from the RAN for a secondary RAT.

3.14 BC IP CAN Bearer Charging Data in P-GW (PGW-CDR)

If FBC is enabled and the collection of CDR data is enabled then the P-GW data specified in the following table shall be available for each IP CAN bearer.

Table 3-14 PGW-CDR

Field	Category	Tag	Data Type	Description
pGWRecord	M	0xBF4F	SET	P-GW IP CAN bearer record.
recordType	M	0x80	INTEGER	P-GW IP CAN bearer record.
servedIMSI	C	0x83	TBCD-STRING (SIZE (3..8))	IMSI of the served party, if available.
pGWAddress	M	0xA4	GSNAddress	The control plane IP address of the P-GW used.
chargingID	M	0x85	INTEGER (0..4294967295)	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs.
servingNodeAddress	M	0xA6	SEQUENCE OF GSNAddress	List of SGSN/S-GW control plane IP addresses used during this record.
accessPointNameNI	O_M	0x87	IA5String (SIZE(1..63))	The logical name of the connected access point to the external packet data network (network identifier part of APN).
pdpPDNType	O_M	0x88	OCTET STRING (SIZE(2))	PDP type, i.e. IP, PPP, or IHOSS:OSP.
servedPDPPDNAddress	O_C	0xA9	PDPAddress	IP address allocated for the PDP context / PDN connection, i.e. Ipv4 when PDP/PDN Type is Ipv4 or Ipv6 when PDP/PDN Type is Ipv6 or Ipv4v6. This parameter shall be present except when both the PDP type is PPP and dynamic IP CAN bearer address assignment is used.
dynamicAddressFlag	O_C	0x8B	BOOLEAN	Indicates whether served IP CAN bearer address is dynamic, which is allocated during IP CAN bearer activation. This field is missing if address is static.
listOfTrafficVolumes	O_M	0xAC	SEQUENCE OF ChangeOfCharCondition	A list of changes in charging conditions for this IP CAN bearer, each change is time stamped. Charging conditions are used to categorize traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed.
recordOpeningTime	M	0x8D	OCTET STRING (SIZE(9))	Time stamp when IP CAN bearer is activated in this P-GW or record opening time on subsequent partial records.
duration	M	0x8E	INTEGER	Duration of this record in the P-GW.

Field	Category	Tag	Data Type	Description
causeForRecClosing	M	0x8F	INTEGER	The reason for the release of record from this P-GW.
diagnostics	O_M	0xB0	Diagnostics	A more detailed reason for the release of the connection.
recordSequenceNumber	C	0x91	INTEGER	Partial record sequence number, only present in case of partial records.
nodeID	O_M	0x92	IA5String (SIZE(1..20))	Name of the recording entity.
recordExtensions	OC	0xB3	ContentInfo	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
localSequenceNumber	O_M	0x94	INTEGER (0..4294967295)	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
apnSelectionMode	O_M	0x95	ENUMERATED	An index indicating how the APN was selected.
servedMSISDN	O_M	0x96	OCTET STRING (SIZE (1..9))	This field contains the MSISDN of the served party. In case of multi-numbering the MSISDN stored in a PGW CDR will be the primary MSISDN of the calling party.
chargingCharacteristics	M	0x97	OCTET STRING (SIZE(2))	The Charging Characteristics applied to the IP CAN bearer.
chChSelectionMode	O_M	0x98	ENUMERATED	Holds information about how Charging Characteristics were selected.
iMSsignalingContext	O_C	0x99	NULL	Included if the IP CAN bearer IM-CN Subsystem Signalling Flag is set, see [201] is used for IMS character.
externalChargingID	O_C	0x9A	OCTET STRING	A Charging Identifier received from a non-EPC, external network entity e.g ICID.
servingNodePLMNIdentifier	O_M	0x9B	OCTET STRING (SIZE (3))	Serving node PLMN Identifier (MCC and MNC) used during this record.
pSFurnishChargingInformation	O_C	0xBC	PSFurnishChargingInformation	Online charging session specific information.
servedIMEISV	O_C	0x9D	TBCD-STRING (SIZE (8))	IMEISV of the ME, if available. It is used for identifying the user in case Served IMSI is not present during emergency bearer service.

