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<tr>
<td>custom6 Dictionary ............................................................ 141</td>
</tr>
<tr>
<td>ASN.1 Definition for Fields in custom6 Dictionary ....................... 153</td>
</tr>
<tr>
<td>custom19 Dictionary .......................................................... 167</td>
</tr>
<tr>
<td>ASN.1 Definition for Fields in custom19 Dictionary ..................... 180</td>
</tr>
<tr>
<td>standard Dictionary .......................................................... 196</td>
</tr>
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About this Guide

This preface describes the *GTPP Interface Administration and Reference*, how it is organized and its document conventions.

GPRS Tunneling Protocol Prime (GTPP) protocol is a StarOS™ service that runs on Cisco® ASR 5x00 platforms. This document provides information on GTPP interface between Charging Gateway Function (CGF) and Cisco Systems’ licensed products including the GGSN, P-GW, S-GW, and SGSN in General Packet Radio Service (GPRS), Universal Mobile Telecommunications System (UMTS) data networks, 3GPP2 evolved High Rate Packet Data (eHRPD) and Long Term Evolution-System Architecture Evolution (LTE-SAE) wireless data networks.
# Conventions Used

The following tables describe the conventions used throughout this documentation.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Notice Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Info" /></td>
<td>Information Note</td>
<td>Provides information about important features or instructions.</td>
</tr>
<tr>
<td><img src="image" alt="Caution" /></td>
<td>Caution</td>
<td>Alerts you of potential damage to a program, device, or system.</td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>Warning</td>
<td>Alerts you of potential personal injury or fatality. May also alert you of potential electrical hazards.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typeface Conventions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text represented as a <em>screen display</em></td>
<td>This typeface represents displays that appear on your terminal screen, for example: Login:</td>
</tr>
<tr>
<td>Text represented as <em>commands</em></td>
<td>This typeface represents commands that you enter, for example: show ip access-list. This document always gives the full form of a command in lowercase letters. Commands are not case sensitive.</td>
</tr>
<tr>
<td>Text represented as a <em>command variable</em></td>
<td>This typeface represents a variable that is part of a command, for example: show card slot_number. slot_number is a variable representing the desired chassis slot number.</td>
</tr>
<tr>
<td>Text represented as menu or sub-menu names</td>
<td>This typeface represents menus and sub-menus that you access within a software application, for example: Click the File menu, then click New</td>
</tr>
</tbody>
</table>
Supported Documents and Resources

Related Common Documentation

The following common documents are available:

- AAA Interface Administration and Reference
- Command Line Interface Reference
- Installation Guide (platform dependant)
- Release Change Reference
- SNMP MIB Reference
- Statistics and Counters Reference
- System Administration Guide (platform dependant)
- Thresholding Configuration Guide

Related Product Documentation

The most up-to-date information for this product is available in the product Release Notes provided with each product release.

The following product documents are also available and work in conjunction with GTPP:

- ADC Administration Guide
- CF Administration Guide
- ECS Administration Guide
- ePDG Administration Guide
- eWAG Administration Guide
- GGSN Administration Guide
- HA Administration Guide
- HeNB-GW Administration Guide
- HNB-GW Administration Guide
- HSGW Administration Guide
- InTracer Installation and Administration Guide
- IPSec Reference
- IPSG Administration Guide
- MME Administration Guide
- MURAL Software Installation Guide
Supported Documents and Resources

- MURAL User Guide
- MVG Administration Guide
- NAT Administration Guide
- PDSN Administration Guide
- PSF Administration Guide
- P-GW Administration Guide
- SAEGW Administration Guide
- SaMOG Administration Guide
- SCM Administration Guide
- SecGW Administration Guide
- SGSN Administration Guide
- S-GW Administration Guide

Obtaining Documentation

The most current Cisco documentation is available on the following website: http://www.cisco.com/cisco/web/psa/default.html

Use the following path selections to access the GTPP reference documentation:

Products > Wireless > Mobile Internet> Platforms > Cisco ASR 5000 Series > Cisco ASR 5000
Contacting Customer Support

Use the information in this section to contact customer support.

Refer to the support area of http://www.cisco.com for up-to-date product documentation or to submit a service request. A valid username and password are required to access this site. Please contact your Cisco sales or service representative for additional information.
Chapter 1
GTPP Accounting Overview

This chapter provides an overview of GPRS Tunneling Protocol Prime (GTPP) protocol accounting, and the following Charging Data Records (CDRs) in the Cisco ASR 5x00 Multimedia Core Platform:

- Evolved Packet Data Gateway CDRs (ePDG-CDRs)
- Gateway GPRS Support Node (GGSN) CDRs (G-CDRs), Enhanced GGSN CDRs (eG-CDRs)
- Packet Data Network Gateway (P-GW) CDRs (PGW-CDRs)
- Serving Gateway (S-GW) CDRs (SGW-CDRs)
- Serving GPRS Support Node (SGSN) CDRs (S-CDRs, SM-MO-CDRs, SM-MT-CDRs), Mobility CDRs (M-CDRs)
- Wireless Local Area Network CDRs (WLAN-CDRs)
GTPP Interface Overview

This section provides information on GTPP interface between Charging Gateway Function (CGF) and Cisco Systems’ licensed products running on the ASR 5x00 core platforms, including the GGSN, P-GW, S-GW, and SGSN in General Packet Radio Service (GPRS), Universal Mobile Telecommunications System (UMTS) data networks, 3GPP2 evolved High Rate Packet Data (eHRPD) and Long Term Evolution-System Architecture Evolution (LTE-SAE) wireless data networks.

The Ga is the reference point from Charging Data Function (CDF) to the CGF, which is intended for the transport of CDRs. The CDF could either be GGSN, P-GW, S-GW, or any other similar products.

By definition, dealing with CDRs only implies that Ga is solely related to offline charging.

The following figure depicts the position of the Ga reference point within the overall 3GPP offline charging architecture.

![3GPP Offline Charging Architecture](image)

As illustrated in the above figure, the CDF in each network domain, service or subsystem is relevant for the network side of the Ga reference point. Different mappings of the ubiquitous offline charging functions, CDF and CGF, onto physical implementations are possible.

The transport protocol associated to the Ga reference point, providing functions for transfer of CDRs from CDF to CGF, is GTPP.

Each CDF will have an O&M configurable address list of CGFs (Charging Gateways) to which it can send its CDRs. The list will be organized in CGF address priority order. If the primary CGF is not available (for example, out of service), then the CDF will send the CDRs to the secondary CGF and so on.

Each CDR generating function will only send the records to the CGF(s) of the same PLMN, not to CGF(s) located in other PLMNs.

Each CGF in the PLMN will know the other CGFs’ network addresses (for example, for redundancy reasons, to be able to recommend another CGF address). This is achieved by O&M configuration facilities that will enable each CGF to have a configurable list of peer CGF addresses.
The GTPP charging support is currently available for the following core multimedia gateway products:

- Evolved Packet Data Gateway (ePDG)
- Gateway GPRS Support Node (GGSN)
- IP Services Gateway (IPSG)
- Packet Data Gateway/Tunnel Termination Gateway (PDG/TTG)
- Packet Data Network (PDN) Gateway (P-GW)
- Serving Gateway (S-GW)
- Serving GPRS Support Node (SGSN)
- S2a Mobility Over GTP (SaMOG) Gateway

**CDR Transport by GTPP**

GTPP has been designed to deliver the CDR(s) from the CDF to the CGF(s). This protocol is required if the CGF resides outside the CDFs. It utilizes some aspects of GTPP, which is used for packet data tunneling in the backbone network.

GTPP operates on the Ga interface and does not imply the use of any specific backbone network.

GTPP performs the following functions:

- CDR transfer between the CDF and the CGF
- Redirection of CDRs to another CGF
- Advertise to peers about its CDR transfer capability (for example, after a period of service downtime)
- Prevents duplicate CDRs that might arise during redundancy operations. If so configured, the CDR duplication prevention function may also be carried out by marking potentially duplicated CDR packets, and, delegating the final duplicate deletion task to a CGF or the Billing Domain (instead of handling the possible duplicates solely by GTPP messaging).

**CDR Push Functionality**

This feature facilitates sending of local CDR (G-CDR, eGCDR, PGW/SGW CDR, or any other GTPP CDR) files to a remote host using the CLI command `gtpp storage-server local file push` in context configuration mode or GTPP group configuration mode.

When the push is enabled in a GTPP group then the AAA proxy registers with the HD controller for the push. If the registration is successful then the controller periodically (~1 min) checks to see if any of the registered clients have files, in the CDR_DIR (`/records/cdr/<gtppp-group>.-<vpnid>/*`), to be pushed to the configured remote host URLs. If yes, it will start the PUSH process for that particular client. After pushing all the files of this client, the requests for the next client will be serviced in sequence.

If the registration fails, the client will re-attempt to register indefinitely in intervals unless the configuration is removed. Upon each failure an error log will be printed.

**Important:** The push framework does not support FTP or TFTP for pushing CDR files but it supports only SFTP.
For information on how to configure push functionality, refer to the *Configuring CDR Push* section in the *HDD Storage* chapter of this guide.

**Automatic Transfer of Stranded CDRs on ICSR**

During an ICSR switchover, the GTPP charging interface between the active chassis and CGF server goes down and all pending CDRs are written to internal hard disk. Once the chassis becomes standby, the CDRs will remain on HDD until the chassis becomes active.

This feature provides a way to move the stranded CDRs from the new standby chassis to the new active chassis and stream them to the OCG. This CLI command enables/disables the Push-To-Active feature to automatically transfer CDR files from new standby chassis to new active chassis.

Releases prior to 16.0, CDRs from current standby chassis were manually transferred to current active chassis using the CLI command “gtpp storage-server streaming start”. Once the transfer is complete, a CLI command in the Exec mode is configured to stream the CDRs to CGF.

In 16.0 and later releases, the stranded CDRs in the standby ICSR node (moved from active to standby) are automatically transferred to the newly active ICSR node. This automation process is achieved through the use of “gtpp push-to-active url” CLI command in the global configuration mode.

**Limitations**

This section provides the limitations with this feature.

- This feature could lead to duplicate CDRs. When streaming is in progress and ICSR switchover happens, the current file being streamed, will not complete the streaming as interface with CGF went down. This file will be transferred to new active chassis and streamed from beginning from new chassis.

- The accounting contexts should be in the same order in both the chassis. The directory names are created using vpn-id. If the accounting contexts are in different order, vpn-id will be different and the sub-directories in HDD will be different in both the chassis for same GTPP group.

**How this Feature Works**

This section describes the work flow for the stranded CDR automation process.

**Step 1**  Chassis-1 is Active and Chassis-2 in Standby State.

**Step 2**  SRP switchover is initiated from Chassis-1 to Chassis-2.

**Step 3**  Now, Chassis-1 becomes Standby and Chassis-2 becomes Active.

**Step 4**  Chassis-1 stores CDRs to HDD since the IP interface to CGF is down.

**Step 5**  After 12 min (time to write all CDRs to HDD), Chassis-1 initiates SFTP transfer of files to Chassis-2.

**Step 6**  Chassis-2 on getting the file transfer complete indication, reloads file list from HDD and streams transferred CDRs to CGF server.

**Step 7**  If ICSR switch-overs to Chassis-1 during the file transfer, file transfer stops and reverse transfer of files is initiated from Chassis 2 to Chassis 1.
Path Protocol

GTPP uses path protocol to transport CDRs from CDF to CGF over the Ga interface so as to facilitate charging. The following path protocols are supported for GTPP:

- **UDP as the Path Protocol**
  
  Ports for signaling the request messages:
  
  - The UDP Destination Port may be the server port number 3386 which has been reserved for GTPP. Alternatively, another port can be used as configured by O&M.
  
  - The UDP Source Port is a locally allocated port number at the sending network element.
  
  Ports for signaling the response messages:
  
  - The UDP Destination Port can be the value of the Source Port of the corresponding request message.
  
  - The UDP Source Port can be the value from the Destination Port of the corresponding request message.

- **TCP as the Path Protocol**
  
  The TCP Destination Port may be the server port number 3386, which has been reserved for G-PDUs. Alternatively, another port may be used as configured by O&M. Extra implementation-specific destination ports are possible but all CGFs shall support the server port number.
  
  The TCP Source Port is a random port locally assigned at the sending network element.

---

**Important:** ASR chassis supports IPV4 only as a transport layer IP.
GTPP Message Types

GTPP defines a set of messages between two associated nodes. The GTPP messages defined are shown in the following table. The messages introduced by GTPP are in boldface letters. The other messages are inherited from GTPP protocol.

Table 1. GTPP Messages

<table>
<thead>
<tr>
<th>Message Type value (Decimal)</th>
<th>GTPP Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Echo Request</td>
</tr>
<tr>
<td>2</td>
<td>Echo Response</td>
</tr>
<tr>
<td>3</td>
<td>Version Not Supported</td>
</tr>
<tr>
<td>4</td>
<td>Node Alive Request</td>
</tr>
<tr>
<td>5</td>
<td>Node Alive Response</td>
</tr>
<tr>
<td>6</td>
<td>Redirection Request</td>
</tr>
<tr>
<td>7</td>
<td>Redirection Response</td>
</tr>
<tr>
<td>240</td>
<td>Data Record Transfer Request</td>
</tr>
<tr>
<td>241</td>
<td>Data Record Transfer Response</td>
</tr>
<tr>
<td>Others</td>
<td>Reserved for future use</td>
</tr>
</tbody>
</table>

The GTPP introduced the following signaling message types as Path Management Messages:

- Node Alive Request
- Node Alive Response
- Redirection Request
- Redirection Response

**Important:** Echo messages and node-alive messages are not supported if the transport layer protocol is TCP.

The following signaling messages are grouped under the category “Record Transmission Messages”:

- Data Record Transfer Request
- Data Record Transfer Response

The reserved fields in the signaling messages can be filled with ones, and are intended for future use.

GTPP reuses the GTPP Cause values. The message type numbers required for the newly introduced GTPP messages have been derived from the unallocated message type number space specified in the GTPP message table defined in TS 29.060.

The number ranges allocated for GTPP are as follows:

For Information Elements: 117-127 (TV type fields) and 239-254 (for TLV type fields).
The following table provides the information on the TLV and TV Information Element types introduced in this document:

### Table 2. TLV and TV Information Element Types

<table>
<thead>
<tr>
<th>TLV Information Element Types</th>
<th>TV Information Element Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>254</td>
<td>Address of Recommended Node</td>
</tr>
<tr>
<td>253</td>
<td>Requests Responded</td>
</tr>
<tr>
<td>252</td>
<td>Data Record Packet</td>
</tr>
<tr>
<td>251</td>
<td>Charging Gateway Address (this IE is also used in TS 29.060 [200])</td>
</tr>
<tr>
<td>250</td>
<td>Sequence Numbers of Canceled Packets</td>
</tr>
</tbody>
</table>

### Usage of GTPP Header in Charging

In GTPP messaging only the signalling plane of GTPP is partly reused. The GTPP header is shown in the following figure.

**Figure 2. GTPP Header**

<table>
<thead>
<tr>
<th>Octets</th>
<th>Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>5-6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Version PT Spare ’1 1 1’ ’0/1’</td>
</tr>
<tr>
<td>Message Type</td>
</tr>
<tr>
<td>Length</td>
</tr>
<tr>
<td>Sequence Number</td>
</tr>
</tbody>
</table>

Bit 5 of octet 1 of the GTPP header is the Protocol Type (PT) flag: it is '0' if the message is GTPP.
The Version bits indicate the GTPP protocol version when the Protocol Type flag is '0'.

Bit 1 of octet 1 is not used in GTPP (except in v0), and it is marked '0' in the GTPP header. It is in use in GTPP v0 and distinguishes the used header-length. In the case of GTPP v0, this bit being marked one (1) indicates the usage of the 6 octets header. If the bit is set to '0' (usually the case) the 20-octet header is used. For all other versions of GTPP, this bit is not used and is set to '0'. However, this does not suggest the use of the 20-octet header, rather a shorter 6-octet header.

The Length indicates the length of payload (number of octets after the GTPP header). The Sequence Number of the packet is part of the GTPP header.

Information Elements

The messages contain several Information Elements (IEs). The TLV (Type, Length, Value) or TV (Type, Value) encoding formats will be used for the GTPP IEs. The GTPP messages have the IEs sorted with the Type fields in ascending order. The Length field contains the IE length excluding the Type and Length fields.

Within the Type field the most significant bit will be set to 0 when the TV format is used and set to 1 when the TLV format is used.
GTPP Messages

This section provides the detailed information on the GTPP message types.

Node Alive Request

The Node Alive Request message may be used to inform that a node in the network has started its service (e.g. after a service break due to software or hardware maintenance or data service interruption after an error condition). A node may send a different Node Address than its own in the Information Element, e.g. informing the “next node in the chain” that the “previous node in the chain” (which is located on the other side of the sender of this message) is now ready for service.

The Node Alive Request message allows a quicker reconnect capability than the Echo Request message based polling can provide, and its usage will have a reduced load effect on the network, particularly when the number of network nodes using GTPP is high. It may also be used to inform when a new network node has become available for service. If the Echo Request message is also used, then the usage of the Node Alive Request message allows the interval of Echo Requests to be longer, thus reducing network load by reducing number of Echo Requests.

Important: Node Alive request messages are not supported if the transport layer protocol is TCP.

The Information elements in a Node Alive Request message are shown in the following table:

<table>
<thead>
<tr>
<th>Information Element</th>
<th>Presence Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node Address</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Alternative Node Address</td>
<td>Optional</td>
</tr>
<tr>
<td>Private Extension</td>
<td>Optional</td>
</tr>
</tbody>
</table>

The Node Address format is the same as for the Charging Gateway Address format described in TS 29.060. The format definition for the Node Address information element is the same as the format of the source and destination address of the IP packet that transports the GTPP messages. The optional Alternative Node Address IE can be used in the Node Alive Request if the message sender wants to advertise an IP address that is different from the node address format. This way both the IPv4 and IPv6 node address formats can be supported simultaneously in the messaging, regardless of whether IPv4 or IPv6 is used in the underlying transport.

The optional Private Extension IE contains vendor- or operator-specific information.

Node Alive Response

The Node Alive Response message, shown in the following table, shall be sent as a response to a received Node Alive Request.
Table 4. Node Alive Response Message

<table>
<thead>
<tr>
<th>Information Element</th>
<th>Presence Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Extension</td>
<td>Optional</td>
</tr>
</tbody>
</table>

The optional Private Extension IE contains vendor- or operator-specific information.

Redirection Request

There are two use cases for the Redirection Request message:

- One is to advise that received CDR traffic is to be redirected to another CGF due to the sending CGF node is about to stop service (due to an outage for maintenance or an error condition).
- The second purpose is to inform a CDF which is currently sending data to this node (e.g. CGF), that the next node in the chain (e.g. a mediator device or Billing Computer) has lost connection to this node (e.g. CGF).

The Information Elements in a Redirection Request Message are listed in the following table. An Address of Recommended Node may be given if, for example, a CGF maintenance outage is handled by first introducing another CGF ready to take incoming CDRs. This way, the network performance can be maintained. The Address of Recommended Node shall only describe an intra-PLMN node containing a CGF, and not a node in any other PLMN.

Table 5. Redirection Request Message

<table>
<thead>
<tr>
<th>Information Element</th>
<th>Presence Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Address of Recommended Node</td>
<td>Optional</td>
</tr>
<tr>
<td>Alternative Address of Recommended Node</td>
<td>Optional</td>
</tr>
<tr>
<td>Private Extension</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Possible Cause values are:

- This node is about to go down
- Another node is about to go down
- System failure
- Receive buffers becoming full
- Send buffers becoming full

The Address of Recommended Node IE, shown in the following figure, defines the IPv4 or IPv6 format address that the node is identified by in the UMTS network.
The format definition for the Address of Recommended Node information element is the same as the format of the source and destination address of the IP packet that transports the GTPP messages. The optional Alternative Address of Recommended Node IE can be used in the Node Alive Request if the message sender wants to advertise an IP address that is different from the node address format. This way both the IPv4 and IPv6 node address formats can be supported simultaneously in the messaging, regardless of whether IPv4 or IPv6 is used in the underlying transport.

The optional Private Extension contains vendor- or operator-specific information.

### Redirection Response

A Redirection Response message shall be sent as a response of a received Redirection Request. The information elements of this message are listed in the following table.

<table>
<thead>
<tr>
<th>Information Element</th>
<th>Presence Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Private Extension</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Possible Cause values are:
- Request Accepted
- No resources available
- Service not supported
- System failure
- Mandatory IE incorrect
- Mandatory IE missing
- Optional IE incorrect
- Invalid message format
- Version not supported

The optional Private Extension contains vendor- or operator-specific information.

Data Record Transfer Request

This message is used to transmit the CDR(s) to the CGF. The CDRs are placed in the Data Record Packet information element.

Information Elements in Data Record Transfer Request

The IEs in Data Record Transfer Request message are specified in the following table.

Table 7. Data Record Transfer Request Message

<table>
<thead>
<tr>
<th>Information Element</th>
<th>Presence Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packet Transfer Command</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Data Record Packet</td>
<td>Conditional</td>
</tr>
<tr>
<td>Sequence Numbers of Released Packets</td>
<td>Conditional</td>
</tr>
<tr>
<td>Sequence Numbers of Canceled Packets</td>
<td>Conditional</td>
</tr>
<tr>
<td>Private Extension</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Packet Transfer Command IE

The value of the Packet Transfer Command in its Information Element tells the nature of the message:

- 1 = 'Send Data Record Packet'
- 2 = 'Send possibly duplicated Data Record Packet'
- 3 = 'Cancel Data Record Packet'
- 4 = 'Release Data Record Packet'

The following describes the usage of each Packet Transfer Command. The first command is for normal CDR transfer while the other values are only used as part of the redundancy mechanism. The following describes the usage of each Packet Transfer Command. The first command is for normal CDR transfer while the other values are only used as part of the redundancy mechanism.

Send Data Record Packet: This is the usual command used for sending CDRs under normal conditions when no error recovery is needed or the redirection mechanism is not involved. The other three commands are being used only in error recovery cases. Out of the three conditional IEs, only the “Data Record Packet” is present in this message.

Send possibly duplicated Data Record Packet: When the CDR packet is redirected to a secondary CGF (by a CDF) because the currently used CGF is not working or the CDR transfer is not working properly, or if there is an error in the link between the CDF and the CGF, then this Packet Transfer Command is used instead of the normal 'Send Data Record Packet'. Of the conditional IEs, the “Data Record Packet” is present in the message, when sending the message to a CGF acting as temporary storage, when the original primary CGF could not be contacted. This Packet Transfer Command is used also when sending “empty” test packets with older (but not yet acknowledged) sequence numbers.
after a peer node or link recovery, to check if the CGF had received some Data Record Packets (whose acknowledgement did not come to the Data Record Packet sending node) before the link to the recipient node became inoperable.

**Cancel Data Record Packet**: Of the conditional IEs, the “Sequence Numbers of Canceled Packets” is present in the message.

**Release Data Record Packet**: Of the conditional IEs, the “Sequence Numbers of Released Packets” is present in the message.

After the CGF has received the Packet Transfer Command 'Release Data Record Packet' with the Sequence Number(s) for earlier sent 'Send possibly duplicated Data Record Packet' command(s), it can consider itself authorized to send the Data Record Packets previously marked as possibly duplicated towards the BD as normal (not duplicated) CDRs.

### Data Record Packet IE

The Data Record Packet element, which is present conditionally if the Packet Transfer Command is 'Send Data Record Packet' or 'Send possibly duplicated Data Record Packet', may contain one or more CDRs. If an “empty packet” is to be sent, then the Data Record Packet IE contains only the Type (with value 252 in decimal) and the Length (with value 0) fields.

There are two fields identifying the CDR format: Data Record Format and Data Record Format Version.

The format of the CDRs is ASN.1 or some other format, as identified by the value of Data Record Format. The Data Record Format Version identifies the TS release and version numbers that were used for the CDR encoding.

### Sequence Numbers of Released Packets IE

The Sequence Numbers of Released Packets is present if the Packet Transfer Command is 'Release Data Record Packet'. The format of the Information Element is described in the following figure:

![Sequence Numbers of Released Packets IE](image-url)
Sequence Numbers of Canceled Packets IE

The following figure shows the sequence numbers of Canceled Packets IE that contains the IE Type, Length and the Sequence Number(s) (each 2 octets) of the canceled Data Record Transfer Request(s). It is present if the Packet Transfer Command is “Cancel Data Record Packet”.

Figure 5. Sequence Numbers of Canceled Packets IE

<table>
<thead>
<tr>
<th>Octets</th>
<th>Bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2-3</td>
<td>7</td>
</tr>
<tr>
<td>4-5</td>
<td>6</td>
</tr>
<tr>
<td>n...n+1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Private Extension IE

The optional Private Extension contains vendor- or operator-specific information.

Data Record Transfer Response

The message shall be sent as a response to a received Data Record Transfer Request. Also, several Data Record Transfer Requests can be responded by a single Data Record Transfer Response.

The Cause (whatever the value may be) applies for all those Data Record Transfer Requests, responded by that particular Data Record Transfer Response.

Possible Cause values are:

- Request Accepted
- No resources available
- Service not supported
- System failure
- Mandatory IE incorrect
- Mandatory IE missing
• Optional IE incorrect
• Invalid message format
• Version not supported
• Request not fulfilled
• CDR decoding error
• Request already fulfilled
• Request related to possibly duplicated packet already fulfilled
• Sequence numbers of released/canceled packets IE incorrect

The cause value “CDR decoding error” is optional, primarily intended to inform the CDF that the receiving node cannot decode the CDR. Thus, special features in the receiving node that are based on information within the CDR, would not be operable. This message alerts the operator of a remote generating node of incompatible CDR encoding. It is optional and no action or response is required.

The Requests Responded IE contains the IE Type, Length and the Sequence Numbers (each 2 octets) of the Data Record Transfer Requests.

The optional Private Extension contains vendor- or operator-specific information. Depending on the Cause value severity and general occurrence frequency, the node that sent the corresponding Data Record Transfer Request, may start to direct its CDRs to another CGF.

Handling Error Response Cause

By default, on getting an error response, the request is retried to the same CGF server until max-retries is reached. Then the server is marked as NOT ACTIVE and the request is retried to the secondary server. This behavior is seen for the below response causes.

• Mandatory IE incorrect
• Mandatory IE missing
• Optional IE incorrect
• Invalid message format

On getting the following error response causes, the request will NOT retried and the server will be marked as NOT ACTIVE immediately.

• No resources available
• Service not supported
• System failure

No special action is taken on getting “CDR Decoding error” response cause and the behavior is similar to getting a "Request Accepted" cause.

On getting “Version not supported” cause, the request is resent with the version supported by the CGF server (by default, GTPP v2 is supported).
Charging Characteristics

Whether or not the GGSN accepts charging characteristics from the SGSN, the accounting protocol can be configured on a per-APN basis based on whether the subscriber is visiting, roaming, or home.

By default, the GGSN always accepts the charging characteristics from the SGSN. They will be provided by the SGSN for GTPv1 requests for primary PDP contexts. If they are not provided for secondary PDP contexts, the GGSN re-uses those from the primary. The charging characteristics field is optional. If not provided by SGSN, the GGSN selects the locally configured values. Also, there is a provision to override the values from RADIUS as indicated in the following table.

Table 8. Charging Characteristics Selection Mechanism

<table>
<thead>
<tr>
<th>CLI command configured on GGSN</th>
<th>Sent by SGSN</th>
<th>Sent by AAA</th>
<th>CC used</th>
<th>chargingCharSelMode</th>
</tr>
</thead>
<tbody>
<tr>
<td>no cc-sgsn</td>
<td>no cc</td>
<td>no cc</td>
<td>Default</td>
<td>Home/Visiting/Roaming Default</td>
</tr>
<tr>
<td></td>
<td>cc</td>
<td></td>
<td>Default</td>
<td>Home/Visiting/Roaming Default</td>
</tr>
<tr>
<td>cc-sgsn use-ggsn</td>
<td>no cc</td>
<td>no cc</td>
<td>GGSN</td>
<td>GGSN Override</td>
</tr>
<tr>
<td></td>
<td>cc</td>
<td></td>
<td>GGSN</td>
<td>GGSN Override</td>
</tr>
<tr>
<td>cc-sgsn radius-returned</td>
<td>no cc</td>
<td>no cc</td>
<td>Default</td>
<td>Home/Visiting/Roaming Default</td>
</tr>
<tr>
<td></td>
<td>cc</td>
<td></td>
<td>AAA</td>
<td>AAA Supplied</td>
</tr>
<tr>
<td>cc-sgsn radius-returned use-ggsn</td>
<td>no cc</td>
<td>no cc</td>
<td>GGSN</td>
<td>GGSN Override</td>
</tr>
<tr>
<td></td>
<td>cc</td>
<td></td>
<td>AAA</td>
<td>AAA Supplied</td>
</tr>
</tbody>
</table>

Please note that “Default” refers to the value set with the cc-home, cc-roaming, and cc-visiting commands. The “GGSN Override” and “AAA Override” are applicable ONLY for custom5 dictionary. Others will use Home/Visiting/Roaming Default based on the PLMN type.

If the system is configured to reject the charging characteristics from the SGSN, the GGSN can be configured with its own that can be applied based on the subscriber type (visiting, roaming, or home) at the APN level. The charging characteristics consists of a string of 16 bits designated as profile index and behavior settings. The GGSN supports up to 16 profile indexes numbered 0 through 15 whereas P-GW/S-GW supports up to a maximum of 256 charging profiles.

The profile indexes specify the criteria for closing accounting records based on specific criteria.
When a bearer is activated, an appropriate charging profile will be selected based on the following sources of input:

- Downloaded AAA attribute (ONLY in P-GW)
- MME/HSS via charging characteristics IE
- Local defaults

Following is the order of precedence when charging profile value is received from multiple sources.

- Profile index in the override rule on the APN
- Profile index in the override rule on the gateway
- Profile index from AAA in case of P-GW
- Profile index from non-override rule on the APN
- Profile index from non-override rule on the gateway

For more information on the commands that configure additional GTPP accounting properties, refer to the Command Line Interface Reference.
Charging Records

Charging records support details of the termination such as which end initiated the termination, termination type e.g. RST, FIN, etc. and in case of HTTP 1.1, whether or not the connection is still open. It is possible to pipeline up to 15 HTTP requests on the same TCP connection. The billing system, based on this information, decides upon the success or failure of the connection and charge or refund accordingly.

To cover the requirements of standard solutions and at the same time, provide flexible and detailed information on service usage, the following types of usage records are provided:

- Standard G-CDRs
- eG-CDRs
- PGW-CDRs
- SGW-CDRs
- S-CDRs
- WLAN-CDRs

The Multimedia Core Platform supports multiple fields for use in these CDRs. The CDRs are encoded using the ASN.1 format and are sent to the CGF using the GTPP.

**Important:** The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the Command Line Interface Reference.

**Important:** SGW-CDRs are suppressed and only PGW-CDRs are generated for a session hosted by the associated S-GW and P-GW service. SGW-CDRs are generated when the S-GW connects to an external P-GW.

In StarOS release 16.0, S2a Mobility Over GTP (SaMOG) Gateway supports generation of CDR files for offline charging. In Offline Charging, charging information is collected concurrently with resource usage. The charging information is then passed through a chain of logical charging functions, and the CDR files are generated by the network, which are then transferred to the network operator's Billing Domain.

As 3GPP specifications does not define a CDR format for SaMOG, the S-GW CDR and SGSN CDR record formats are used to define the CDR format for SaMOG 4G/3G subscribers. The record format can be selected using a CLI command under the GTPP Group Configuration Mode. By default, for an SaMOG license, the S-GW record type is used, and for an SaMOG 3G license, the SGSN record type is used.

Zero Volume CDR Suppression

**Important:** The Zero Volume CDR Suppression is a license-controlled feature applicable to all types of CDRs – GGSN CDRs, PGW-CDRs, SGW-CDRs, and SGSN CDRs. For more information, contact your Cisco account representative.

This feature is developed to suppress the CDRs with zero byte data count, so that the OCG node is not overloaded with a flood of CDRs. The CDRs can be categorized as follows:

- **Final-cdr:** These CDRs are generated at the end of a context.
• Internal-trigger-cdrs: These CDRs are generated due to internal triggers such as volume limit, time limit, tariff change or user generated interims through the CLI commands.

• External-trigger-cdrs: These CDRs are generated due to external triggers such as QoS Change, RAT change and so on. All triggers which are not considered as final-cdrs or internal-trigger-cdrs are considered as external-trigger-cdrs.

The customers can select the CDRs they want to suppress. A new CLI command \[ \text{default | no } \text{ gtpp suppress-cdrs zero-volume} \{ \text{external-trigger-cdr | final-cdr | internal-trigger-cdr} \} \] is introduced to enable this feature. This feature is disabled by default to ensure backward compatibility. For more information on this command, see Cisco ASR 5x00 Command Line Interface Reference.

### File Format for CDRs

The file format determines the information organization and structure -- format -- of the generated data files. All file formats are different and are customizable.

The following file formats are supported for CDRs:

• **custom1 Format**: This file format encodes CDRs according to the following conventions:
  
  - **Header**: No header
  - **Contents**: CDR1CDR2CDR3...CDRn
  - **EoF marker**: \n
  - **File name format**: 

    `<node-id-suffix+vpn-id>_date+_time_`<total-cdrs>_file<fileseqnum>

    The `<fileseqnum>` denotes the file sequence number ranging from 1 through 4294967295.

    - **Example**: 

      `default3_07_15_2009+07_53_02_5_file1`

• **custom2 Format**: This customer-specific file format encodes CDRs according to the following conventions:
  
  - **Header**: 24 byte header incorporating the following information:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00 - 0x03</td>
<td>Offset</td>
<td>Offset from EoH to first Unread CDR (4 Bytes)</td>
</tr>
<tr>
<td>0x04 - 0x07</td>
<td>Encoding</td>
<td>Basic Encoding Rule (BER) i.e. 1 (4 Bytes)</td>
</tr>
<tr>
<td>0x08 - 0x0b</td>
<td>Number of CDRs</td>
<td>Total number of CDRs in the file (4 Bytes)</td>
</tr>
<tr>
<td>0x0c - 0x0f</td>
<td>Number of read CDRs</td>
<td>Total number of read CDRs in the file (4 Bytes)</td>
</tr>
<tr>
<td>0x10 - 0x13</td>
<td>File size</td>
<td>Size of CDR file in bytes (4 Bytes)</td>
</tr>
<tr>
<td>0x14 - 0x17</td>
<td>Abstract Syntax Notation One (ASN.1) format definition version</td>
<td>ASN.1 definition version information (4 Bytes)</td>
</tr>
</tbody>
</table>

  - **Contents**: LEN1CDR1LEN2CDR2LEN3CDR3...LENnCDRn
  - **EoF marker**: No EoF marker
  - **File name format**: 

    `<node-id-suffix+vpn-id>_date+_time_`<total-cdrs>_file<fileseqnum>.u
The $<fileseqnum>$ denotes the file sequence number ranging from 1 through 4294967295.

- **Example:**
  
  ```
  default3_07_15_2009_07_59_32_5_file2.u
  ```

**Important:** With file format **custom2**, the files are generated with .u file extension indicating an unprocessed file by the billing system. Typically, the billing system would rename the file with .p extension after processing the files with CDR information.

**Important:** Remember that the unprocessed CDR (*.u) files should never be deleted from HDD.

- **custom3 Format:** This customer-specific file format encodes CDRs according to the following conventions:
  - **Header:** No header
  - **Contents:** CDR1CDR2CDR3…CDRn
  - **EoF marker:** No EoF marker
  - **File name format:**
    
    ```
    <node-id-suffix+vpn-id>_<date>+<time>_<total-cdrs>_file<fileseqnum>.u
    ```
    
    The $<fileseqnum>$ denotes the file sequence number ranging from 1 through 4294967295.

- **Example:**
  
  ```
  default3_07_15_2009_07_59_32_5_file2.u
  ```

- **custom4 Format:** This custom4 format was created to support writing CDRs in blocks. This file format is similar to custom3 file format except CDRs will be written in 2Kbyte blocks in a file.
  - **Header:** No Header
  - **Contents:** CDR1|CDR2|FF|CDR3|FF|FF|…|CDRn|FF|
    
    where | represents the end of a 2K block
  - **EoF marker:** No EoF marker
  - **File name format:**
    
    ```
    <node-id-suffix+vpn-id>_<date>+<time>_<total-cdrs>_file<fileseqnum>.u
    ```
    
    The $<fileseqnum>$ denotes the file sequence number ranging from 1 through 4294967295.