Field	Category	Tag	Data Type	Description
rATType	O_C	0x9E	INTEGER (0..255)	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station as defined in TS 29.060 [204], if available.
mSTimeZone	O_C	0x9F1F	OCTET STRING (SIZE (2))	This field contains the MS Time Zone the MS is currently located as defined in TS 29.060 [203], if available.
userLocationInformation	O_C	0x9F20	OCTET STRING	The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification. For GTPv0 and GTPv1(29.060): This field includes two parts: Geographic Location Type and Geographic Location. Geographic Location could alternatively be CGI (PLMN+LAC+CI) or SAI (PLMN+LAC+SAC). Geographic Location Type = 0 means CGI will be included; Geographic Location Type = 1 means SAI will be included. In case of 2G RAN, CGI is used. In case of 3G RAN, SAI is used. Note: For GTPv0 and GTPv1, only value part is filled into CDR field. Type and Length part defined in 29.060 are not presented in CDR. For GTPv2(29.274): There is three access method for GTPv2: In case of 4G, TAI and ECGI are used. In case of 3G, SAI and RAI are used. In case of 2G, CGI and RAI are used. Note: For GTPv2, only value part is filled into CDR field. Type, Length and Instance part defined in 29.274 are not presented in CDR.
cAMELChargingInformation	O_C	0x9F21	OCTET STRING	Set of CAMEL information related to IP CAN bearer.

Field	Category	Tag	Data Type	Description
listOfServiceData	O_M	0xBF22	SEQUENCE OF ChangeOfServiceConditions	A list of changes in charging conditions for all service data flows within this IP CAN bearer categorized per rating group or per combination of the rating group and service id. Each change is time stamped. Charging conditions are used to categorize traffic volumes, elapsed time and number of events, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are also listed. Online charging information (PS Furnish Charging Information) may be added per each service data flow container in case it is sent by the OCS. Failure-Handling: This field shall be present in case P-GW triggers the Failure-Handling procedure. It shall indicate the Failure Handling scenario and the instant the Failure Action is triggered (see annex B). Scenarios: Continue/New Session; Continue/Ongoing Session; Retry&Terminate/Ongoing Session; Terminate/Ongoing Session.
servingNodeType	O_C	0xBF23	SEQUENCE OF ENUMERATED	List of serving node types in control plane. The serving node types listed here map to the serving node addresses listed in the field **Serving node Address** in sequence.
servedMNNAI	O_C	0xBF24	SubscriptionID	Mobile Node Identifier in NAI format (based on IMSI), if available.
pGWPLMNIdentifier	O_C	0x9F25	OCTET STRING (SIZE (3))	This field is the P-GW PLMN Identifier (Mobile Country Code and Mobile Network Code). The MCC and MNC are coded as described for **User Location Info** in TS 29.274 [91].
startTime	O_C	0x9F26	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session starts at the S-GW/P-GW, available in the CDR for the first bearer in an IP-CAN session.
stopTime	O_C	0x9F27	OCTET STRING (SIZE(9))	This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW, available in the CDR for the last bearer in an IP-CAN session.

Field	Category	Tag	Data Type	Description
served3gpp2MEID	O_C	0x9F28	OCTET STRING	This field contains the Mobile Equipment Identity of the user's terminal in 3GPP2 access, and the content is defined in 3GPP TS 29.272 [93].
pDNConnectionChargingID	O_M	0x9F29	INTEGER (0..4294967295)	This field holds the Charging Id of the EPS default bearer in GTP case, or the unique Charging Id of the IP-CAN session in PMIP case: it is used to identify different records belonging to same PDN connection.
iMSIunauthenticatedFlag	O_C	0x9F2A	NULL	This field indicates the provided served IMSI is not authenticated (emergency bearer service situation).
userCSGInformation	O_C	0xBF2B	UserCSGInformation	This field contains the **User CSG Information** status of the user accessing a CSG cell: it comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies.
threeGPP2UserLocationInformation	O_C	0x9F2C	OCTET STRING	This field contains the User Location Information of the MS as defined in TS 29.212 [71] for 3GPP2 access, if available.
servedPDPPDNAddressExt	O_C	0xBF2D	PDPAddress	This field holds IPv4 address of the served IMSI, if available, when PDP/PDN type is IPv4v6.
lowPriorityIndicator	O_C	0x9F2E	NULL	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.
dynamicAddressFlagExt	O_C	0x9F2F	BOOLEAN	Indicates whether served IPv4 PDP/PDN address is dynamic, which is allocated during IP CAN bearer activation, initial attach (E-UTRAN or over S2x) and UE requested PDN connectivity with PDP/PDN type IPv4v6. This field is missing if IPv4 address is static.
pGWiPv6AddressUsed	O_C	0xBF32	GSNAddress	This field is the P-GW IPv6 Address used for the Control Plane, when both IPv4 and IPv6 addresses of the P-GW are available.