- **Example:**
  
  ```
  default3_07_15_2009_07_59_32_5_file2.u
  ```

- **custom5 Format:** This file format is similar to custom3 file format except that the sequence number for CDR file name is of six digits in length ranging from 000001 to 999999.
  - **Header:** No Header
  - **Contents:** CDR1CDR2CDR3…CDRn
  - **EoF marker:** No EoF marker
  - **File name format:**
    
    ```
    <node-id-suffix+vpn-id>_<date>+<time>_<total-cdrs>_file<fixed-length-seqnum>.u
    ```
**Example:**

```
default3_07_15_2009_08_09_25_4_file000003.u
```

**custom6 Format:** This file format is similar to custom4 file format except CDRs will be written in 8Kbyte blocks in a file.

- **Header:** No Header
- **Contents:** CDR1|CDR2|CDR3|...|CDRn
  
  where | represents the end of a 8K block
- **EoF marker:** No EoF marker
- **File name format:**
  
  `<node-id-suffix+vpn-id>_ <date>+<time>_<total-cdr>_file<fileseqnum>.u`
  
  The `<fileseqnum>` denotes the file sequence number ranging from 1 through 4294967295.

**Example:**

```
default3_07_15_2009_07_59_32_5_file2.u
```

---

**Important:** These file formats are customer-specific. For more information on the file formats, contact your Cisco account representative.

---

**Evolved Packet Data Gateway Call Detail Records (ePDG-CDRs)**

ePDG-CDRs are generated according to 3GPP TS 32.298 V12.6.0.

**ePDG-CDR Format**

The ePDG-CDRs can be in ASN.1 format.

**Standard G-CDRs**

G-CDRs are generated according to 3GPP TS 32.251 V6.6.0. Currently ECS supports generation of CDRs using AAAMgrs only.

**G-CDR Format**

The G-CDRs can be in ASN.1 Format.

**Enhanced G-CDRs**

The ECS also supports enhanced G-CDRs, which is an enhanced format of standard G-CDRs to provide greater portability of charging information. eG-CDRs are compliant with 3GPP TS 32.298 v6.5.0 for Rel. 6 based dictionaries, and with 3GPP TS 32.298 v7.4.0 for Rel. 7 based dictionaries.
By default, the G-CDR does not support the traffic and vendor specific records. To support a traffic and vendor specific record, the ECS must be configured to generate eG-CDRs. eG-CDRs are useful to implement Time Based Charging (TBC) and Flow Based bearer Charging (FBC) to ECS.

eG-CDR supports customer specific formats configured in Ga context in a GGSN service with standard or custom specific GTPP dictionaries.

eG-CDR Format

The eG-CDRs can be in ASN.1 Format.

For more information on G-CDR and eG-CDR attributes and definitions, refer to the G-CDR and Enhanced G-CDR Field Descriptions chapter in this reference guide.

PDN Gateway Call Detail Records (PGW-CDRs)

PGW-CDRs are generated according to 3GPP TS 32.298 V8.5.0.

PGW-CDR Format

The PGW-CDRs can be in ASN.1 Format.

Serving Gateway Call Detail Records (SGW-CDRs)

SGW-CDRs are generated according to 3GPP TS 32.298 V8.7.0.

SGW-CDR Format

The SGW-CDRs can be in ASN.1 Format.

Standard SGSN CDRs

S-CDRs are generated according to 3GPP TS 32.215 V4.5.0 for Release 4 dictionaries, and 3GPP TS 32.298 V6.4.1 for Release 6 dictionaries.

S-CDR Format

The S-CDRs can be in ASN.1 Format.

Wireless LAN Call Detail Records (WLAN-CDRs)

WLAN-CDRs are generated according to 3GPP TS 32.298 V6.4.1.
WLAN-CDR Format

The WLAN-CDRs can be in ASN.1 Format.
Restructuring of CDR Module

Charging Data Records (CDRs) play very important role in billing of mobile subscribers and hence are of utmost importance for the mobile service providers. Though eGCDRs and PGW-CDRs comply to 32.298 3GPP standards, many customers have their own requirements (customizations) which may vary from the standards and hence there is a need to create and maintain a new “dictionary” which defines the fields and behavior of that customer's CDR.

GTTP dictionary will define all the attributes e.g. list of all the fields, encoding type (ASCII/ASN.1), release-compliance, supported product-type, etc.

The customizations include:

- Addition of new fields
- Encoding (ASN.1/ASCII)
- New cause codes
- New behavior e.g. suppress-zero-volume CDRs, bucket-updating based on certain dictionary.
- Management extensions
- 3GPP release compliance

There are various limitations/drawbacks with the current CDR dictionary implementation:

- High turnaround time – It takes approximately 2-3 weeks for doing any new minor customization.
- Error-prone implementation – The code changes are error-prone and likely to cause regressions.
- Outdated documentation – Either there is no documentation for various dictionaries or the document is out-of-sync with the actual implementation.

To nullify the above limitations, a new flexible and extensible framework has been implemented to generate eGCDR and PGW-CDR.

This new framework will be provided to define a dictionary in a structured format using a “Dictionary Definition Language (DDL)”. Using this language customers can clearly define fields, encoding and behavior applicable for a particular GTTP dictionary. DDL file will be parsed at compilation time and metadata will be populated to generate eGCDR and PGW-CDR.

PGW-CDRs/eGCDRs have been moved onto flexible DDL based framework. The syntax of these dictionaries/field modified dictionaries can be validated using the `ddl_validate` binary provided.

In StarOS release 16.0, the CLI command “gtpp egcdr new-path” is used to activate new framework for customized/field defined CDR generations. In release 17.0, the CLI command “gtpp egcdr dynamic-path” should be used to to load the customized or dynamic DDL. This framework provides a mechanism to define and load a customized dictionary by providing the path to the appropriate DDL file through this CLI command.

Customers should explicitly configure the dictionary as there will be no default dictionary. If no dictionary is configured, then eGCDR/PGW-CDR will not be generated.

When customer wants to add/modify/remove a field, this information has to be updated in DDL. The DDL file is processed dynamically and the field reflects in CDR.

**Important:** This framework works only for eGCDR and PGW-CDR.

It is not recommended to enable `gtpp egcdr dynamic-path` when there are active calls.
For more information on the command, refer to the *Command Line Interface Reference*. 
Triggers for Generation of Charging Records

The following sections describe the triggers for the generation of partial and final CDRs.

ePDG-CDR Triggers

The ePDG will use the Charging Characteristics to determine whether to activate or deactivate CDR generation. The Charging Characteristics are also used to set the coherent chargeable event conditions (e.g. time/volume limits that trigger CDR generation or information addition). Multiple Charging Characteristics “profiles” are configured on the ePDG to allow different sets of trigger values.

ePDG-CDR Charging Information Addition

The “List of Traffic Data Volumes” attribute in the ePDG-CDR consists of a set of containers that are added when specific trigger conditions are met, and identify the volume count per QoS, separated for uplink and downlink traffic, on encountering that trigger condition.

The following table identifies the conditions that are supported to trigger ePDG-CDR charging information addition.

<table>
<thead>
<tr>
<th>Trigger Conditions</th>
<th>Description/Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoS Change</td>
<td>A change in the QoS will result that open “List of Traffic Data Volumes” containers being closed and added to the CDR and new bearer specific container is opened. This can happen when P-GW initiates UBRRequest to modify the QoS for the session.</td>
</tr>
<tr>
<td>Tariff Time Change</td>
<td>On reaching the Tariff Time Change open “List of Traffic Data Volumes” containers will be closed and added to the CDR. Tariff-time change is for adding charging information to CDR during a particular tariff-time of day. For example, in a day CDR can be generated at 10 AM and 8:30 PM.</td>
</tr>
<tr>
<td>CDR Closure</td>
<td>Open “List of Traffic Data Volumes” containers will be closed and added to the ePDG-CDR.</td>
</tr>
</tbody>
</table>

Volume container identifies the uplink/downlink volume since the closure of the last container. When Charging Event is triggered by CDR Closure condition, this Change-Condition sub-field associated to the added volume container will be omitted, except when CDR closure is due to “maximum number of charging condition changes”, where it will be present with the original condition change.

Triggers for ePDG-CDR Closure

The ePDG-CDR will be closed on encountering some trigger conditions.

The following table identifies the conditions that are supported to permit closure of the ePDG-CDR.
Table 10. Triggers for ePDG-CDR Closure

<table>
<thead>
<tr>
<th>Closure Conditions</th>
<th>Description/Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of bearer within the ePDG</td>
<td>Deactivation of the bearer (either default or dedicated) in the ePDG will result in the CDR being closed. The trigger condition covers:</td>
</tr>
<tr>
<td></td>
<td>• termination of bearer;</td>
</tr>
<tr>
<td></td>
<td>• any abnormal release (as listed below):</td>
</tr>
<tr>
<td></td>
<td>• GTP-C/GTP-U path failures in S2b interface</td>
</tr>
<tr>
<td></td>
<td>• Dead Peer Detection in SWu interface.</td>
</tr>
<tr>
<td></td>
<td>• IKEA/IPSEA rekey failure</td>
</tr>
<tr>
<td>Partial Record Reason</td>
<td>OAM&amp;P reasons permit the closure of the CDR for internal reasons. The trigger condition covers:</td>
</tr>
<tr>
<td></td>
<td>• data volume limit; CDR generated based on every uplink/downlink/total volume limit.</td>
</tr>
<tr>
<td></td>
<td>• time (duration) limit; CDR generated for every configured &quot;x&quot; seconds time</td>
</tr>
<tr>
<td></td>
<td>• maximum number of charging condition changes (QoS/tariff time change); CDR generated when the max bucket limit is reached. By default it 4. Please check &quot;cc profile &lt;&gt; buckets &lt;&gt;&quot; CLI under accounting-policy configuration mode.</td>
</tr>
<tr>
<td></td>
<td>• management intervention; (clear subscriber &lt;&gt;)</td>
</tr>
</tbody>
</table>

The Partial Record generation trigger thresholds are those associated with the Charging Characteristics. The Partial Record generation trigger thresholds are ePDG configuration parameters defined per Charging Characteristics profile by the operator through configuration options. In the event that the ePDG-CDR is closed and the bearer remains active, a further ePDG-CDR is opened with an incremented Sequence Number in the ePDG.

When Charging Event is triggered by the above listed conditions, the Change-Condition (at PS information level) associated to the CDR closure, indicating the appropriate condition will be present, and it will be omitted otherwise.

**GGSN CDR Triggers**

The following sections describe the triggers for the generation of partial and final G-CDRs and eG-CDRs.

**G-CDR Triggers**

G-CDRs are updated (not closed) for any of the following conditions:

- SGSN IP address change
  
  When the SGSN IP address changes, i.e. an Update PDP Context Request is received with a new SGSN IP address, the old address (if not already added) and the new address are added to the field “List of SGSN Addresses”.

- QoS change
When a QoS change is detected, i.e. an Update PDP Context Request is received with a new QoS value) and the maximum number of configured “buckets” has not been reached, then a traffic data volume container for the previous QoS and volume is added to the field “List of Traffic Data Volumes”.

- **Tariff Time Change**

  When the tariff time changes and the maximum number of configured “buckets” has not been reached, then a traffic data volume container is added to the field “List of Traffic Data Volumes” for the volume before the tariff time.

The following events trigger closure and sending of a partial G-CDR:

- When the number of SGSN changes has reached the configured number of “sgsms”. Before this, the new SGSN address is added to the list of SGSN IP addresses in the CDR. If “sgsms 4” is configured, this means that after 4 handovers the record is closed and the G-CDR will contain 5 SGSN IP addresses. The parameter can be set to 1 to 4 with a default of 4.
- When the number of QoS changes or tariff time changes, with up to 4 timestamps which can be configured using the tariff statement, has reached the configured number of “buckets” (1 to 4 with default of 4). Before this, another traffic data volume container is added to the CDR for every change.
- Every x seconds configured using “interval x”
- Every x octets configured using “volume x” (up/down/total)

A G-CDR is closed as the final record of a subscriber session for the following events:

- Delete PDP context received from SGSN
- Delete PDP context initiated by GGSN (e.g. expiry of idle or absolute timer)
- Abnormal Releases such as PDP context replacements

### eG-CDR Triggers

eG-CDRs are updated (not closed) for any of the following conditions:

- **PDP context modification**

  When a change of PDP context conditions occurs (QoS change, SGSN change, PLMN Id change, RAT change) the List of Service Data (LOSDV) and the List of Traffic Volume (LOTV) containers are updated.

  In case of SGSN change condition only LOSDV containers are updated and also the List of SGSN addresses is updated.

- **Tariff time change**

  When a change of tariff time occurs a set of LOSDV and LOTV containers, i.e. all active service data flow containers, will be added to eG-CDR.

- **Failure handling procedure triggering**

  When the failure handling mechanism is triggered and the failure action is set to “continue” a set of LOSDV and LOTV containers, i.e. all active service data flow containers, will be added to eG-CDR.

- **Service data flow report**

  When an expiry of time limit, volume limit or termination is detected for a service data flow a set of LOSDV container is added to eG-CDR.

- **CDR closure**

  When a CDR closure occurs all active LOSDV containers are added to eG-CDR.

- **ULI change**
When the ULI changes, then a data volume container is added to the field "List of Service Data Volumes". The eG-CDRs will be closed and sent as a partial record for any of the following triggers:

- Data volume limit
- Time duration limit
- Maximum number of charging condition changes (QoS/tariff time change)
- Maximum number of service data containers
- Management intervention
- MS/Subscriber time zone change
- Inter PLMN SGSN change
- Radio Access Technology (RAT) change

When an eG-CDR partial is written, all open LOSDVs will be closed as well with a matching change condition.

The eG-CDRs will be closed and sent as a final record upon the deactivation of the PDP context in the GGSN, both for normal termination and for any abnormal release.

All LOSDV which have been reported in previous partials but did not have a final change condition in the container are repeated in the final eG-CDR with a final change condition (e.g. pDPContextRelease). In case no volume has been transferred for this container since the last eG-CDR, then the timestamps for first and last usage will be set to the default value of "000101000000-0200".

The following table lists the values for the “CauseForRecordClosing” field based on trigger scenarios.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Supported</th>
</tr>
</thead>
</table>
| normalRelease        | – Delete PDP from SGSN
– Manual call clearing on GGSN
– Radius disconnect
– Idle and absolute timeout | Final          | 0     | Yes       |
| abnormalRelease      | – Path failure
– Context replacement                                                     | Final          | 4     | Yes       |
| volumeLimit          | Configured volume threshold has been exceeded                              | Partial       | 16    | Yes       |
| timeLimit            | Configured interval has been reached                                        | Partial       | 17    | Yes       |
| sGSNChange           | – Configured limit of SGSN changes has been reached
– inter-PLMN SGSN change                                                  | Partial       | 18    | Yes       |
| maxChangeCond        | Configured limit of change conditions has been reached                     | Partial       | 19    | Yes       |
| managementIntervention| For example, using the command \texttt{gtpp interim now}                     | Partial       | 20    | Yes       |
| rATChange            | Radio access technology change                                             | Partial       | 22    | Yes       |
| mSTimeZoneChange     | MS changes time zone                                                       | Partial       | 23    | Yes       |
PGW-CDR Triggers

The following events trigger closure and the sending of a partial PGW-CDR:

- When the number of QoS changes or tariff time changes has reached the configured maximum number of charging condition changes. Before this, service containers are added to the CDR for every change.
- Every x seconds configured using “interval x”
- Every x octets configured using “volume x” (up/down/total)
- Command `gtpp interim now active-charging egcdr`
- Transferring the context to a new SGW/SGSN (serving Node Change).
- Changing the access type within the same P-GW (RAT Change)

A PGW-CDR is closed as the final record of a subscriber session for the following events:

- Detach Request received from UE
- Delete bearer context request received from SGW.
- Manual subscriber clearing
- Abnormal Releases such as path failures

The following table lists the values for the “CauseForRecordClosing” field based on trigger scenarios.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalRelease</td>
<td>IP-CAN bearer release or detach</td>
<td>Final</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>abnormalRelease</td>
<td>Any other abnormal release</td>
<td>Final</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>volumeLimit</td>
<td>Configured volume threshold has been exceeded</td>
<td>Partial</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>timeLimit</td>
<td>Configured interval has been reached</td>
<td>Partial</td>
<td>17</td>
<td>Yes</td>
</tr>
<tr>
<td>servingNodeChange</td>
<td>Serving node Address list overflow</td>
<td>Partial</td>
<td>18</td>
<td>Yes</td>
</tr>
<tr>
<td>maxChangeCondition</td>
<td>Maximum number of changes in charging conditions</td>
<td>Partial</td>
<td>19</td>
<td>Yes</td>
</tr>
<tr>
<td>managementIntervention</td>
<td>For example, using the command <code>gtpp interim now active-charging egcdr</code></td>
<td>Partial</td>
<td>20</td>
<td>Yes</td>
</tr>
<tr>
<td>RAT Change</td>
<td>Change of radio interface from (for example, EUTRAN to GSM to UMTS)</td>
<td>Partial</td>
<td>22</td>
<td>Yes</td>
</tr>
<tr>
<td>mSTimeZoneChange</td>
<td>MS changes time zone</td>
<td>Partial</td>
<td>23</td>
<td>Yes</td>
</tr>
<tr>
<td>PLMN Change</td>
<td>Change of PLMN-ID</td>
<td>Partial</td>
<td>24</td>
<td>Yes</td>
</tr>
</tbody>
</table>

PGW-CDR Charging Information Addition

The “List of Service Data” attribute in the PGW-CDR consists of a set of containers that are added when specific trigger conditions are met. Each container identifies the configured counts (volume separated for uplink and downlink, elapsed
time, or number of events) per rating group or combination of the rating group and service id within the same IP-CAN bearer, on encountering that trigger condition.