Field	Category	Tag	Data Type	Description
sGiPtPTunnelling Method	O_C	0x9F40	ENUMERATED	This field indicates whether SGi PtP tunnelling method based on UDP/IP or other methods are used for this PDN connection when a non-IP PDN type.
uNIPDUCPOnlyFlag	O_C	0x9F41	BOOLEAN	This field indicates whether this PDN connection is applied with "Control Plane Only Flag" for UNI PDU transfer, i.e. using only S11-U in Control Plane CIoT EPS optimisation.
servingPLMNRate Control	O_C	0xBF42	ServingPLMNRateControl	This field holds the Serving PLMN Rate Control used by the MME during this record
aPNRateControl	O_C	0xBF43	APNRateControl	This field holds the APN Rate Controls enforced in the PGW during this record.
pDPPDNTypeExtension	O_M	0x9F44	INTEGER	This field defines the PDN type as per TS 29.061 [216] for Non-IP PDN Type.
mOExceptionData Counter	O_C	0xBF45	MOExceptionDataCounter	MO exception data counter.
listOfRANSecondaryRATUsageReports	O_C	0xBF49	SEQUENCE OF RANSecondaryRATUsageReport	This list applicable in PGW-CDR, includes one or more containers reported from the RAN for a secondary RAT.

4 Description of Record Fields

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

4.1 threeGPP2 User Location Information

This field contains the User Location Information as described in TS 29.060 [75]. The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification procedure as specified in TS 23.060 [74].

This field contains the User Location Information as described in

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

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

4.2 Access Point Name Network/Operator Identifier

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

Following TS 23.003 [7003 [68], the APN field is specified in the CDR by two variable strings. The first is the APN Network Identifier (NI portion) and the second is the APN Operator Identifier (OI portion). The APN NI may contain one or more label as described in TS 23.003 [7].003 [68]. The APN OI is composed of three labels. The first and second labels together shall uniquely identify the PLMN operator (e.g. mnc<operator mnc>.mcc<operator mcc>.gprs).

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

See 3GPP TS 23.003 [7003 [68] and 3GPP TS 23.060 [2060 [74] for more information about APN format and access point decision rules.

4.3 APN Rate Control

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

4.4 APN Selection Mode

This field indicates how the SGSN/MME selected the APN to be used. The values and their meaning are as specified in 3GPP TS 29.060 [8060 [75] clause "7.9 Information elements."

4.5 CAMEL Charging Information

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

4.6 CAMEL Information

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

- CAMEL Access Point Name NI (S-CDR)

  This field contains the network identifier part of APN before modification by the CSE.
- CAMEL Access Point Name OI (S-CDR)

  This field contains the operator identifier part of APN before modification by the CSE.
- CAMEL Calling Party Number (S-SMO-CDR, S-SMT-CDR)

  This field contains the Calling Party Number modified by the CAMEL service.
- CAMEL Destination Subscriber Number (S-SMO-CDR)

  This field contains the short message Destination Number modified by the CAMEL service.
- CAMEL SMSC Address (S-SMO-CDR)

  This field contains the SMSC address modified by the CAMEL service.
- SCF address (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR)

  This field identifies the CAMEL server serving the subscriber. Address is defined in HLR as part of CAMEL subscription information.
- Service key (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR)

  This field identifies the CAMEL service logic applied. Service key is defined in HLR as part of CAMEL subscription information.
- Default Transaction/SMS Handling (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR)

  This field indicates whether or not a CAMEL encountered default GPRS- or SMS-handling. This field shall be present only if default call handling has been applied. Parameter is defined in HLR as part of CAMEL subscription information.
- Free Format Data (S-CDR, M-CDR, S-SMO-CDR, S-SMT-CDR)

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

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

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

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

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

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

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

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

  - **Basic** means that CAMEL feature is invoked during the PDP context activation phase only (e.g. to modify APN_NI/APN_OI).
  - **Call duration supervision** means that PDP context duration or volume supervision is applied in the gprsSSF of the VPLMN (Apply Charging message is received from the gsmSCF).

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

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

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

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

4.7 Cause for Record Closing

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

- normal release: IP-CAN bearer release or detach
- data volume limit
- time (duration) limit
- maximum number of changes in charging conditions
- For SGSN: intra SGSN intersystem change (change of radio interface from GSM to UMTS or vice versa)
- For P-GW and S-GW: Radio Access Technology (RAT) change

- abnormal termination (IP-CAN bearer or MM context)
- For SGSN: SGSN change
- For S-GW: S-GW change
- Timezone change
- SGSN or S-GW PLMN change
- unauthorized network originating a location service request
- unauthorized client requesting a location service
- position method failure at a location service execution
- unknown or unreachable LCS client at a location service request
- management intervention (request due to O&M reasons)

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

4.8 Cell Identifier

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

4.9 Charging Characteristics

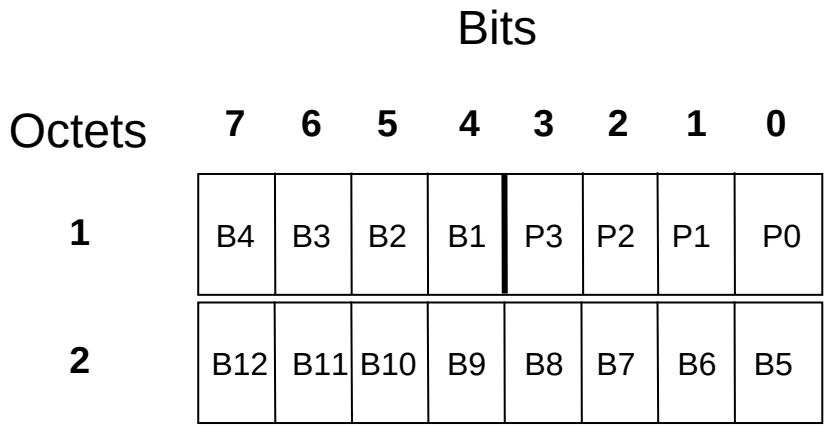
The Charging Characteristics field allows the operator to apply different kind of charging methods in the CDRs.

A subscriber may have Charging Characteristics assigned to his subscription. These characteristics can be supplied by the HLR/HSS to the SGSN/MME as part of the subscription information, and, upon activation of an IP-CAN bearer, the SGSN/MME forwards the charging characteristics to the GGSN/S-GW according to the rules specified in Annex A of TS 32.251 [11]. This information can be used by the PCNs to activate charging generation and e.g. control the closure of the CDR or the traffic volume containers (see clause 4.29) and applied charging characteristics is included in CDRs transmitted to nodes handling the CDRs via the Ga reference point. It can also be used in nodes handling the CDRs (e.g., the CGF or the billing system) to influence the CDR processing priority and routing. These functions are accomplished by specifying the charging characteristics as sets of charging profiles and the expected 60haracte associated with each profile.

The interpretations of the profiles and their associated behaviours can be different for each PLMN operator and are not subject to 60haracterized60n. In the present document only the charging characteristic formats and selection modes are specified.

The functional requirements for the Charging Characteristics as well as the profile and 60haracte bits are further defined in normative Annex A of TS 32.251 [11], including the definitions of the trigger profiles associated with each CDR type.

The format of charging characteristics field is depicted in Figure 4. Px (x =0..3) refers to the Charging Characteristics Profile index. Bits classified with a **B** may be used by the operator for non-standardized 60haracte (see Annex A of TS 32.251 [11]).



4.10 Charging Characteristics Selection Mode

This field indicates the charging characteristic type that the GSNs applied to the CDR.

- In the SGSN the allowed values are:
  - Home default
  - Visiting default
  - Roaming default
  - APN specific
  - Subscription specific
- In the S-GW/P-GW the allowed values are:
  - Home default
  - Visiting default
  - Roaming default
  - SGSN supplied (this value is used S-GW uses MME supplied)

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

4.11 Charging ID

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

Different P-GWs allocate the charging ID independently of each other and may allocate the same numbers.

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

4.12 CP CIoT EPS Optimisation Indicator

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

4.13 Destination Number

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

4.14 Diagnostics

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

4.15 Duration

This field contains the relevant duration in seconds for IP-CAN bearer (S-CDR, SGW-CDR, PGW-CDR, and attachment (M-CDR).

It is the duration from Record Opening Time to record closure. For partial records this is the duration of the individual partial record and not the cumulative duration.

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

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

- A duration of zero seconds shall be accepted providing that the transferred data volume is greater than zero.
- 2The same method of truncation/rounding shall be applied to both single and partial records.

4.16 Dynamic Address Flag

This field indicates that PDP address has been dynamically allocated for that particular PDP context. This field is missing if address is static i.e. part of PDP context subscription. Dynamic address allocation might be relevant for charging e.g. the duration of PDP context as one resource offered and possible owned by network operator.

4.17 Dynamic Address Flag Extension

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

4.18 Event Time Stamps

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

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

4.19 External Charging Identifier

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

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

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

4.20 GGSN Address Used

This field is the current serving GGSN/P-GW IP Address for the Control Plane. If both an Ipv4 and an Ipv6 address of the GGSN/P-GW are available, the SGSN shall include the Ipv4 address in the CDR.

4.21 IMSI Unauthenticated Flag

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

4.22 IMS Signalling Context

Indicates if the IP-CAN bearer is used for IMS 63haracter. It is only present if the IP-CAN bearer is an IMS 63haracter bearer. A IP-CAN bearer for IMS 63haracter is determined via the **IM CN Subsystem Signalling Flag** conveyed via the **Activate PDP context request** message from the MS to the network (refer to TS 24.008 [64]).