Table 13. Triggers for PGW-CDR Charging Information Addition

<table>
<thead>
<tr>
<th>Trigger Conditions</th>
<th>Description/Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP-CAN bearer modification</td>
<td>A change of IP-CAN bearer conditions (QoS change, SGSN/S-GW change, PLMN Id change, RAT change, user location change) results in a set of “List of Service Data” containers, such as all active service data flow containers, being added to the CDR.</td>
</tr>
<tr>
<td>Tariff Time Change</td>
<td>On reaching the Tariff Time Change, a set of “List of Service Data” containers, such as all active service data flow containers, is added to the CDR.</td>
</tr>
<tr>
<td>DCCA Failure-Handling procedure triggering</td>
<td>When the Diameter Credit-Control-Failure-Handling mechanism is triggered a “List of Service Data”, such as all active service data flow containers, is added to the CDR. The causes are only relevant due to simultaneous usage of an active DCCA session.</td>
</tr>
</tbody>
</table>
| Service data flow report                   | For independent online and offline charging, a “List of Service Data” container for the service data flow is added at:  
  * expiry of time limit
  * expiry of volume limit
  * expiry of unit limit
  * termination of service data flow  
For tight interworking of online and offline charging, a “List of Service Data” container for the service data flow is added when:  
  * time threshold reached
  * volume threshold reached
  * unit threshold reached
  * time quota exhausted
  * volume quota exhausted
  * unit quota exhausted
  * expiry of quota validity timer
  * termination of service data flow – re-authorization request by OCS. |

S-CDR Triggers

The SGSN will use the Charging Characteristics to determine whether to activate or deactivate CDR generation. The Charging Characteristics are also used to set the coherent chargeable event conditions (e.g. time/volume limits that trigger CDR generation or information addition). Multiple Charging Characteristics "profiles" may be configured on the SGSN to allow different sets of trigger values.

Triggers for S-CDR Closure

The following events trigger closure and sending of a partial S-CDR:
The number of QoS changes or tariff time changes has reached the configured number of "buckets". Before this, another traffic data volume container is added to the CDR for every change.

- every x seconds configured using "interval x"
- every x octets configured using "volume x" (uplink/downlink/total)
- command "gtpp interim now"
- transferring the context to a new SGSN (Inter SGSN Routing Area Update)
- changing the access type within the same SGSN (Intra SGSN Inter System Change)

An S-CDR is closed as the final record of a subscriber session for the following events:

- Detach Request received from MS
- Delete PDP context request received from MS
- Delete PDP context request received from GGSN
- Cancel Location received from HLR
- Delete subscriber data received from HLR
- Inactivity timeout on the SGSN
- Manual subscriber clearing
- command "clear subscribers all"
- ISRAU scenario (PDP is released at the OLD SGSN)
- Abnormal Releases such as path failures

The following table lists the different values for the CauseForRecordClosing field depending on the different trigger scenarios.

### Table 14. Cause for Record Closing

<table>
<thead>
<tr>
<th>Cause For Record Closure</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Configurable</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalRelease</td>
<td>• delete PDP from MS&lt;br&gt;• delete PDP from GGSN&lt;br&gt;• PDP Release due to ISRAU scenario</td>
<td>Final</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>abnormalRelease</td>
<td>• Path failure&lt;br&gt;• Attach on Attach</td>
<td>Final</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>SGSN Change</td>
<td>PDP Release in old SGSN due to ISRAU scenario.</td>
<td>Final</td>
<td>18</td>
<td>No</td>
</tr>
<tr>
<td>volumeLimit</td>
<td>configured volume threshold has been exceeded</td>
<td>Partial</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>timeLimit</td>
<td>configured interval threshold has been reached</td>
<td>Partial</td>
<td>17</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Triggers for S-CDR Charging Information Addition

The "List of Traffic Volumes" attribute of the S-CDR consists of a set of containers, which are added when specific trigger conditions are met, and identify the volume count per PDP context, separated for uplink and downlink traffic, on encountering that trigger condition.

Table 15. Triggers for S-CDR Charging Information Addition

<table>
<thead>
<tr>
<th>Change Condition</th>
<th>Scenario</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Configurable</th>
</tr>
</thead>
<tbody>
<tr>
<td>qoSChange</td>
<td>A change in the QoS will result in a &quot;List of Traffic Data Volumes&quot; container being added to the CDR.</td>
<td>Partial</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>tariffTime</td>
<td>On reaching the Tariff Time Change a &quot;List of Traffic Data Volumes&quot; container will be added to the CDR.</td>
<td>Partial</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>Direct Tunnel establishment</td>
<td>When the SGSN establishes or removes a Direct Tunnel a “List of Traffic Data Volumes” container will be added to the CDR. When a direct tunnel is established, the SGSN will no longer be able to count data volumes associated with the IP-CAN bearer for which the direct tunnel is established.</td>
<td>Partial</td>
<td>8</td>
<td>Yes</td>
</tr>
<tr>
<td>Direct Tunnel Removal</td>
<td>When the SGSN establishes or removes a Direct Tunnel a “List of Traffic Data Volumes” container will be added to the CDR.</td>
<td>Partial</td>
<td>9</td>
<td>Yes</td>
</tr>
<tr>
<td>recordClosure</td>
<td>A list of &quot;List of Traffic Data Volumes&quot; container will be added to the S-CDR.</td>
<td>-</td>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>

SGW-CDR Triggers

The following events trigger closure and sending of a partial SGW-CDR.
• When the number of QoS changes or tariff time changes or number of user location changes have reached the configured number of “buckets”. Prior to this, another traffic data volume container is added to the CDR for every change.
• Every x seconds configured using “interval x”
• Every x octets configured using “volume x” (up/down/total)
• Command `gtpp interim now`
• Transferring the context to a new S-GW
• Changing the access type within the same S-GW (RAT Change)

An SGW-CDR is closed as the final record of a subscriber session for the following events:
• Detach Request received from UE
• Delete bearer context request received from MME
• Delete bearer context request received from P-GW
• Manual subscriber clearing
• Abnormal Releases such as path failures

The following table lists the different values for the “CauseForRecordClosing” field depending on the different trigger scenarios.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalRelease</td>
<td>IP-CAN bearer release or detach</td>
<td>Final</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>abnormalRelease</td>
<td>Any other abnormal release</td>
<td>Final</td>
<td>4</td>
<td>Yes</td>
</tr>
<tr>
<td>volumeLimit</td>
<td>Configured volume threshold has been exceeded</td>
<td>Partial</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>timeLimit</td>
<td>Configured interval has been reached</td>
<td>Partial</td>
<td>17</td>
<td>Yes</td>
</tr>
<tr>
<td>servingNodeChange</td>
<td>Serving node Address list overflow</td>
<td>Partial</td>
<td>18</td>
<td>Yes</td>
</tr>
<tr>
<td>maxChangeCondition</td>
<td>Limit for the LOTV containers was exceeded</td>
<td>Partial</td>
<td>19</td>
<td>Yes</td>
</tr>
<tr>
<td>managementIntervention</td>
<td>For example, using the command <code>gtpp interim now</code></td>
<td>Partial</td>
<td>20</td>
<td>Yes</td>
</tr>
<tr>
<td>RAT Change</td>
<td>Change of radio interface from (for example, EUTRAN to GSM to UMTS)</td>
<td>Partial</td>
<td>22</td>
<td>No</td>
</tr>
<tr>
<td>mSTimeZoneChange</td>
<td>MS changes time zone</td>
<td>Partial</td>
<td>23</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Important:** The spec 3GPP TS 32.251 mentions that a CDR must be generated whenever the PLMN-ID of the serving node changes, but does not have a corresponding “cause for record closure” reason in 3GPP TS 32.298. In the case when the MME changed during the call and the PLMN-ID has the same address, the MME is added to the “Serving Node Address” list. If a “Serving Node Address” list overflow occurs, a partial CDR will be generated with "cause for record closure" as “servingNodeChange”.
SGW-CDR Charging Information Addition

The “List of Traffic Volumes” attribute of the SGW-CDR consists of a set of containers which are added when specific trigger conditions are met. They identify the volume count per QCI/ARP pair and are separated for uplink and downlink traffic after encountering that trigger condition.

The following table identifies which conditions are supported to trigger SGW-CDR charging information addition. Volume container identifies the uplink/downlink volume since the closure of the last container. The “Serving Node Address” attribute of the SGW-CDR consists of a list of serving node (for example, MME) addresses. A new serving node address is added to the list when MME changes.

Table 17. Triggers for SGW-CDR Charging Information Addition

<table>
<thead>
<tr>
<th>Trigger Conditions</th>
<th>Description/Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoS Change</td>
<td>A change in the QoS will occur when the open “List of Traffic Data Volumes” containers are closed and added to the CDR, and a new IP-CAN bearer specific container is opened.</td>
</tr>
<tr>
<td>Tariff Time Change</td>
<td>After reaching the Tariff Time Change, open “List of Traffic Data Volumes” containers are closed and added to the CDR.</td>
</tr>
<tr>
<td>User Location Change</td>
<td>A change in the User Location Info (for example, ECGI, TAI, RAI, SAI or CGI) will close open “List of Traffic Data Volumes” containers. They are then added to the CDR if location reporting is required and a report of User Location Change is received.</td>
</tr>
<tr>
<td>ULI Change</td>
<td>When the ULI changes, then a data volume container is added to the field &quot;List of Service Data Volumes&quot;.</td>
</tr>
<tr>
<td>Apn-Ambr Change</td>
<td>If APN AMBR changes container need to be added to a bearer based on the configuration of the trigger CLI command.</td>
</tr>
<tr>
<td>CDR Closure</td>
<td>Open “List of Traffic Data Volumes” containers are closed and added to the SGW-CDR.</td>
</tr>
</tbody>
</table>

WLAN-CDR Triggers

The following events trigger closure and sending of a partial WLAN-CDR:

- Time Trigger (every x seconds configured using “interval x”)
- Volume Trigger (every x octets configured using “volume x” (up/down/total))
- On reaching maximum number of container limit
- command gtpp interim now

A WLAN-CDR is closed as the final record of a session for the following events:

- UE initiated call termination
- command clear subscribers all
- Abnormal Releases due to multiple software failures
The table below lists the different values for the “CauseForRecordClosing” field depending on the different trigger scenarios.

### Table 18. Cause for Record Closing

<table>
<thead>
<tr>
<th>Cause</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Configurable</th>
</tr>
</thead>
<tbody>
<tr>
<td>normalRelease</td>
<td>UE is terminating the call</td>
<td>Final</td>
<td>0</td>
<td>No</td>
</tr>
<tr>
<td>abnormalRelease</td>
<td>Failure within the chassis (due to multiple software failures)</td>
<td>Final</td>
<td>4</td>
<td>No</td>
</tr>
<tr>
<td>volumeLimit</td>
<td>Configured volume threshold has been exceeded</td>
<td>Partial</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>timeLimit</td>
<td>Configured interval has been reached</td>
<td>Partial</td>
<td>17</td>
<td>Yes</td>
</tr>
<tr>
<td>maxChangeCondition</td>
<td>Limit for the LOTV containers was exceeded</td>
<td>Partial</td>
<td>19</td>
<td>Yes</td>
</tr>
<tr>
<td>managementIntervention</td>
<td>For example, using the command <code>gtpp interim now</code></td>
<td>Partial</td>
<td>20</td>
<td>No</td>
</tr>
<tr>
<td>managementIntervention</td>
<td>For example, using the command <code>clear subscribers all</code></td>
<td>Final</td>
<td>20</td>
<td>No</td>
</tr>
</tbody>
</table>

### WLAN-CDR Charging Information Addition

The “List of Traffic Volumes” attribute of the WLAN-CDR consists of a set of containers, which are added when specific trigger conditions are met, and identify the volume count per PDP context, separated for uplink and downlink traffic, on encountering that trigger condition.

The following table identifies which conditions are supported to trigger WLAN-CDR charging information addition. Volume container identifies the uplink/downlink volume since the closure of the last container. The “Serving Node Address” attribute of the SGW-CDR consists of a list of serving node (for example, MME) addresses. A new serving node address is added to the list when MME changes.

### Table 19. Triggers for WLAN-CDR Charging Information Addition

<table>
<thead>
<tr>
<th>Cause</th>
<th>Scenarios</th>
<th>Partial/Final</th>
<th>Value</th>
<th>Configurable</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoS Change</td>
<td>A change in the QoS shall result that open “List of Traffic Data Volumes” containers being closed and added to the CDR and new bearer specific container is opened.</td>
<td>Partial</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>tariffTime</td>
<td>On reaching the Tariff Time Change a “List of Traffic Data Volumes” container will be added to the CDR.</td>
<td>Partial</td>
<td>1</td>
<td>Yes</td>
</tr>
<tr>
<td>recordClosure</td>
<td>A list of “List of Traffic Data Volumes” container will be added to the WLAN-CDR.</td>
<td>-</td>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>
Chapter 2
GTPP Interface Configuration

This chapter describes how to configure the GTPP functionality. The following topics are covered in this chapter:

- Configuring the GPRS Tunneling Protocol
  - Configuring GTPP for ePDG
  - Configuring GTPP for GGSNP-GW
  - Configuring GTPP for PDG and TTG
  - Configuring GTPP for S-GW
  - Configuring GTPP for SGSN
Configuring the GPRS Tunneling Protocol

Cisco Systems’ GGSN/P-GW/S-GW supports both GTPP- and RADIUS-based accounting. The accounting protocol is configured on a per-APN basis.

When the GTPP protocol is used, accounting messages are sent to the Charging Gateways (CGs) over the Ga interface. The Ga interface and GTPP functionality are typically configured within the system's source context. As specified by the standards, a CDR is not generated when a session starts. CDRs are generated according to the interim triggers configured using the charging characteristics configured for the GGSN, and a CDR is generated when the session ends. For interim accounting, STOP/START pairs are sent based on configured triggers.

GTPP version 2 is always used. However, if version 2 is not supported by the Charging Gateway Function (CGF), the system reverts to using GTPP version 1. All subsequent CDRs are always fully-qualified partial CDRs. GTPP version 0 is not supported.

GTPP is configured at the routing context level. Some of the configurables associated with GTPP are Attributes, Charging Agent, Deadtime, etc. The GTPP configuration commands vary according to the services configured, for example, the commands used for GGSN might differ from what is configured for P-GW. For more information on the configuration commands, refer to the Command Line Interface Reference.

This section provides the GTPP configuration applied to various products.

**Important:** Commands used in the configuration examples in this section provide base functionality to the extent that the most common or likely commands and/or keyword options are present. In many cases, other optional commands and/or keyword options are available. Refer to the Command Line Interface Reference for complete information regarding all commands.

### Configuring GTPP for ePDG

This section provides the GTPP configuration for ePDG.

1. Configure the accounting context in Call Control Profile level and also specify the accounting mode.

```
configure

call-control-profile cc-prof_name

accounting-mode gtpp

end
```

When the accounting mode is set to GTPP, it indicates that the offline charging is enabled and Ga reference point will be used for passing ePDG CDRs to CGF (if enabled).

2. Associate the call-control-profile with an accounting policy configured in the same context. Accounting policies are configured through the policy accounting command in the Context Configuration mode.

```
configure

call-control-profile cc-prof_name

accounting-policy cc-prof_name
```

When the accounting policy is set, it indicates that the offline charging is enabled and Ga reference point will be used for passing ePDG CDRs to CGF (if enabled).
**GTPP Interface Configuration**

**Configuring the GPRS Tunneling Protocol**

1. **Call-control-profile**

   ```
   call-control-profile cc-prof_name
   ```

   ```
   associate accounting-policy policy_name
   ```

   ```
   end
   ```

   The accounting policy name will be used for finding the thresholds limits for various CDR triggers enabled.

3. **Associate the accounting context with the ePDG service.**

   ```
   configure
   ```

   ```
   context context_name
   ```

   ```
   call-control-profile cc-prof_name
   ```

   ```
   accounting context context-name [ gtpp group gtppgroup-name ]
   ```

   ```
   end
   ```

   This command can also be used to associate a predefined GTPP server group - including all its associated configuration - with the call-control-profile. If the GTPP group is not specified, then a default GTPP group in the accounting context will be used.

4. **Configure the GTPP group related parameters like GTPP server parameters, GTPP dictionary, and optionally CGF to support GTPP accounting:**

   ```
   configure
   ```

   ```
   context context_name
   ```

   ```
   gtpp group gtppgroup
   ```

   ```
   gtpp charging-agent address ip_address port port_num
   ```

   ```
   gtpp server server_name udp-port port_num
   ```

   ```
   gtpp dictionary dictionary_num
   ```

   ```
   gtpp storage-server mode { local | remote | streaming }
   ```

   ```
   gtpp attribute node-id-suffix cg
   ```

   ```
   gtpp attribute local-record-sequence-number
   ```

   ```
   gtpp trigger time-limit
   ```

   ```
   end
   ```

**Configuring GTPP for GGSN/P-GW**

This section provides the GTPP configuration for GGSN and P-GW.

1. **Configure the GTPP group and accounting context configuration in APN level and also specify the accounting mode.**
2. Configure the GTPP group related parameters like GTPP server parameters, GTPP dictionary, and optionally CGF to support GTPP accounting:

```plaintext
configure
context source
  gtpp group group1
  gtpp charging-agent address 1.2.3.4 port 3386
  gtpp server 1.3.5.6 max msgs priority 1
  gtpp dictionary dict1
  gtpp max-cdr 255 wait-time 10
  gtpp transport-layer udp
end
```

**Important:** For GGSN, accounting context can also be configured in GGSN service. In this case more priority will be given to the APN level configuration. In APN level, if no accounting context is configured then accounting context configured in GGSN service will be considered.

```plaintext
configure
context source
  ggsn-service ggsn1
  accounting context billing
end
```

The following tables list all configuration commands related to the creation and formatting of G-CDRs, eG-CDR, PGW-CDRs. These commands are specified in different portions of the system configuration file:
• **gtpp group** `<name>` - These are commands specified within the billing context that also contains the definition of the external interface (the storage server).

• Also contained in the GTPP group is the GTPP dictionary.

• For the 3GPP compliant P-GW records described in this document, the correct dictionary is **gtpp dictionary custom24**.

• The Rulebase Configuration mode sets the thresholds for various triggers.

## Table 20. G-CDR Configuration Parameters

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>gtpp group name in billing context</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>gtpp trigger volume-limit</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled no partial record closure occurs when volume limit is reached.</td>
</tr>
<tr>
<td><strong>gtpp trigger time-limit</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled no partial record closure occurs when the configured time limit is reached.</td>
</tr>
<tr>
<td><strong>gtpp trigger tariff-time-change</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled container closure does not happen for a tariff-time change.</td>
</tr>
<tr>
<td><strong>gtpp trigger sgsn-change-limit [ also-intra-sgsn-multiple-address-group-change ]</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>Disabling this trigger ignores an SGSN change and does not add the SGSN IP address into the SGSN address list of the G-CDR. This helps to reduce the release of G-CDRs due to SGSN changes crossing the configured limit. also-intra-sgsn-multiple-address-group-change : This keyword includes Intra-SGSN group changes as an SGSN change.</td>
</tr>
<tr>
<td><strong>gtpp trigger inter-plmn-sgsn-change</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>Disabling this trigger ignores an Inter-PLMN SGSN change and doesn't release a G-CDR.</td>
</tr>
<tr>
<td><strong>gtpp trigger qos-change</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>Disabling this trigger ignores a qos-change and does not open a new GCDR for it.</td>
</tr>
<tr>
<td><strong>gtpp trigger rat-change</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>No partial record closure for a RAT change occurs when this trigger is disabled.</td>
</tr>
<tr>
<td><strong>gtpp trigger ms-timezone-change</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>No partial record closure for a time zone change occurs when this trigger is disabled.</td>
</tr>
<tr>
<td><strong>gtpp attribute diagnostics</strong></td>
<td>No</td>
<td>no, enabled</td>
<td>Includes the Diagnostic field in the CDR that is created when PDP contexts are released</td>
</tr>
<tr>
<td><strong>gtpp attribute duration-ms</strong></td>
<td>No</td>
<td>no, enabled</td>
<td>Specifies that the information contained in the mandatory Duration field be reported in milliseconds instead of seconds (as the standards require).</td>
</tr>
<tr>
<td><strong>gtpp attribute plmn-id</strong></td>
<td>Enabled</td>
<td>no, enabled</td>
<td>Reports the SGSN PLMN Identifier value (the RAI) if it was originally provided by the SGSN in the GTP create PDP context request. It is omitted if the SGSN does not supply one.</td>
</tr>
</tbody>
</table>
### GTPP Interface Configuration

#### Configuring the GPRS Tunneling Protocol

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gtppp attribute local-record-sequence-number</td>
<td>no</td>
<td>no, enabled</td>
<td>Includes the Local Record Sequence Number together Node ID field in the CDR that is created when PDP contexts are released.</td>
</tr>
<tr>
<td>gtppp attribute node-id-suffix string</td>
<td>no</td>
<td>string between 1 to16 characters</td>
<td>Specifies the string suffix to use in the NodeID field of GTPP G-CDRs. With the default setting of &quot;no&quot; the GGSN uses the GTPP context name for the NodeId field.</td>
</tr>
</tbody>
</table>

"ggsn-service name" in Gn context

| cc profile index buckets number | index=0-15 number=4 | index=0-15 number=1-4 | Specifies the number of traffic volume container changes due to QoS changes or tariff time that can occur before an accounting record should be closed. |
| cc profile index sgsns num_changes | index=0-15 num_changes=4 | index=0-15 num_changes=1-15 | Specifies the number of SGSN changes (i.e., inter-SGSN switchovers) resulting in a new RAI (Routing Area Identity) that can occur before closing an accounting record. |

| cc profile index interval seconds [ downlink down_octets uplink up_octets | total total_octets ] | No | index=0-15 interval= 60-40,000,000 seconds octets=0-1,000,000 | Specifies the normal time duration that must elapse before closing an accounting record provided that any or all of the following conditions occur: |
| | | | • Downlink traffic volume is reached within the time interval. |
| | | | • Uplink traffic volume is reached within the time interval. |
| | | | • Total traffic volume (up and downlink) is reached within the time interval. |
| | | | Time is measured in seconds and can be configured to any integer value from 60 to 40,000,000. |
| | | | down_octets is the downlink traffic volume measured in octets and can be configured to any integer value from 0 to 1,000,000. |
| | | | up_octets is the uplink traffic volume measured in octets and can be configured to any integer value from 0 to 1,000,000. |
| | | | total_octets is the total traffic volume measured in octets and can be configured to any integer value from 0 to 1,000,000. |

| cc profile index volume volume [ downlink octets uplink octets | total octets ] | No | index=0-15 octets= 100,000-4,000,000,000 | Specifies the downlink, uplink, and total volumes that must be met before closing an accounting record. vol_down_octets is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000. vol_up_octets is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000. total_octets is the total traffic volume (up and downlink) measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000. |
### Command Line Interface Configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cc profile</strong> index tariff time1 mins hours time2 mins hours time3 mins hours time4 mins hours</td>
<td>No</td>
<td>index=0-15 mins=0 to 59 hours=0 to 23</td>
<td>Specifies time-of-day time values to close the current traffic volume container (but not necessarily the accounting record). Four different tariff times may be specified. If less than four times are required, the same time can be specified multiple times.</td>
</tr>
<tr>
<td>cc behavior no-records</td>
<td>No</td>
<td>1-12</td>
<td>Specifies the behavior bit upon which the GGSN ceases sending accounting records to a server. nr_value can be configured to any integer value between 1 and 12 corresponding to the 12 behavior bits B1 through B12.</td>
</tr>
</tbody>
</table>

*"apn name"*

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>cc-home behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFF index=0-15</td>
<td>When the GGSN is configured to reject the charging characteristics sent by the SGSN for &quot;home&quot; subscribers, it uses the profile index specified by this command to determine the appropriate CCs to use. Multiple behavior bits can be configured for a single profile index by &quot;Or&quot;ing the bit strings together and convert the result to hexadecimal. The properties of the actual CC profile index are configured as part of the GGSN service using the cc profile command.</td>
</tr>
<tr>
<td>cc-roaming behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFF index=0-15</td>
<td>Same as above, but for &quot;roaming&quot; subscribers</td>
</tr>
<tr>
<td>cc-visiting behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFF index=0-15</td>
<td>Same as above, but for &quot;visiting&quot; subscribers.</td>
</tr>
<tr>
<td>cc-sgsn</td>
<td>No</td>
<td></td>
<td>Causes the GGSN’s accepting of the specified CC from the SGSN(s).</td>
</tr>
<tr>
<td>cc-sgsn radius-returned</td>
<td>No</td>
<td></td>
<td>GGSN accepts CC provided by Radius</td>
</tr>
<tr>
<td>cc-sgsn radius-returned use-ggsn profile index</td>
<td>No</td>
<td>index=0-15</td>
<td>GGSN accepts CC from AAA server, or uses index if not provided</td>
</tr>
<tr>
<td>cc-sgsn use-ggsn profile index</td>
<td>No</td>
<td>index=0-15</td>
<td>GGSN uses profile index and sets bits 0-3 of the CC to index, overriding all other ways of providing CC</td>
</tr>
<tr>
<td>cc-sgsn use-ggsn behaviour bits</td>
<td>0xFFF</td>
<td>0x000-0xFFF</td>
<td>GGSN sets bits 4-31 of the CC to bits, overriding all other ways of providing CC</td>
</tr>
</tbody>
</table>

**Table 21. eG-CDR Configuration Parameters**
## Configuring the GPRS Tunneling Protocol

### GTPP Interface Administration and Reference, StarOS Release 18

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>gtpp trigger egcdr max-losdv</code></td>
<td>no</td>
<td>no, enabled</td>
<td>When this trigger is enabled a partial record will be generated once the maximum configured number of eG-CDR service containers has been reached.</td>
</tr>
<tr>
<td><code>gtpp egcdr lotdv-max-containers int</code></td>
<td>int=8</td>
<td>int=1..8</td>
<td>This parameter allows changing the maximum number of traffic volume containers in the LOTV field of the eG-CDR.</td>
</tr>
<tr>
<td><code>gtpp egcdr losdv-max-containers int</code></td>
<td>int=10</td>
<td>int=1..255</td>
<td>This parameter allows changing the maximum number of service data containers in the eG-CDR.</td>
</tr>
<tr>
<td>`gtpp egcdr final-record include-content-ids (all</td>
<td>only-with-traffic) closing-cause (same-in-all-partials</td>
<td>unique)`</td>
<td>only-with-traffic same-in-allpartials</td>
</tr>
<tr>
<td><code>gtpp eg cdr service-idle-timeout seconds</code></td>
<td>seconds=0</td>
<td>seconds=0, 10-86400</td>
<td>The service idle timeout configuration allows to specify a time period after which, if no data is reported for a service flow, the service container is closed and added to the eGCDR as part of LOSDV Container list with service condition change as &quot;ServiceIdleOut&quot;.</td>
</tr>
</tbody>
</table>

### Rulebase `name` in Active Charging Service

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>`timestamp rounding egcdr (ceiling</td>
<td>floor</td>
<td>round-off)`</td>
</tr>
<tr>
<td><code>egcdr threshold interval seconds</code></td>
<td>no</td>
<td>seconds=60..40000000</td>
</tr>
<tr>
<td>`egcdr threshold volume (downlink octets</td>
<td>uplink octets</td>
<td>total octets)`</td>
</tr>
<tr>
<td><code>egcdr service-data-flow threshold interval seconds</code></td>
<td>no</td>
<td>seconds=60..40000000</td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Range</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>egcdr service-data-flow threshold volume (downlink octets</td>
<td>no</td>
<td>octets=10000-400000000</td>
</tr>
<tr>
<td>egcdr tariff minute minute hour hour</td>
<td>no</td>
<td>minute=0..59 hour=0..23</td>
</tr>
<tr>
<td>apn name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>active-charging-service rulebase string</td>
<td></td>
<td>string= 1..63 characters</td>
</tr>
<tr>
<td>cc-home behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFFF index=0-15</td>
</tr>
<tr>
<td>cc-roaming behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFFF index=0-15</td>
</tr>
<tr>
<td>cc-visiting behavior bits profile index</td>
<td>bits=0x000 index=8</td>
<td>bits=0x000-0xFFFF index=0-15</td>
</tr>
<tr>
<td>cc-sgsn</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>cc-sgsn radius-returned</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>cc-sgsn radius-returned use-ggsn profile index</td>
<td>no</td>
<td>index=0-15</td>
</tr>
<tr>
<td>cc-sgsn use-ggsn profile index</td>
<td>no</td>
<td>index=0-15</td>
</tr>
<tr>
<td>cc-sgsn use-ggsn behaviour bits</td>
<td>0xFFF</td>
<td>0x000-0xFFFF</td>
</tr>
</tbody>
</table>
Table 22.  PGW-CDR Configuration Parameters

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTPP Configuration mode - “gtpp group &lt;name&gt;” in billing context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gtpp trigger volume-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the volume limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger time-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the configured time limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger tariff-time-change</td>
<td>Enabled</td>
<td>When this trigger is enabled, container closure occurs for a tariff-time change.</td>
</tr>
<tr>
<td>gtpp trigger qos-change</td>
<td>Enabled</td>
<td>When this trigger is enabled, container closure occurs for qos-change.</td>
</tr>
<tr>
<td>gtpp trigger rat-change</td>
<td>Enabled</td>
<td>Partial record closure for a RAT change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp trigger ms-timezone-change</td>
<td>Enabled</td>
<td>Partial record closure for a time zone change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp attribute plmn-id</td>
<td>Enabled</td>
<td>Specifying this option includes the “PLMN Id” field in the CDR.</td>
</tr>
<tr>
<td>gtpp trigger serving-node-change-limit</td>
<td>Enabled</td>
<td>A change of the serving node address will cause the new address to be added to the list of serving node addresses. A partial CDR will then be generated when the configured limit is reached.</td>
</tr>
<tr>
<td>gtpp attribute diagnostics</td>
<td>No</td>
<td>Includes the “Diagnostic” field in the CDR that is created when PDP contexts are released.</td>
</tr>
<tr>
<td>gtpp attribute duration-ms</td>
<td>No</td>
<td>Specifying this option results in the mandatory “Duration” field in the CDR to be recorded in milliseconds rather than seconds.</td>
</tr>
<tr>
<td>gtpp attribute imei</td>
<td>Enabled</td>
<td>Specifying this option includes the “IMEI” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute local-record-sequence-number</td>
<td>No</td>
<td>Specifying this option includes the optional “Local Record Sequence Number” and “Node-ID” fields in the CDR. Since the Local Record Sequence Number must be unique within one node (identified by Node-ID), the Node-ID field will consist of the sessMgr Recovery count + AAA Manager identifier + the name of the GSN service. Since each AAA Manager generates CDRs independently, the Local Record Sequence Number and Node ID fields uniquely identify a CDR.</td>
</tr>
<tr>
<td>gtpp attribute msisdn</td>
<td>Enabled</td>
<td>Specifying this option includes the “MSISDN” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute node-id-suffix &lt;string&gt;</td>
<td>No</td>
<td>Specifies the suffix to use in the Node-ID field of PGW-CDRs. With the default setting of “no”, the P-GW uses the active-charging service name for the Node-ID field.</td>
</tr>
<tr>
<td>gtpp attribute rat</td>
<td>Enabled</td>
<td>Specifying this option includes the “RAT” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute record-extensions rat</td>
<td>No</td>
<td>Enables encoding of the RAT in the record-extension field of the CDR.</td>
</tr>
<tr>
<td>gtpp attribute apn-ni</td>
<td>Enabled</td>
<td>Specifying this option includes field accessPointNameNI in the CDR.</td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>gtpp attribute pdp-type</td>
<td>Enabled</td>
<td>Specifying this option includes the pdpPDNType field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute pdp-address</td>
<td>Enabled</td>
<td>Specifying this option includes the servedPDPPDNAddress field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute dynamic-flag</td>
<td>Enabled</td>
<td>Specifying this option includes the dynamicAddressFlag field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute node-id</td>
<td>Enabled</td>
<td>Specifying this option includes the nodeID field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute apn-selection-mode</td>
<td>Enabled</td>
<td>Specifying this option includes the apnSelectionMode field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute charging-characteristic-</td>
<td>Enabled</td>
<td>Specifying this option includes the chChSelectionMode field in the CDR.</td>
</tr>
<tr>
<td>selection-mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gtpp attribute mstime-zone</td>
<td>Enabled</td>
<td>Specifying this option includes the mSTimeZone field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute uli</td>
<td>Enabled</td>
<td>Specifying this option includes the userLocationInformation field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute losdv</td>
<td>Enabled</td>
<td>Specifying this option includes the LOSDVs field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute served-mnai</td>
<td>Enabled</td>
<td>Specifying this option includes the servedMNAI field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute pgw-plmn-id</td>
<td>Enabled</td>
<td>Specifying this option includes the p-GWPLMNIdentifier field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute start-time</td>
<td>Enabled</td>
<td>Specifying this option includes the startTime field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute stop-time</td>
<td>Enabled</td>
<td>Specifying this option includes the stopTime field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute pdn-connection-id</td>
<td>Enabled</td>
<td>Specifying this option includes the pDNConnectionID field in the CDR.</td>
</tr>
<tr>
<td>gtpp storage-server local file format</td>
<td></td>
<td>Defines the file format for CDR files created on the hard disk.</td>
</tr>
<tr>
<td>gtpp storage-server local file compression</td>
<td>None</td>
<td>Compresses billing files with gzip.</td>
</tr>
</tbody>
</table>

**Rulebase Configuration mode**

| egcdr threshold interval <seconds> | No     | Specifies the threshold for the time interval. |
## Configuring GTPP Interface for PDG and TTG

This section provides the GTPP configuration for PDG.

1. At the APN level configure GTPP in the accounting-mode.

   ```
   configure
   
   context dest1
   
   apn apn_name
   
   accounting-mode gtpp
   
   gtpp group group1 accounting-context pdg
   
   end
   ```

2. At the context level configure the accounting policy. This is required only for time/tariff/volume threshold configuration.

   ```
   configure
   
   context dest1
   
   policy accounting acct1
   
   cc profile 1 interval 60
   ```

---

### Command Table

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>egcdr threshold</strong> volume { downlink</td>
<td>uplink</td>
<td>total &lt;bytes&gt; }</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>downlink bytes</strong> is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>uplink bytes</strong> is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <strong>total bytes</strong> is the total traffic volume (up and downlink) measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000.</td>
</tr>
<tr>
<td><strong>egcdr tariff minute</strong> &lt;mins&gt; hour &lt;hours&gt;</td>
<td>No</td>
<td>Specifies the time-of-day time values for closing the current traffic volume container (but not necessarily the accounting record). Six different tariff times may be specified. If less than four times are required, the same time can be specified multiple times.</td>
</tr>
</tbody>
</table>

### Cc profile configuration

| cc profile index {0..15} serving-nodes {1..15} | index=8 | serving-nodes=4 | Specifies the number of serving node changes for which a new address is added to the list of serving node addresses in the CDR. A partial CDR is generated when this limit is exceeded. Currently this is not supported. |
3. Associate the accounting policy with the PDG service.

```bash
classify
context source

ddg-service pdg1
associate accounting-policy acct1
end
```

4. Configure the GTPP group related parameters and CDR attributes/triggers.

```bash
configure

context source

  gtpp group group1
  gtpp charging-agent address 1.2.3.4 port 3386
  gtpp server 1.3.5.6 max msgs priority 1
  gtpp dictionary dict1
  gtpp max-cdr 255 wait-time 10
  gtpp transport-layer udp
  gtpp trigger volume-limit
  gtpp attribute local-record-sequence-number
end
```

The following table lists configuration commands related to creating and formatting WLAN-CDRs. These commands appear at different portions of the system configuration file.

- **gtpp group <name>** - These are commands specified within the billing context that also contains the definition of the external interface (the storage server).