4.23 LCS Cause

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

4.24 LCS Client Identity

This field contains further information on the LCS Client identity:

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

4.25 LCS Client Type

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

4.26 LCS Priority

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

4.27 LCS QoS

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

4.28 List of Service Data

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

- **Rating Group** is the identifier of rating group. This field is mandatory. The parameter corresponds to the Charging Key as specified in TS 23.203 [203].
- **Charging Rule Base Name** is the reference to group of PCC rules predefined at the PCEF. This field is included if any of the PCC rules, which usage is reported within this service data container, was activated by using the Charging Rule Base Name as specified in TS 29.212 [220]. In case multiple Charging Rule Base Names activate PCC rules, which usage is reported within this service data container, the P-GW shall include only one occurrence to the service data container.
- **Result Code** contains the result code after the interconnection with the OCS. This field may be added to the service data container if online and offline charging are both used for same rating group. The result code in service data container is the value of the

Result-Code AVP received within last CCA message in corresponding MSCC AVP to this service data container.

- **Local Sequence Number** is a service data container sequence number. It starts from 1 and is increased by 1 for each service date container generated within the lifetime of this IP-CAN bearer.
- **Time of First Usage** is the time stamp for the first IP packet to be transmitted and mapped to the current service data container. For envelope reporting controlled by the Time Quota Mechanism, this indicates the time stamp for the first IP packet to be transmitted that causes an envelope to be opened – see TS 32.299 [50].
- **Time of Last Usage** is the time stamp for the last IP packet to be transmitted and mapped to the current service data container. For envelope reporting, controlled by the Time Quota Mechanism, this indicates the time stamp for an envelope to be closed – see TS 32.299 [50] for conditions for envelope closure.
- **Time Usage** contains the effective used time within the service data container recording interval.
- **Service Condition Change** defines the reason for closing the service data container (see TS 32.251 [11]), such as tariff time change, IP-CAN bearer modification(e.g. QoS change, S-GW change, user location change), service usage thresholds, service idled out, termination or failure handling procedure. When one of the "CGI/SAI, ECGI or TAI or RAI Change" are reported as user location change, the dedicated value in service Condition Change is set instead of the generic **user location change** value. This field is specified as bitmask for support of multiple change trigger (e.g. S-GW and QoS change). This field is derived from Change-Condition AVP at Service-Data-Container AVP level defined in TS 32.299 [40] when received on Rf. Each value is mapped to the corresponding value in **ServiceConditionChange** field. When simultaneous change triggers are met, multiple Change-Condition values are set in field bitmask. When no Change-Condition AVP is provided, the **recordClosure** value is set for the service data container. For envelope reporting, the Service Condition Change value shall always take the value **envelopeClosure**. The mechanism for creating the envelope is identified within the Time Quota Mechanism field.
- **Qos Information** in IP CAN bearer specific service data container contains the negotiated QoS applied for the IP CAN bearer. QoS Information in service specific service data containers contains the QoS applied for the service. This is included in the first service data container. In following container QoS information is present if previous change condition is **QoS change**. The P-GW shall include only one QoS Information occurrence to one service data container.
- **Serving Node Address** contains the valid serving node (e.g. SGSN/S-GW) control plane IP address during the service data container recording interval.
- **Data Volume Uplink** and **Downlink** includes the number of octets transmitted during the service data container recording interval in the uplink and/or downlink direction, respectively. In case of GTP based 65haracter, the amount of data counted in P-GW shall be based on the payload of the GTP-U protocol. In case of PMIP based protocol, the amount of data counted in P-GW shall be based on the payload of the GRE tunnel. In case of DSMIPv6 based protocol, the amount of data counted in P-GW shall be based on the payload of the 65haracter layer. As minimum 65haracte, the full payload shall be included.
- **Report Time** is a time stamp, which defines the moment when the service data container is closed.
- **Service Identifier** is an identifier for a service. The service identifier may designate an end user service, a part of an end user service or an arbitrarily formed group thereof. This field is only included if reporting is per combination of the rating group and service id.

- **PS Furnish Charging Information** includes charging information per rating group in case it is sent by OCS.
- **User location information** contains the user location (e.g. CGI/SAI, ECGI/TAI or RAI) where the UE was located during the service data container recording interval. This is included in the service data container only if previous container's change condition is **user location change** or one of the "CGI/SAI, ECGI or TAI or RAI Change." Note the user location information in PGW-CDR main level contains the location where the UE was when PGW-CDR was opened.
- **threeGPP2 User Location Information** contains the 3GPP2 user location (i.e. 3GPP2-BSID: Cell-Id, SID, NID) where the UE was located during the service data container recording interval. This is included in the service data container only if previous container's change condition is "user location change." Note the **3GPP2 user location information** in PGW-CDR main level contains the location where the UE was when PGW-CDR was opened.
- **AF-Record-Information** includes the **AF Charging Identifier** (ICID for IMS) and associated flow identifiers generated by the AF and received by the P-GW over Gx interfaces as defined in TS 29.212 [220]. In case usage of PCC rules, which usage is reported within the container, has different AF-Record-Information then the P-GW shall include only one occurrence to the service data container.
- **Event Based Charging Information** includes the number of events and associated 66haracteri (each event is timestamped) during the service data container recording interval.
- **Time Quota Mechanism** contains two further subfields and is included if envelope reporting is required:
  - **Time Quota Type** identifies the mechanism by which time based usage should be reported – as defined in TS 32.299 [50].
  - **Base Time Interval** identifies the length of the base time interval, for controlling the reporting of time based usage, in seconds.
- **Service Specific Info** holds service specific data for a pre-defined PCC rule that is used for enhanced packet filtering.
- **Serving PLMN Rate Control** This field contains the Serving PLMN Rate Control applied by MME during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is included in the service data container only if previous container's change condition is "Serving PLMN Rate Control change ". Note the Serving PLMN Rate Control field in PGW-CDR main level contains the Serving PLMN Rate Control when PGW-CDR was opened.
- **APN Rate Control** This field contains the APN Rate Control applied by PGW during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is included in the service data container only if previous container's change condition is " APN Rate Control change ". Note the APN Rate Control field in PGW-CDR main level contains the APN Rate Control when PGW-CDR was opened.

4.29 List of Traffic Data Volumes

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

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

- **Data Volume Uplink** includes the number of octets transmitted during the use of the packet data services in the uplink direction. In MBMS charging, this field is normally to

be set to zero, because MBMS charging is based on the volume of the downlink data. The counting of uplink data volumes is optional. In S-CDR this field is not present when the SGSN has successfully established Direct Tunnel between the RNC and the GGSN.

- **Data Volume Downlink** includes the number of octets transmitted during the use of the packet data services in the downlink direction. In S-CDR this field is not present when the SGSN has successfully established Direct Tunnel between the RNC and the GGSN.
- **Change Condition** defines the reason for closing the container (see TS 32.251 [11]), such as tariff time change, QoS change or closing of the CDR.
- **Change Time** is a time stamp, which defines the moment when the volume container is closed or the CDR is closed. All the active IP-CAN bearers do not need to have exactly the same time stamp e.g. due to same tariff time change (variance of the time stamps is implementation and traffic load dependent, and is out of the scope of 67haracterized67n).
- **User Location Information** contains the location (e.g. CGI/SAI, ECGI/TAI or RAI) where the UE is located and used during the transfer of the data volume captured by the container (applicable only to the SGW-CDR). This is included in the Traffic data container only if previous container's change condition is **user location change**. Note the user location information in SGW-CDR main level contains the location where the UE was when PGW-CDR was opened.
- **EPC QoS Information** In case of IP-CAN bearer specific container this contains authorized QoS for the IP-CAN bearer. First container for each QCI/ARP pair includes this field. In following containers this field is present if previous change condition is **QoS change**. This field is applicable only in SGW-CDR and PGW-CDR.
- **CP CIoT EPS optimisation indicator** This field contains the indication on whether Control Plane CIoT EPS optimisation is used for the transfer of the data volume captured by the container. This is included in the Traffic data container only if previous container's change condition is "change in user plane to UE". Note the CP CIoT EPS Optimisation indicator field in SGW-CDR main level contains the CP CIoT EPS optimisation indicator value when SGW-CDR was opened.
- **Serving PLMN Rate Control** This field contains the Serving PLMN Rate Control applied by MME during the transfer of the data volume captured by the container (applicable only to the SGW-CDR). This is included in the Traffic data container only if previous container's change condition is " Serving PLMN Rate Control change ". Note the Serving PLMN Rate Control field in SGW-CDR main level contains the Serving PLMN Rate Control when SGW-CDR was opened.

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

Table 4-1 illustrates an examplefor S-CDR but same principles are applicable also for SGW-CDR. There are five containers (sets of volume counts) caused by one QoS change, one location change, one tariff time change and one Direct Tunnel establishment (direct tunnel change applicable in S-CDR only). When CDR is opened the subscriber is in CGI1.

Table 4-1 Example list of traffic data volumes

QoS Requested = QoS1	QoS Requested = QoS2 (if requested by the MS) QoS Negotiated = QoS2	Data Volume Uplink = 10 Data Volume Downlink = 3

QoS Negotiated = QoS1 Data Volume Uplink = 1 Data Volume Downlink = 2 Change Condition = QoS change Time Stamp = TIME1	 Data Volume Uplink = 5 Data Volume Downlink = 6 Change Condition = Tariff change Time Stamp = TIME2	 Change Condition = CGI/SAI Change Time Stamp = TIME3

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

First container includes initial QoS values and corresponding volume counts. Second container includes new QoS values and corresponding volume counts before tariff time change. Third container includes the indication of location change and corresponding volume counts before the location change and after the tariff time change. Fourth container includes volume counts after the location change and contains the indication of Direct Tunnel establishment. Last container includes no volume count as it refers to Direct Tunnel establishment. The total volume counts can be 68haracte as shown in Table 4-2 (tariff1 is used before and tariff2 after the tariff time change):

Table 4-2 Itemized list of total volume count corresponding to Table 4-1

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

Information Element	Volume	Container
Direct Tunnel	-, -	5

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

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

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

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

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

4.30 Local Record Sequence Number

This field includes a unique record number created by this node. The number is allocated sequentially for each partial CDR (or whole CDR) including all CDR types. The number is unique within one node, which is identified either by field Node ID or by record-dependent node address (SGSN address, GGSN address, Recording Entity).