- **policy accounting** - These commands contain the thresholds for various triggers. The policy accounting commands can be associated with the PDG or TTG service by configuring an associated accounting-policy in that particular service.
Table 23. WLAN-CDR Configuration Parameters

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GTPP Configuration mode - “gtpp group &lt;name&gt;” in billing context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gtpp trigger volume-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the volume limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger time-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the configured time limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger tariff-time-change</td>
<td>Enabled</td>
<td>When this trigger is enabled, container closure occurs for a tariff-time change.</td>
</tr>
<tr>
<td>gtpp trigger qos-change</td>
<td>Enabled</td>
<td>Enabling this trigger opens a new CDR for a QoS change.</td>
</tr>
<tr>
<td>gtpp trigger rat-change</td>
<td>Enabled</td>
<td>Partial record closure for a RAT change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp trigger ms-timezone-change</td>
<td>Enabled</td>
<td>Partial record closure for a time zone change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp attribute cell-plmn-id</td>
<td>Enabled</td>
<td>Specifying this option includes the “Cell PLMN Id” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute diagnostics</td>
<td>No</td>
<td>Specifying this option includes the “Diagnostic” field in the CDR that is created when PDP contexts are released.</td>
</tr>
<tr>
<td>gtpp attribute duration-ms</td>
<td>No</td>
<td>Specifying this option results in the mandatory “Duration” field in the CDR to be recorded in milliseconds rather than seconds.</td>
</tr>
<tr>
<td>gtpp attribute imei</td>
<td>Enabled</td>
<td>Specifying this option includes the “IMEI” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute local-record-sequence-number</td>
<td>No</td>
<td>Specifying this option includes the optional “Local Record Sequence Number” and “Node-ID” fields in the CDR. Since the Local Record Sequence Number must be unique within one node (identified by Node-ID), the Node-ID field will consist of the sessMgr Recovery count + AAA Manager identifier + the name of the GSN service. Since each AAA Manager generates CDRs independently, the Local Record Sequence Number and Node ID fields uniquely identify a CDR.</td>
</tr>
<tr>
<td>gtpp attribute msisdn</td>
<td>Enabled</td>
<td>Specifying this option includes the “MSISDN” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute node-id-suffix &lt;string&gt;</td>
<td>No</td>
<td>Specifying this option sets the string suffix to use in the NodeID field of SGW-CDRs. The S-GW uses the GTPP context name for the NodeID field with the default setting of “no”.</td>
</tr>
<tr>
<td>gtpp attribute rat</td>
<td>Enabled</td>
<td>Specifying this option includes the “RAT” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute record-extensions rat</td>
<td>No</td>
<td>Specifying this option enables encoding of the RAT in the record-extension field of the CDR.</td>
</tr>
<tr>
<td>gtpp storage-server local file format</td>
<td></td>
<td>Defines the file format for CDR files created on the hard disk.</td>
</tr>
<tr>
<td>gtpp storage-server local file compression</td>
<td>None</td>
<td>Compresses generated billing files with gzip.</td>
</tr>
</tbody>
</table>
"policy accounting" in Gn context

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>cc profile &lt;index&gt; buckets &lt;number&gt;</td>
<td>index=0-15 number=4</td>
<td>Specifies the number of traffic volume container changes due to QoS changes or tariff time that can occur before an accounting record is closed.</td>
</tr>
<tr>
<td>cc profile &lt;index&gt; interval &lt;seconds&gt; [ downlink &lt;down_octets&gt; uplink &lt;up_octets&gt;</td>
<td>No</td>
<td>Specifies the normal time duration that must elapse before closing an accounting record provided that any or all of the following conditions occur:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Downlink traffic volume is reached within the time interval</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Uplink traffic volume is reached within the time interval</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Total traffic volume (uplink and downlink) is reached within the time interval measured in seconds and can be configured to any integer value from 60 to 4000000.</td>
</tr>
<tr>
<td>cc profile &lt;index&gt; volume { downlink &lt;vol_down_octets&gt; uplink &lt;vol_up_octets&gt;</td>
<td>No</td>
<td>Specifies the downlink, uplink, and total volumes that must be met before closing an accounting record.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• vol_down_octets is measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• vol_up_octets is measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• total_octets is the total traffic volume (uplink and downlink) measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
</tr>
<tr>
<td>cc profile &lt;index&gt; tariff time1 mins hours time2 mins hours time3 mins hours time4 mins hours</td>
<td>No</td>
<td>Specifies time-of-day time values to close the current traffic volume container (but not necessarily the accounting record). Four different tariff times may be specified. If less than four times are required, then the same time value can be specified multiple times.</td>
</tr>
</tbody>
</table>

This section provides the GTPP configuration for TTG.

1. At the subscriber level configure GTPP in the accounting-mode.

    configure

    context dest1

    subscriber default

    accounting-mode gtpp

    end
2. At the context level configure the accounting policy. This is required only for time/tariff/volume threshold configuration.

```
configure

context dest1

policy accounting acct1

cc profile 1 interval 60
cc profile 1 volume total 100000
cc profile 1 tariff time 1 0 0 time 2 2 2 time 3 4 4 time 4 5 5
cc profile 1 buckets 3
cc profile 1 serving-nodes 4
end
```

3. Associate the accounting policy with the TTG service.

```
configure

context source

pdg-service pdg1
accounting context pdg
associate accounting-policy acct1
end
```

4. Configure the GTPP group related parameters and CDR attributes/triggers.

```
configure

context source

gtpp group default
gtpp charging-agent address 1.2.3.4 port 3386
gtpp server 1.3.5.6 max msgs priority 1
gtpp dictionary dict1
gtpp max-cdr 255 wait-time 10
gtpp transport-layer udp
gtpp trigger volume-limit
gtpp attribute rat
```
Configuring GTPP for S-GW

This section provides the GTPP configuration for S-GW.

1. At the subscriber level configure GTPP in the accounting-mode.

```config
configure
context dest1
    subscriber default
    accounting-mode gtpp
end
```

2. At the context level configure the accounting policy. This is required only for time/tariff/volume threshold configuration.

```config
configure
context dest1
    policy accounting lte
        cc profile 1 interval 60
        cc profile 1 volume total 100000
        cc profile 1 tariff time 1 0 0 time 2 2 2 time 3 4 4 time 4 5 5
        cc profile 1 buckets 3
        cc profile 1 serving-nodes 4
end
```

3. Associate the accounting policy with the S-GW service.

```config
configure
context source
    sgw-service sgwl
    associate accounting-policy lte
end
```

4. Configure the accounting context and GTPP group in S-GW service level. If accounting context is not configured in S-GW service the source context and "default" GTPP group will be selected.

```config
```
5. Configure the GTPP group related parameters.

configure

context source

sgw-service sgw1

accounting context dest1 gtpp group sgw

end

**Important**: SGW-CDRs are suppressed and only PGW-CDRs are generated for a session hosted by the associated S-GW and P-GW service. SGW-CDRs are generated when the S-GW connects to an external P-GW.

The following table lists the configuration commands related to creating and formatting SGW-CDRs. These commands appear at different portions of the system configuration file.

- **gtpp group <name>** - These are commands specified within the billing context that also contains the definition of the external interface (the storage server).

- **policy accounting** - These commands contain the thresholds for various triggers. The "policy accounting" commands can be associated with the sgw-service by configuring an associated accounting-policy" in sgw-service.

**Table 24. SGW-CDR Configuration Parameters**

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GTPP Configuration mode</strong> - “gtpp group &lt;name&gt;” in billing context</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gtpp trigger volume-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the volume limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger time-limit</td>
<td>Enabled</td>
<td>When this trigger is enabled, partial record closure occurs when the configured time limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger tariff-time-change</td>
<td>Enabled</td>
<td>When this trigger is enabled, container closure occurs for a tariff-time change.</td>
</tr>
<tr>
<td>Command</td>
<td>Default</td>
<td>Comment</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>gtpp trigger qos-change</td>
<td>Enabled</td>
<td>Enabling this trigger opens a new CDR for a QoS change.</td>
</tr>
<tr>
<td>gtpp trigger rat-change</td>
<td>Enabled</td>
<td>Partial record closure for a RAT change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp trigger ms-timezone-change</td>
<td>Enabled</td>
<td>Partial record closure for a time zone change occurs when this trigger is enabled.</td>
</tr>
<tr>
<td>gtpp attribute apn-ambr-change</td>
<td>disabled</td>
<td>No partial record closure for an apn-ambr-change occurs when this trigger is disabled.</td>
</tr>
<tr>
<td>gtpp attribute cell-plmn-id</td>
<td>Enabled</td>
<td>Specifying this option includes the “Cell PLMN Id” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute diagnostics</td>
<td>No</td>
<td>Specifying this option includes the “Diagnostic” field in the CDR that is created when PDP contexts are released.</td>
</tr>
<tr>
<td>gtpp attribute duration-ms</td>
<td>No</td>
<td>Specifying this option results in the mandatory “Duration” field in the CDR to be recorded in milliseconds rather than seconds.</td>
</tr>
<tr>
<td>gtpp attribute imei</td>
<td>Enabled</td>
<td>Specifying this option includes the “IMEI” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute local-record-sequence-number</td>
<td>No</td>
<td>Specifying this option includes the optional “Local Record Sequence Number” and “Node-ID” fields in the CDR. Since the Local Record Sequence Number must be unique within one node (identified by Node-ID), the Node-ID field will consist of the sessMgr Recovery count + AAA Manager identifier + the name of the GSN service. Since each AAA Manager generates CDRs independently, the Local Record Sequence Number and Node ID fields uniquely identify a CDR.</td>
</tr>
<tr>
<td>gtpp attribute msisdn</td>
<td>Enabled</td>
<td>Specifying this option includes the “MSISDN” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute node-id-suffix &lt;string&gt;</td>
<td>No string between 1 and 16 characters</td>
<td>Specifying this option sets the string suffix to use in the NodeID field of SGW-CDRs. The S-GW uses the GTPP context name for the NodeID field with the default setting of “no”.</td>
</tr>
<tr>
<td>gtpp attribute rat</td>
<td>Enabled</td>
<td>Specifying this option includes the “RAT” field in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute record-extensions rat</td>
<td>No</td>
<td>Specifying this option enables encoding of the RAT in the record-extension field of the CDR.</td>
</tr>
<tr>
<td>gtpp storage-server local file format</td>
<td>No</td>
<td>Defines the file format for CDR files created on the hard disk.</td>
</tr>
<tr>
<td>gtpp storage-server local file compression</td>
<td>None</td>
<td>Compresses generated billing files with gzip.</td>
</tr>
<tr>
<td>gtpp attribute served-pdp-pdn-address-extension</td>
<td>None</td>
<td>Allows the operator to configure the served-pdp-pdn-extension field in S-CDR. This CLI introduced in 14.0 release.</td>
</tr>
<tr>
<td>gtpp attribute apn-ambr</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;APN-AMBR&quot; in the CDR as part of epcQOSInformationContent.</td>
</tr>
<tr>
<td>gtpp attribute imsi-unauthenticated-flag</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;IMSI Unauthenticated Flag&quot; in the CDR.</td>
</tr>
</tbody>
</table>
### GTPP Interface Configuration

#### Configuring the GPRS Tunneling Protocol

<table>
<thead>
<tr>
<th>Command</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gtpp attribute user-csg-information</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;User CSG Information&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute dynamic-flag-extension</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;Dynamic Address Flag Extension&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute sgw-ipv6-addr</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;sgw-ipv6-addr&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute sna-ipv6-addr</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;servingNodeIPv6Address&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute pgw-ipv6-addr</td>
<td>None</td>
<td>Specifying this option includes optional field &quot;pgw-ipv6-addr&quot; in the CDR.</td>
</tr>
</tbody>
</table>

### "policy accounting" in Gn context

| cc profile <index> buckets <number> | index=0-15 number=4 | Specifies the number of traffic volume container changes due to QoS changes or tariff time that can occur before an accounting record is closed. |

<table>
<thead>
<tr>
<th>cc profile &lt;index&gt; interval &lt;seconds&gt;</th>
<th>&lt;downlink&gt; &lt;down_octets&gt; &lt;uplink&gt; &lt;up_octets&gt;</th>
<th>total &lt;total_octets&gt;</th>
<th>No</th>
<th>Specifies the normal time duration that must elapse before closing an accounting record provided that any or all of the following conditions occur:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>down_octets is the downlink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>up_octets is the uplink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>total_octets is the total traffic volume measured in octets and can be configured to any integer value from 0 to 1000000.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cc profile &lt;index&gt; volume { downlink &lt;vol_down_octets&gt; uplink &lt;vol_up_octets&gt;</th>
<th>total &lt;total_octets&gt;</th>
<th>No</th>
<th>Specifies the downlink, uplink, and total volumes that must be met before closing an accounting record.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>vol_down_octets is measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>vol_up_octets is measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>total_octets is the total traffic volume (uplink and downlink) measured in octets and can be configured to any integer value from 100000 to 4000000000.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| cc profile <index> tariff time1 mins hours time2 mins hours time3 mins hours time4 mins hours | No | Specifies time-of-day time values to close the current traffic volume container (but not necessarily the accounting record). Four different tariff times may be specified. If less than four times are required, then the same time value can be specified multiple times. |
Configuring GTPP for SGSN

This section provides the GTPP configuration for SGSN.

1. At the local context level, configure the system to reserve a CPU for performing a AAA proxy function for accounting.

   ```
   configure
   context local
   gtpp single-source private-extensions
   end
   ```

2. When gprs-service and sgsn-service are configured in source context, configure the GTPP group related parameters like GTPP server parameters, GTPP dictionary, and optionally CGF to support GTPP accounting:

   ```
   configure
   context source
   gtpp group default
   gtpp charging-agent address 192.168.10.10
   gtpp server 192.168.10.2 priority 1 max 1
   gtpp dictionary custom10
   end
   ```

**Important:** The above configuration is applicable for the transfer of generated CDRs to the CGF server over GTPP protocol. Configuration varies slightly if GSS/HDD is used for transferring/storing CDRs.

The following table lists all configuration commands which are related to the creation and formatting of S-CDRs. These commands are given in different portions of the configuration file:

- **gtpp group** `<name>` in the billing context: these are commands specified together with the definition of the external interface, i.e. the storage server.

- **sgsn-service/gprs-service** `<name>` in the Gn context: global settings, mainly for triggers, related to all subscribers depending on the selected charging characteristics.
  - sgsn-service config is required for 3G.
  - gprs-service config is required for 2G.

- **sgsn-operator-policy** `<name>`: defines the preference and default value for the charging characteristics

<table>
<thead>
<tr>
<th>Table 25</th>
<th>S-CDR Configuration Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>Default Value</td>
</tr>
</tbody>
</table>

GTPP Interface Administration and Reference, StarOS Release 18
### Configuring the GPRS Tunneling Protocol

#### GTPP Interface Configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>gtpp group</strong> &lt;name&gt; in billing context</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Trigger Related Configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gtpp trigger volume-limit</td>
<td>enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled no partial record closure occurs when volume limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger time-limit</td>
<td>enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled no partial record closure occurs when the configured time limit is reached.</td>
</tr>
<tr>
<td>gtpp trigger tariff-time-change</td>
<td>enabled</td>
<td>no, enabled</td>
<td>When this trigger is disabled container closure does not happen for a tariff-time-change.</td>
</tr>
<tr>
<td>gtpp trigger qos-change</td>
<td>enabled</td>
<td>no, enabled</td>
<td>Disabling this trigger ignores a qos-change and does not open a new CDR for it.</td>
</tr>
</tbody>
</table>

#### CDR attribute related configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gtpp attribute diagnostics</td>
<td>no</td>
<td>no, enabled</td>
<td>Includes the Diagnostic field in the CDR that is created when PDP contexts are released.</td>
</tr>
<tr>
<td>gtpp attribute duration-ms</td>
<td>no</td>
<td>no, enabled</td>
<td>Specifying this option results in mandatory &quot;Duration&quot; field in the CDR to be recorded in milliseconds rather than seconds.</td>
</tr>
<tr>
<td>gtpp attribute imei</td>
<td>enabled</td>
<td>no, enabled</td>
<td>Specifying this option includes field &quot;IMEI&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute camel-info</td>
<td>disabled</td>
<td>no, enabled</td>
<td>If enabled include CAMEL related information in the CDR provided if Ge interface is enabled.</td>
</tr>
<tr>
<td>gtpp attribute local-record-sequence-number</td>
<td>no</td>
<td>no, enabled</td>
<td>Specifying this option includes optional fields &quot;Local Record Sequence Number&quot; and &quot;Node-ID&quot; in the CDR. Since the &quot;Local Record Sequence Number&quot; has to be unique within one node (identified by &quot;Node-ID&quot;), &quot;Node-ID&quot; field will consist of sessMgr Recovery count + AAA Manager identifier + the name of the GSN service. Since each AAA Manager generates CDRs independently, that allows the &quot;Local Record Sequence Number&quot; and &quot;Node ID&quot; fields to uniquely identify a CDR.</td>
</tr>
<tr>
<td>gtpp attribute msisdn</td>
<td>enabled</td>
<td>no, enabled</td>
<td>Specifying this option includes field &quot;MSISIDN&quot; in the CDR.</td>
</tr>
<tr>
<td>gtpp attribute node-id-suffix &lt;string&gt;</td>
<td>no</td>
<td>string from 1 to 16 characters</td>
<td>Specifies the string suffix to use in the Node-ID field of S-CDRs. With the default setting of &quot;no&quot; the SGSN uses the GTPP context name for the Node-Id field.</td>
</tr>
<tr>
<td>gtpp attribute rat</td>
<td>enabled</td>
<td>no, enabled</td>
<td>Specifying this option includes field &quot;RAT&quot; in the CDR.</td>
</tr>
</tbody>
</table>

#### HDD related configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>gtpp storage-server local file format &lt;custom1-custom6&gt;</td>
<td>custom4</td>
<td>enabled</td>
<td>Defines the file format for CDR files created on the hard disk.</td>
</tr>
<tr>
<td>Command</td>
<td>Default Value</td>
<td>Range</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>gtpp storage-server local file compression</code></td>
<td>none</td>
<td>none</td>
<td>Allows to compress generated billing files with gzip.</td>
</tr>
<tr>
<td>`gtpp storage-server mode { local</td>
<td>remote }`</td>
<td>remote</td>
<td>enabled</td>
</tr>
<tr>
<td><code>gtpp storage-server local file rotation cdr-count</code> &lt;1000–65535&gt;</td>
<td>cdr-count 10000</td>
<td>no, enabled</td>
<td>Configures cdr-count for file rotation.</td>
</tr>
<tr>
<td><code>gtpp storage-server local file rotation volume mb &lt;2MB–40MB&gt;</code></td>
<td>4MB</td>
<td>no, enabled</td>
<td>Configures file volume for file rotation.</td>
</tr>
<tr>
<td><code>gtpp storage-server local file rotation time-interval</code></td>
<td>3600</td>
<td>no, enabled</td>
<td>Configures time-interval for file rotation.</td>
</tr>
</tbody>
</table>