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

4.31 Location Estimate

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

4.32 Location Method

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

4.33 Location Type

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

4.34 Measurement Duration

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

4.35 Message reference

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

4.36 MLC Number

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

4.37 MS Network Capability

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

4.38 MS Time Zone

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

4.39 Network Initiated PDP Context

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

4.40 Node ID

This field contains an optional, operator configurable, identifier string for the node that had generated the CDR.

The Node ID may or may not be the DNS host name of the node.

4.41 Notification to MS user

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

4.42 P-GW Address Used

These field is the serving P-GW IP Address for the Control Plane. If both an Ipv4 and an IPv6 address of the P-GW is available, the P-GW shall include the IPv4 address in the CDR.

4.43 P-GW PLMN Identifier

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

The MCC and MNC are coded as described for **User Location Info** in TS 29.274 [91].

4.44 PDN Connection ID

This field defines the PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection. This field includes Charging Id of first IP-CAN bearer activated within the PDN connection. Together with P-GW address this uniquely identifies the PDN connection.

4.45 PDP Type

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

4.46 PDP/PDN Type

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

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

4.47 PDP/PDN Type Extension

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

4.48 Positioning Data

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

4.49 Privacy Override

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

4.50 PS Furnish Charging Information

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

- PS Free Format Data

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

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

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

- PS FFD Append Indicator

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

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

4.51 QoS Requested/QoS Negotiated

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

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

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

4.52 RAT Type

Holds the value of RAT Type, as provided to S-GW and P-GW, described in TS 29.060 [75]. The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification procedure as specified in TS 23.060 [74].

4.53 Record Extensions

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

4.54 Record Opening Time

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

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

4.55 Record Sequence Number

This field contains a running sequence number employed to link the partial records generated in the SGSN/SGW/PGW for a particular MM context or IP-CAN bearer (73haracterized with the same Charging ID and PGW address pair). For M-CDR or S-CDR the sequence number always restarts from one (1) after an inter-SGSN routing area update, see field **SGSN change**. The Record Sequence Number is missing if the record is the only one produced in the SGSN/SGW/PGW (e.g. inter-SGSN routing area update can result to two M-CDR or two S-CDRs without sequence number and field **SGSN change** present in the second record).

4.56 Low Priority Indicator

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

4.57 MO Exception Data Counter

This field contains the counter value and timestamp.

4.58 Record Type

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

4.59 Recording Entity Number

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

4.60 RNC Unsent Downlink Volume

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

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

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

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

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

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

Editor's note: The location information at S-/P-GW is ffs.

4.62 SGW Address Used

These field is the serving S-GW IP Address for the Control Plane. If both an Ipv4 and an Ipv6 address of the S-GW is available, the S-GW shall include the Ipv4 address in the CDR.

4.63 Served 3GPP2 MEID

This field contains the Mobile Equipment Identity of the user's terminal in 3GPP2 access, and the content is defined in 3GPP TS 29.272 [93].

4.64 Served IMEI

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

4.65 Served IMEISV

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

4.66 Served IMSI

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

The structure of the IMSI is defined in 3GPP TS 23.003 [768].

4.67 Served MN NAI

This field contains the Mobile identifier of the served user, in NAI format based on IMSI, as defined TS 23.003 [68].

4.68 Served MSISDN

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

The structure of the MSISDN is defined in 3GPP TS 23.003 [7003 [68].

4.69 Served PDP Address

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

4.70 Served PDP/PDN Address

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

4.71 Served PDP/PDN Address Extension

This field contains the Ipv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack Ipv4 Ipv6 is used, and the Ipv6 prefix is included in Served PDP Address or Served PDP/PDN Address.

4.72 Service Centre Address

This field contains an ITU-T E.164 number identifying a particular service centre e.g. Short Message Service (SMS) centre (see 3GPP TS 23.040 [15040 [72]].

4.73 Serving Node Address

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

If both an IPv4 and an IPv6 address of the SGSN/S-GW are available, the S-GW/P-GW shall include the Ipv4 address in the CDR.