**sgsn-service <name> in Gn context or "gprs-service <name>" in Gn context**

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>cc profile &lt;index&gt; buckets &lt;number&gt;</code></td>
<td>index=0-15</td>
<td>index=0-15 number=4</td>
<td>Specifies the number of traffic volume container changes due to QoS changes or tariff time that can occur before an accounting record should be closed.</td>
</tr>
<tr>
<td><code>cc profile &lt;index&gt; interval &lt;seconds&gt;</code></td>
<td>no</td>
<td>index=0-15 interval= 60-40.000.000 seconds octets=0-1,000,000</td>
<td>Specifies the normal time duration that must elapse before closing an accounting record.</td>
</tr>
</tbody>
</table>
| `cc profile <index> volume volume { downlink <octets> uplink <octets> | total <octets> } | no | index=0-15 octets= 100,000-4,000.000.000 | Specifies the downlink, uplink, and total volumes that must be met before closing an accounting record.  
  - vol_down_octets is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000  
  - vol_up_octets is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000  
  - total_octets is the total traffic volume (up and downlink) measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000 |
| `cc profile <index> tariff time1 mins hours time2 mins hours time3 mins hours time4 mins hours` | no            | index=0-15 mins= 0 to 59 hours= 0 to 23 | Specifies time-of-day time values to close the current traffic volume container (but not necessarily the accounting record). Four different tariff times may be specified. If less than four times are required, the same time can be specified multiple times. |
GTPP Interface Configuration

<table>
<thead>
<tr>
<th>Command</th>
<th>Default Value</th>
<th>Range</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>sgsn-operator-policy { default</td>
<td>name &lt;name&gt; }</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cc behavior no-records</td>
<td>no</td>
<td>1-12</td>
<td>Specifies the behavior bit upon which the SGSN ceases sending accounting records to a server. \textit{nr_value} can be configured to any integer value between 1 and 12 corresponding to the 12 behavior bits.</td>
</tr>
<tr>
<td>cc prefer</td>
<td>hlr-value</td>
<td>local-valuehlr-value</td>
<td>Specify the preference for local/HLR CC settings.</td>
</tr>
<tr>
<td>cc local-value behavior &lt;bits&gt; profile &lt;index&gt;</td>
<td>bits=0x000index=8</td>
<td>bits=0x000-0xFFF index=0-15</td>
<td>When no CC is provided by the HLR or the local-value is preferred, then this command specifies the charging characteristics to be used.</td>
</tr>
<tr>
<td>sgsn-operator-policy { default</td>
<td>name &lt;name&gt; } ,apn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cc local-value-for-scdrs behaviour &lt;bits&gt;</td>
<td>no</td>
<td>bits=0x000-0xFFF</td>
<td>Set behavior bits per APN for S-CDR. This will be given highest priority if CC is configured in sgsn-op-policy and apn level.</td>
</tr>
<tr>
<td>cc prefer</td>
<td>no</td>
<td>hlr-value-for-scdrshlr-value-for-scdrs</td>
<td>Define if HLR or local CC value is used in S-CDR.</td>
</tr>
</tbody>
</table>

Sample Configuration for SGSN when HDD is Used

When internal HDD is enabled for storage of generated CDRs, AAA proxy should use the configuration from GTPP group for File Format/GTPP Custom dictionary/File rotation, etc.

```bash
configure

cntext source
gtp group default
gtp dictionary custom10
gtp storage-server mode local
gtp storage-server local file format custom3
gtp storage-server local file rotation cdr-count 1000
gtp storage-server local file rotation time-interval 4000
gtp storage-server local file rotation volume mb 8
end
```
Sample Configuration for SGSN when GSS is Used

S-CDRs are generated by Session Manager and are sent immediately to the GSS using a proprietary protocol based on UDP.

```
configure

  context source

    gtpg group default

    gtpg charging-agent address 192.168.201.1

    gtpg storage-server 192.168.201.12 port 50000

    gtpg dictionary custom10

end
```
Gathering Statistics

The following table lists the commands that can be used to gather GTPP statistics.

In the following table, the first column lists what statistics/information to gather and the second column lists the command to use.

<table>
<thead>
<tr>
<th>Statistics/Information</th>
<th>Action to Perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>GTPP statistics for Charging Gateway Functions</td>
<td>At the Exec Mode prompt, enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>show gtpp statistics cgf-address cgf_address</code></td>
</tr>
<tr>
<td>Information on the number of CDRs stored in HDD</td>
<td>At the Exec Mode prompt, enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>show gtpp storage-server local file statistics</code></td>
</tr>
<tr>
<td>Information on the GTPP accounting server configuration</td>
<td>At the Exec Mode prompt, enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>show gtpp accounting servers group name group_name</code></td>
</tr>
<tr>
<td>Information on the CDR storage server status</td>
<td>At the Exec Mode prompt, enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>show gtpp storage-server status</code></td>
</tr>
</tbody>
</table>
Chapter 3
ePDG CDR Field Reference

This chapter provides a reference for CDR fields supported by the system for use in ePDG-CDRs. A complete list and descriptions of supported CDR fields is provided in the ePDG CDR Field Descriptions chapter of this reference.

Important: This reference document contains information only on standard GTPP dictionaries. For information on custom dictionaries, contact your Cisco account representative.

The category column in all tables use keys described in the following table.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be present in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR for all conditions.</td>
</tr>
<tr>
<td></td>
<td>Mandatory</td>
<td></td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR if certain conditions are met.</td>
</tr>
<tr>
<td></td>
<td>Conditional</td>
<td></td>
</tr>
</tbody>
</table>
# CDR Fields Supported in ePDG-CDRs

The table in this section lists the ePDG-CDR fields present in the available GTPP dictionary.

## custom24 Dictionary

ePDG-CDR fields in this dictionary are compliant to 3GPP TS 32.298 v12.6.0.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size (in bytes)</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>ePDG IP CAN bearer record.</td>
<td>Integer</td>
<td>1</td>
<td>0x80</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>IMSI of the served party.</td>
<td>BCD encoded</td>
<td>3-8</td>
<td>0x83</td>
</tr>
<tr>
<td>ePDGAddressUsed</td>
<td>4</td>
<td>M</td>
<td>The control plane IP address of the S-GW used.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>0xa4</td>
</tr>
<tr>
<td>ePDG BINARY IPV4 ADDRESS</td>
<td>4-0</td>
<td>M</td>
<td>The octet string includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>ePDG BINARY IPV6 ADDRESS</td>
<td>4-0</td>
<td>M</td>
<td>The octet string included in the field described includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>IP CAN bearer identifier used to identify IP CAN bearer in different records created by PCNs.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x85</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>7</td>
<td>M</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
<td>IA5 string</td>
<td>1-63</td>
<td>0x87</td>
</tr>
<tr>
<td>PDP/PDN Type</td>
<td>8</td>
<td>M</td>
<td>This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).</td>
<td>Octet string</td>
<td>2</td>
<td>0x88</td>
</tr>
<tr>
<td>Served PDP/PDN Address</td>
<td>9</td>
<td>M</td>
<td>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.</td>
<td>Choice</td>
<td>8 (IPv4) or 20 (IPv6)</td>
<td>0xa9</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>9-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>0xa0</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>PDP IPV4 Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the S-GW in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>PDP IPV6 Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv6 address assigned to the subscriber by the S-GW in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>11</td>
<td>O</td>
<td>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.</td>
<td>Boolean</td>
<td>1</td>
<td>0x8b</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>12</td>
<td>M</td>
<td>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.</td>
<td>Sequence</td>
<td>0xac</td>
<td></td>
</tr>
<tr>
<td>Change of charging condition</td>
<td>12-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>0x30</td>
<td></td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>12-0-3</td>
<td>M</td>
<td>The Data Volume GPRS Uplink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x83</td>
</tr>
<tr>
<td>Data Volume GPRS Downlink</td>
<td>12-0-4</td>
<td>M</td>
<td>The Data Volume GPRS Downlink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x84</td>
</tr>
<tr>
<td>Change Condition</td>
<td>12-0-5</td>
<td>M</td>
<td>The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x85</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>-----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Change Time</td>
<td>12-0-6</td>
<td>M</td>
<td>The Change Time field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It provides the local time when a change condition (e.g. record closure) occurred and the container was closed.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>0x86</td>
</tr>
<tr>
<td>qci</td>
<td>12-9-1</td>
<td>M</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x81</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>0x8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>This field contains the duration in seconds for the record.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR.</td>
<td>Integer</td>
<td>1</td>
<td>0x8f</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>17</td>
<td>O</td>
<td>Partial record sequence number, only present in case of partial records.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x91</td>
</tr>
<tr>
<td>Node ID</td>
<td>18</td>
<td>O</td>
<td>Name of the recording entity.</td>
<td>IA5 string</td>
<td>5-20</td>
<td>0x92</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>20</td>
<td>O</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x94</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>21</td>
<td>M</td>
<td>An index indicating how the APN was selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x95</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>22</td>
<td>M</td>
<td>The primary MSISDN of the subscriber.</td>
<td>Integer</td>
<td>1-9</td>
<td>0x96</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>23</td>
<td>M</td>
<td>The Charging Characteristics applied to the IP CAN bearer.</td>
<td>Hex Value Octet string</td>
<td>2</td>
<td>0x97</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>24</td>
<td>O</td>
<td>Holds information about how Charging Characteristics were selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x98</td>
</tr>
<tr>
<td>Selection Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAT Type</td>
<td>30</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.</td>
<td>Integer</td>
<td>1</td>
<td>9e</td>
</tr>
<tr>
<td>P-GW Address Used</td>
<td>36</td>
<td>M</td>
<td>This field is the P-GW IP Address for the Control Plane.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>bf24</td>
</tr>
<tr>
<td>P-GW Binary IPV4 Address</td>
<td>36-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>P-GW Binary IPV6 Address</td>
<td>36-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv6 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet String</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>P-GW PLMN Identifier</td>
<td>37</td>
<td>O</td>
<td></td>
<td>Octet string</td>
<td>3</td>
<td>9f25</td>
</tr>
<tr>
<td>Start Time</td>
<td>38</td>
<td>O</td>
<td>This field holds the time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.</td>
<td>BCD encoded</td>
<td>9</td>
<td>9f26</td>
</tr>
<tr>
<td>Stop Time</td>
<td>39</td>
<td>O</td>
<td>This field holds the time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.</td>
<td>BCD encoded</td>
<td>9</td>
<td>9f27</td>
</tr>
<tr>
<td>PDN Connection ID</td>
<td>40</td>
<td>O</td>
<td>This field holds the PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.</td>
<td>Integer</td>
<td>1-5</td>
<td>9f28</td>
</tr>
<tr>
<td>Served PDP PDN Address Extension</td>
<td>43</td>
<td>O</td>
<td>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 adress is included in Served PDP Address or Served PDP/PDN Address.</td>
<td>Choice</td>
<td>8</td>
<td>bf2b</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>43-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6</td>
<td>0xa0</td>
</tr>
<tr>
<td>PDP IPV4 Address</td>
<td>43-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by S-GW in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>dynamicAddressFlagExt</td>
<td>47</td>
<td>O</td>
<td>This field 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.</td>
<td>Boolean</td>
<td>1</td>
<td>9f2f</td>
</tr>
<tr>
<td>ePDGiPv6AddressUsed</td>
<td>48</td>
<td>O</td>
<td>The control plane IPv6 address, in case of IPv4v6 dual stack, of the ePDG.</td>
<td>Choice</td>
<td>18</td>
<td>bf30</td>
</tr>
<tr>
<td>ePDG BINARY IPV6 ADDRESS</td>
<td>48-0</td>
<td>O</td>
<td>The octet string in this field includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>p-GWiPv6AddressUsed</td>
<td>50</td>
<td>O</td>
<td>This field is the P-GW IPv6 Address, in case of IPv4v6 dual stack, for the Control Plane.</td>
<td>Choice</td>
<td>18</td>
<td>bf32</td>
</tr>
<tr>
<td>PGW BINARY IPV6 ADDRESS</td>
<td>50-0</td>
<td>O</td>
<td>The octet string in this field includes the IPv6 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
</tbody>
</table>
Notes:

- All IP addresses are encoded in binary format.

**ASN.1 Definition for Fields in custom24**

The following section provides the complete ASN.1 definition of all ePDG-CDR related fields in this dictionary.

```asn1
GPRSRecord ::= CHOICE

--
-- GPRS RECORDS
--

GPRSRecord ::= CHOICE

--
-- Record values 20, 22..27 are specific
-- Record values 76..77 are MBMS specific
-- Record values 78..79 are EPC specific
{
    ePDGRecord[96] EPDGRecord
}

EPDGRecord ::= SET

{
    recordType [0] RecordType,
    servedIMSI [3] IMSI OPTIONAL,
    ePDGAddressUsed [4] GSNAddress,
    chargingID [5] ChargingID,
    accessPointNameNI [7] AccessPointNameNI OPTIONAL,
    pdpPDNType [8] PDPType OPTIONAL,
}
```
servedPDPDNAddress [9] PDPAddress OPTIONAL,
dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL,
listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
recordOpeningTime [13] TimeStamp,
duration [14] CallDuration,
causeForRecClosing [15] CauseForRecClosing,
diagnostics [16] Diagnostics OPTIONAL,
recordSequenceNumber [17] INTEGER OPTIONAL,
nodeID [18] NodeID OPTIONAL,
recordExtensions [19] ManagementExtensions OPTIONAL,
localSequenceNumber [20] LocalSequenceNumber OPTIONAL,
apnSelectionMode [21] APNSelectionMode OPTIONAL,
servedMSISDN [22] MSISDN OPTIONAL,
chargingCharacteristics [23] ChargingCharacteristics,
chChSelectionMode [24] ChChSelectionMode OPTIONAL,
imSSignalingContext [25] NULL OPTIONAL,
servedIMEI [29] IMEI OPTIONAL,
rATType [30] RATType OPTIONAL,
sGWChange [34] SGWChange OPTIONAL,
p-GWAddressUsed [36] GSNAddress OPTIONAL,
p-GWPLMNIdentifier [37] PLMN-Id OPTIONAL,
startTime [38] TimeStamp OPTIONAL,
stopTime [39] TimeStamp OPTIONAL,
pDNConnectionChargingID [40] ChargingID OPTIONAL,
servedPDPDNAddressExt [43] PDPAddress OPTIONAL,
dynamicAddressFlagExt [47] DynamicAddressFlag OPTIONAL,
ePDGiPv6AddressUsed [48] GSNAddress OPTIONAL,
p-GWiPv6AddressUsed [50] GSNAddress OPTIONAL,
retransmission [51] NULL OPTIONAL
AccessPointNameNI::= IA5String (SIZE(1..63))

--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.

APNSelectionMode::= ENUMERATED
{
--
-- See Information Elements TS 29.060, TS 29.274 or TS 29.275
--
msOrNetworkProvidedSubscriptionVerified  (0),
mSProvidedSubscriptionNotVerified        (1),
networkProvidedSubscriptionNotVerified   (2)
}

CauseForRecClosing ::= INTEGER

--
-- In PGW-CDR and SGW-CDR the value servingNodeChange is used for partial record
-- generation due to Serving Node Address list Overflow
-- In SGSN servingNodeChange indicates the SGSN change
--
-- sWGChange value is used in both the S-GW and ePDG for inter serving node change
--
-- LCS related causes belong to the MAP error causes acc. TS 29.002
--
-- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
--
{
  normalRelease (0),
  abnormalRelease (4),
  cAMELInitCallRelease (5),
  volumeLimit (16),
  timeLimit (17),
  servingNodeChange (18),
  maxChangeCond (19),
  managementIntervention (20),
  intraSGSNIntersystemChange (21),
  rATChange (22),
  mSTimeZoneChange (23),
  sGSNPLMNIDChange (24),
  sGWChange (25),
  aPNAMBRChange (26),
  unauthorizedRequestingNetwork (52),
  unauthorizedLCSClient (53),
  positionMethodFailure (54),
  unknownOrUnreachableLCSClient (58),
  listofDownstreamNodeChange (59)
}

ChangeCondition ::= ENUMERATED
{
  qoSChange (0),
CDR Fields Supported in ePDG-CDRs

tariffTime (1),
recordClosure (2),
cGI-SAICHange (6), -- bearer modification. “CGI-SAI Change”
rAIChange (7), -- bearer modification. “RAI Change”
dT-Establishment (8),
dT-Removal (9),
eCGIChange (10), -- bearer modification. “ECGI Change”
tAIChange (11), -- bearer modification. “TAI Change”
userLocationChange (12) -- bearer modification. “User Location Change”
userCSGInformationChange (13) -- bearer modification. “User CGI info Change”

ChangeOfCharCondition ::= SEQUENCE
    --
    -- qosRequested and qosNegotiated are used in S-CDR only
    -- ePCQoSInformation used in SGW-CDR, PGW-CDR, IPE-CDR and ePDG only
    -- userLocationInformation is used only in S-CDR, SGW-CDR and PGW-CDR
    -- chargingID used in PGW-CDR only when Charging per IP-CAN session is active
    --
    {
qosRequested [1] QoSInformation OPTIONAL,
qosNegotiated [2] QoSInformation OPTIONAL,
dataVolumeGPRSUplink [3] DataVolumeGPRS OPTIONAL,
dataVolumeGPRSDownlink [4] DataVolumeGPRS OPTIONAL,
changeCondition [5] ChangeCondition,
changeTime [6] TimeStamp,
userLocationInformation [8] OCTET STRING OPTIONAL,
ePCQoSInformation  [9] EPCQoSInformation OPTIONAL,
chargingID          [10] ChargingID OPTIONAL,
presenceReportingAreaStatus [11] PresenceReportingAreaStatus OPTIONAL,
userCSGInformation  [12] UserCSGInformation OPTIONAL
}

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

ChargingCharacteristics ::= OCTET STRING (SIZE(2))

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

ChChSelectionMode  ::= ENUMERATED
{
servingNodeSupplied  (0), -- For S-GW/P-GW
subscriptionSpecific (1), -- For SGSN only
aPNSpecific         (2), -- For SGSN only
homeDefault         (3), -- For SGSN, S-GW and P-GW
roamingDefault (4), -- For SGSN, S-GW and P-GW
visitingDefault (5) -- For SGSN, S-GW and P-GW
fixedDefault (6) -- For TDF and IP-Edge

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

Diagnostics ::= CHOICE
{
gsm0408Cause [0] INTEGER,
---- See TS 24.008
gsm0902MapErrorValue [1] INTEGER,
--
---- Note: The value to be stored here corresponds to the local values defined in
the MAP-Errors
---- and MAP-DialogueInformation modules, for full details see TS 29.002.
--
itu-tQ767Cause [2] INTEGER,
---- See Q.767
networkSpecificCause [3] ManagementExtension,
---- To be defined by network operator
manufacturerSpecificCause [4] ManagementExtension,
---- To be defined by manufacturer
positionMethodFailureCause [5] PositionMethodFailure-Diagnostic,
---- see TS 29.002
unauthorizedLCSClientCause [6] UnauthorizedLCSClient-Diagnostic,
diameterResultCodeAndExperimentalResult [7] INTEGER