4.74 Serving Node PLMN Identifier

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

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

4.75 Serving Node Type

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

4.76 Serving PLMN Rate Control

This field contains the Serving PLMN Rate Control applied by MME during the transfer of the data volume captured by the container (applicable only to the PGW-CDR). This is

included in the service data container only if previous container's change condition is "Serving PLMN Rate Control change ". Note the Serving PLMN Rate Control field in PGW-CDR main level contains the Serving PLMN Rate Control when PGW-CDR was opened.

4.77 SGi PtP Tunnelling Method

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

4.78 SGSN Address

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

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

The G-CDR fields contain the address of the current GGSN and a list of SGSNs addresses, which have been connected during the record (SGSN change due to inter SGSN Routing Area update).

The M-CDR fields only contain the address of the current SGSN. It does not provide any information related to active PDP context(s) and thus the connected (used) GGSN(s) cannot be identified.

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

If both an Ipv4 and an Ipv6 address of the SGSN are available, the SGSNs shall include the Ipv4 address in the CDR.

4.79 SGSN Change

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

4.80 S-GW Change

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

4.81 Short Message Service (SMS) Result

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

4.82 Start Time

This field contains the time when the IP-CAN session starts at the S-GW/P-GW, available in the CDR for the first bearer in an IP-CAN session.

4.83 Stop Time

This field contains the time when the IP-CAN session is terminated at the S-GW/P-GW, available in the CDR for the last bearer in an IP-CAN session.

4.84 Subscription-Id

This field contains the identification of the user (e.g IMSI, MSISDN, NAI).

4.85 User CSG Information

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

4.86 User Location Information

This field contains the User Location Information as described in:

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

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

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

4.87 S-GW Address IPv6

The control plane IPv6 address, in case of IPv4v6 dual stack, of the S-GW.

4.88 P-GW Address IPv6

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

4.89 UNI PDU CP Only Flag

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

4.90 List of RAN Secondary RAT Usage Reports

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

Each container includes the following fields:

- **Data Volume Uplink** includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The counting and reporting from RAN of uplink data volumes is optional.
- **Data Volume Downlink** includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.
- **RAN Start Time** is a time stamp, which defines the moment when the volume container is opened by the RAN.
- **RAN End Time** is a time stamp, which defines the moment when the volume container is closed by the RAN.
- **Secondary RAT Type** This field contains the RAT type for the secondary RAT.

5 Charging Data Record Structure (ASN.1 Description)

Huawei GGSN/SGSN uses ASN.1 language to describe CDRs. BER (Basic Encoding Rules) is adopted.

The ASN.1 definitions for CDRs refer to ETSI/3GPP, R9, TS 32.298-940.

Huawei PS domain may provide uncombined or combined CDRs for the BS. Uncombined CDRs are provided, by default. The following provides the ASN.1 descriptions of the uncombined and combined CDRs.

5.1 ASN.1 Description of Uncombined CDRs

Download **CDRF_R9_Org.asn** from the **CDR ASN.1 Definitions** directory.

5.2 ASN.1 Description of Combined CDRs

Download **CDRF_R9_Fin.asn** from the **CDR ASN.1 Definitions** directory.

6 Examples of CDR

Download the CDR files in ASN.1 BER code from the **CDR Samples** directory.

A Acronyms and Abbreviations

A

APN	Access Point Name

B

BER	Basic Encoding Rules

C

CAMEL	Customised Applications for Mobile network Enhanced Logic
CI	Cell Identity
CDR	Charging Data Record
CGF	Charging Gateway functionality
CloudCG	Cloud Charging Gateway
CSE	CAMEL Service Environment

D

DNS	Domain Name Server

E

eG-CDR	enhanced G-CDR
EPC	Evolved Packet Core

G

G-CDR	GGSN generated- CDR
GGSN	Gateway GPRS Support Node

GPRS	General Packet Radio Service
GTP	GPRS Tunnel Protocol
H	
HSS	Home Subscriber Server
HPLMN	Home Public Land Mobile Network
I	
IMEISV	International Mobile Station Equipment Identity and Software Version
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP-CAN	IP Connectivity Access Network
M	
MCC	Mobile Country Code
MEID	Mobile Equipment Identity
MME	Mobility Management Entity
MNC	Mobile Network Code
MS	Mobile Station
MSISDN	Mobile Subscriber ISDN Number
O	
OCS	Online Charging System
P	
PCC	Policy and Charging Control
PCEF	Policy and Charging Enforcement Function
PCN	Packet Core Network
PDN	Packet Data Network
PDP	Packet Data Protocol
P-GW	PDN Gateway
PLMN	Public Land Mobile Network
PMIP	Proxy Mobile IP
Q	

QoS	Quality of Service
R	
RAC	Routing Area Code
RAT	Radio Access Technology
RNC	Radio Network Controller
S	
SAC	Service Area Code
SGSN	Serving GPRS Support Node
S-GW	Serving Gateway
T	
TAI	Tracking Area Identity
V	
VPLMN	Visited Public Land Mobile Network