--- see TS 29.338, TS 29.337

DynamicAddressFlag ::= BOOLEAN

EPCQoSInformation ::= SEQUENCE

{
    --
    -- See TS 29.212 for more information
    --
    qCI [1] INTEGER,
    maxRequestedBandwidthUL [2] INTEGER OPTIONAL,
    maxRequestedBandwidthDL [3] INTEGER OPTIONAL,
    guaranteedBitrateUL [4] INTEGER OPTIONAL,
    guaranteedBitrateDL [5] INTEGER OPTIONAL,
    aRP [6] INTEGER OPTIONAL,
    aPNAggregateMaxBitrateUL [7] INTEGER OPTIONAL,
    aPNAggregateMaxBitrateDL [8] INTEGER OPTIONAL
}

ETSIAddress ::= AddressString

--
-- First octet for nature of address, and numbering plan indicator (3 for X.121)
-- Other octets TBCD
-- See TS 29.002
--
GSNAddress ::= IPAddress

IA5String ::= OCTET STRING

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
-- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
--
-- Set to true if PDP context was initiated from network side
--

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

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

PDPType ::= OCTET STRING (SIZE(2))
--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP/PDN Type Number
-- See See TS 29.060 for encoding details.
--

PLMN-Id ::= OCTET STRING (SIZE (3))
QoSInformation ::= OCTET STRING (SIZE (4..255))

--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Bearer Quality of
-- Service" information element specified in TS 29.274
--

RATType ::= INTEGER (0..255)

--
-- This integer is 1:1 copy of the RAT type value as defined in TS 29.061
--

RecordType ::= INTEGER

--
-- Record values 0..17 and 87,89 are CS specific. The contents are defined in TS 32.250
--
{
  ePDGRecord   (96)
}

SGWChange ::= BOOLEAN

--
-- present if first record after inter S-GW change
--
IPAddress ::= CHOICE
    {
        iPBinaryAddress      iPBinaryAddress,
        iPTextRepresentedAddress  iPTextRepresentedAddress
    }

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

IPTextRepresentedAddress ::= CHOICE
    {
        --
        -- IP address in the familiar "dot" notation
        --
        iPTextV4Address  [2] IA5String (SIZE(7..15)),
        iPTextV6Address  [3] IA5String (SIZE(15..45))
    }

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

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

MSTimeZone::= OCTET STRING (SIZE (2))

--
-- 1. Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060

--

TimeStamp::= OCTET STRING (SIZE(9))

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

--

TBCDSTRING ::= OCTET STRING

ISDN-AddressString ::= OCTET STRING
IMEI ::= TBCDSTRING (SIZE(8))
IMSI ::= TBCDSTRING (SIZE(3..8))
maxAddressLength INTEGER ::= 20
AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))
END
Chapter 4
ePDG CDR Field Descriptions

This chapter describes the CDR fields supported by the system for use in ePDG-CDRs.
The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

All ePDG-CDRs are encoded using the ASN.1 format and are sent to the charging gateway function (CGF) using the
GPRS Tunneling Protocol Prime (GTPP) as defined in the following standards:

- 3GPP TS 29.060
- 3GPP TS TS32.298

Also see the *ePDG CDR Field Reference* chapter for information on CDR fields supported in ePDG-CDRs.

*Important*: The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the `gtpp attributes` command in the *Command Line Interface Reference*. 
CDR Fields

Access Point Name Network Identifier

This field contains the Network Identifier part of the Access Point Name (APN). This APN is sent to the ePDG by the UE and authorized by AAA and is relayed to the P-GW in the Create Session Request message. APN name selected from AAA server success response will be used for ePDG (IDr payload and AAA supplied should be the same). The APN string consists of alphabetic characters (“A..Z”, “a..z”), digits (“0..9”) and the dash “-“.

Format
IA5string

Length
1-63 bytes

APN Selection Mode

An index indicating how the APN was selected.

The following APN selection mode index is possible:
0: MS or network provided APN, subscription verified

Format
Enumerated

Length
1 byte

Cause for Record Closing

This field contains a reason for the closure of the CDR.

Supported values:
- normalRelease (0)
- abnormalRelease (4)
- volumeLimit (16)
- timeLimit (17)
- maxChangeCond (19)
- managementIntervention (20)
- aPNAMBRChange (26)

Format
Integer

Length
1 byte
Charging Characteristics

Lists the charging characteristics applied to the PDP context by the ePDG. The ePDG accepts the charging characteristics from the AAA server or use its own configured values.

**Format**
Octet string

**Length**
2 bytes

Charging Characteristics Selection Mode

This field specifies how the Charging Characteristics was selected.

Supported values:
- subscriptionSpecific (1)
- aPNSpecific (2)

**Format**
Enumerated

**Length**
1 byte

Charging ID

This field is a charging identifier, which can be used together with the P-GW address to identify all records involved in a single bearer context. The Charging ID is generated by the P-GW during bearer context activation and is transferred to the context requesting ePDG.

**Format**
Integer

**Length**
1-5 bytes

Duration

This field contains the duration in seconds for the record. For partial records, only the interval described by the “recordOpeningTime” and the “last ChangeTime” in the “ListOfTrafficVolumes” is counted. The value is reset for each new partial CDR. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured.

**Format**
Integer

**Length**
1-5 bytes
Dynamic Address Flag

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

**Format**
- Boolean

**Length**
- 1 byte

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.

**Format**
- Boolean

**Length**
- 1 byte

ePDG Address Used

This field indicates the serving ePDG IP address for the Control Plane on S2b interface. If both an IPv4 and an IPv6 address of the ePDG is available, the ePDG includes the IPv4 address in the CDR. This is a choice attribute and the CDR can contain the binary format or the ASCII format in the CDR.

**Format**
- Octet string

**Length**
- 6 bytes or 18 bytes based on the address type (IPv4 or IPv6)

ePDG IPv4 Binary Address

The octet string included in the “ePDG Address Used” field includes the S2b IPv4 address of the ePDG service in binary coding.

**Format**
- Octet string

**Length**
- 4 bytes

ePDG IPv6 Binary Address

The octet string included in the “ePDG Address Used” field includes the S2b IPv6 address of the ePDG service in binary coding.
ePDG CDR Field Descriptions

CDR Fields

Format
Octet string
Length
4 bytes

ePDGiIPv6Address

This field indicates the control plane IPv6 address, in case of IPv4v6 dual stack, of the ePDG on S2b interface.
Format
Octet string
Length
18 bytes

ePDG IPv6 Binary Address

This field indicates the control plane IPv6 address, in case of IPv4v6 dual stack, of the ePDG on S2b interface.
Format
Octet string
Length
16 bytes

iMSsignalingContext

Indicates if the IP-CAN bearer is used for IMS signaling. It is only present if the IP-CAN bearer is an IMS signaling bearer.
Format
Null
Length
Zero

List of Traffic Data Volumes

This list includes one or more Traffic Volume containers related to a “Change of Charging Condition”. The maximum number of containers is configurable.
Format
Sequence
Length
Variable
Change Of Charging Condition

Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.

**Format**
- Sequence

**Length**
- Variable

GPRS Uplink data volume

The Data Volume GPRS Uplink field is a part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.

The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.

**Important:** In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

**Format**
- Integer

**Length**
- 1-5 bytes

GPRS Downlink data volume

The Data Volume GPRS Downlink field is a part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.

The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.

**Important:** In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

**Format**
- Integer

**Length**
- 1-5 bytes

Change Condition

The Change Condition field is part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It defines the reason for closing the container.
Supported values:

\[
\text{ChangeCondition} ::= \text{ENUMERATED} \\
\{
\text{tariffTime} (1), \\
\text{recordClosure} (2), \\
\}
\]

**Format**

Enumerated

**Length**

1 byte

---

### Change time

The Change Time field is part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It provides the local time when a change condition (e.g. record closure) occurred and the container was closed.

The format is shown below:

\[
\text{TimeStamp ::= OCTET STRING (SIZE(6))}
\]

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

-- e.g. YYMMDDhhmmssShhmm
-- where
-- YY = Year 00 to 99 BCD encoded
-- MM = Month 01 to 12 BCD encoded
-- DD = Day 01 to 31 BCD encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S = Sign 0 = “+”, “-” ASCII encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded

**Format**

BCD encoded octet string

**Length**

9 bytes
Local Record Sequence Number

This field contains a unique sequence number associated with the NodeId field and independent of the bearer context. For each Node ID, this number with range $1..4294967295$ is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. For ePDG-CDRs, this field is included only when the command `gtpp attribute local-record-sequence-number` is configured.

**Format**
Octet String

**Length**
1-5 bytes

MACAddress of AP

The AP-MAC address will be populated in ePDG-CDR only when it is supplied by UE during initial IKEv2 exchange in IDi payload as expected by ePDG. This is an optional proprietary parameter and will be CLI controlled.

**Format**
Octet string

**Length**
6 bytes

Node ID

This field contains an identifier string for the node that had generated the CDR.

The NodeID field is a printable string of the nddddSTRING format:

- **n**: The first digit is the Sessmgr restart counter having a value between 0 and 7.
- **ddd**: The number of the sessmgr instance generating the CDR.
- **STRING**: This is a configured Node-ID-Suffix having any string from 1 to 16 characters, defined using the `gtpp attribute node-id` command.

If this node-id-suffix is not configured, the ePDG uses the GTPP context name as the Node-id-suffix (truncated to 16 characters).

This field is included only when the command `gtpp attribute local-record-sequence-number` is configured.

**Format**
IA5string

**Length**
5-20 bytes

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.
Format
Integer
Length
1-5 bytes

PDP PDN Type

-- OCTET 1: PDP Type Organization

Spare ‘1111’  PDP Type Organization Value

<table>
<thead>
<tr>
<th>PDP Type Organization</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI</td>
<td>0</td>
</tr>
<tr>
<td>IETF</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTE: In LTE, only IETF is supported.

-- OCTET 2: PDP/PDN Type Number

Bits
3 2 1
0 0 1 IPv4
0 1 0 IPv6
0 1 1 IPv4/IPv6

Bits 8-4 of octet are spare and are coded as zero.

Format
Octet string
Length
2 bytes

PGW Address used

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 includes the IPv4 address in the CDR. This is a choice attribute and the CDR can contain the binary format or the ASCII format in the CDR.

Format
Octet string
Length
The length can vary based on whether the encoded IP address is IPv4 or IPv6.
PGW IPv4 Binary Address

The octet string included in the field “PGW Address used” includes the IPv4 address of the P-GW in binary coding.

Format
Octet string

Length
4 bytes

PGW IPv6 Binary Address

The octet string included in the field “PGW Address used” includes the IPv6 address of the P-GW in binary coding.

Format
Octet string

Length
16 bytes

PGW ipv6 Address used

This field indicates the P-GW IPv6 Address, in case of IPv4v6 dual stack, for the control plane.

Format
Octet string

Length
18 bytes

PGW Ipv6 Binary Address

The octet string included in the field “PGW ipv6 Address used” includes the IPv6 address assigned to the subscriber by the P-GW in binary coding.

Format
Octet string

Length
16 bytes

PGW PLMN Identifier

This field indicates the PLMN identifier (MCC MNC) of the P-GW used. MCC and MNC are coded as described for “User Location Info” in 3GPP TS 29.274.

Format
Octet string

Length
3 bytes
**RAT Type**

Holds the value of RAT Type, as provided to ePDG and P-GW, described in TS 29.274.

<table>
<thead>
<tr>
<th>RAT Types</th>
<th>Values (Decimal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLAN</td>
<td>3</td>
</tr>
</tbody>
</table>

**Format**

Integer

**Length**

1 byte

---

**Record Opening Time**

This field contains the time stamp when a PDP context is activated or when a subsequent record is opened after a partial record.

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off), this is translated into the timestamp which only shows the full seconds.

The format is shown below:

```
TimeStamp ::= OCTET STRING (SIZE(6))
```

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

-- e.g. YYMMDhhmmssSshhhm
-- where

-- YY = Year 00 to 99   BCD encoded
-- MM = Month 01 to 12  BCD encoded
-- DD = Day 01 to 31    BCD encoded
-- hh = hour 00 to 23   BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S  = Sign 0 = “+”, “-” ASCII encoded
-- hh = hour 00 to 23   BCD encoded
-- mm = minute 00 to 59 BCD encoded

**Format**

BCD encoded octet string

**Length**

9 bytes
Record Sequence Number

A running sequence number with range 1..4294967296 used to link partial records generated by the ePDG for a specific IP-CAN bearer context (characterized with the same Charging ID and P-GW address). This field is not present if the first record is also the final record.

**Format**
Integer

**Length**
1-5 bytes

Record Type

This field identifies the type of the record.

**ePDG-CDR(ePDGRECORD) 96 (0x60)**

**Format**
Integer

**Length**
1 byte

Served IMSI

This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003. The IMSI is extracted from MN-ID AVP from AAA or NAI (username part contains IMSI).

Example for Coding: (Set by SGSN)

```
3GPP TS 23.003 (CCITT Rec. E 212)ServedIMSI ::= OCTET STRING (SIZE(1..8))-- subscriber identification IMSI-- octet 1..8: <= 15 digits TBCD-String (twisted)-- substructure (without spares or fillers):-- 3 digits - mobile country code (MCC)-- 2 digits - mobile network code (MNC)-- <= 10 digits - mobile subscriber identification number (MSIN)-- first and intermediate octet = 2 digits-- last octet = 2 digits or 1 digit + 1 fill digit H'F''--

-- example:-- IMSI: '262025600010020'-- filled: '262025600010020F'-- encoded: H'62 02 52 06 00 01 20 F0
```

**Format**
BCD encoded octet string

**Length**
3-8 bytes
**Served MSISDN**

This field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create Session Request message. The MSISDN is supplied by AAA in “Subscription-ID” AVP for ePDG.

The MSISDN is TBCD encoded as shown in the example below:

3GPP TS 23.003 (CCITT Rec. E 213)

ServedMSISDN ::= OCTET STRING (SIZE(1..9))

MSISDN in CDR is 1:1 copy of the MSISDN sent in GTP-V2 message. MSISDN value contains only the actual MSISDN number (does not contain the “nature of address indicator” octet, which indicates “international number” as in 3GPP TS 29.002) and is encoded as TBCD digits (i.e. digits from 0 through 9 are encoded “0000” to “1001”). When there is an odd number of digits, bits 8 to 5 of the last octet are encoded with the filler “1111”.

Example:

encoded: H' 94 71 02 04 30 50

**Format**

BCD encoded octet string

**Length**

1-9 bytes

---

**Served PDP PDN Address**

This field contains the IP address for the PDN connection (PDP context, IP-CAN bearer) if available. This is a network layer address of type IP version 4 (PDN Type is IPv4) or IP version 6 (PDN Type is IPv6 or IPv4v6). The address for each bearer type is allocated either temporarily or permanently (see “Dynamic Address Flag”). This parameter is present except when both the bearer type is PPP and dynamic address assignment is used.

NOTE: 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.

**Format**

Octet string

**Length**

8 bytes or 20 bytes based on the address type (IPv4 or IPv6)

---

**PDP IP Address**

This field contains the IP address for the PDP context.

**Format**

IP address

**Length**

The length can vary based on whether the encoded IP address is IPv4 or IPv6.
PDP IPv4 Binary Address

The octet string included in the field “PDP IP Address” includes the IPv4 address of the P-GW in binary coding.

**Format**
Octet string

**Length**
4 bytes

PDP IPv6 Binary Address

The octet string included in the field “PDP IP Address” includes the IPv6 address of the P-GW in binary coding.

**Format**
Octet string

**Length**
16 bytes

Served PDP PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4v6 is used, and the IPv6 address is included in Served PDP Address or Served PDP PDN Address.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**Important:** Note that this field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Rel.9 attribute and it can be present in Rel.7 or Rel.8 dictionary if enabled through the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**Format**
Octet string

**Length**
8 bytes

PDP IP Address

This field contains the IP address for the PDP context.

**Format**
IP address

**Length**
The length can vary based on whether the encoded IP address is IPv4 or IPv6.
PDP IPv4 Binary Address

The octet string included in the “PDP IP Address” field includes the IPv4 address of the P-GW in binary coding.

**Format**

Octet string

**Length**

4 bytes

Start Time

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

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism this is translated into the timestamp which only shows the full seconds.

The format is shown below.

TimeStamp ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead

-- e.g. YYMMDDhhmmssSshhmm

-- where

-- YY = Year 00 to 99 BCD encoded
-- MM = Month 01 to 12 BCD encoded
-- DD = Day 01 to 31 BCD encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S = Sign 0 = “+”, “-” ASCII encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded

**Format**

BCD encoded octet string

**Length**

9 bytes

Stop Time

This field contains the time when the IP-CAN session is terminated at the ePDG/P-GW, available in the CDR for the last bearer in an IP-CAN session.
The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.

The format is shown below.

TimeStamps ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

-- e.g. YYMMDDhhmmssShhmm
-- where
-- YY = Year 00 to 99   BCD encoded
-- MM = Month 01 to 12  BCD encoded
-- DD = Day 01 to 31    BCD encoded
-- hh = hour 00 to 23   BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S  = Sign 0 = “+”, “-” ASCII encoded
-- hh = hour 00 to 23   BCD encoded
-- mm = minute 00 to 59 BCD encoded

Format
    BCD encoded octet string

Length
    9 bytes

### UE Tunnel Information

This field contains the UE Tunnel information (UE IP address and port and ePDG IP address and port on SWu interface). The IP addresses will be binary encoded and present in sequence. This is an optional proprietary parameter and will be CLI controlled.

Format
    Sequence

Length
    The length varies based on whether the encoded IP address is IPv4 or IPv6.

### UE Tunnel Endpoint IP Address

This sub-field is the UE Tunnel endpoint IP address on SWu interface. The IP addresses will be binary encoded and can be IPv4 or IPv6 address.

Format
    Octet string

Length
UE Tunnel Endpoint Port

This field is the UE Tunnel endpoint port on SWu interface.

Format
Octet string

Length
2 bytes

ePDG Tunnel Endpoint IP Address

This field indicates the ePDG Tunnel IP address on SWu interface. The IP addresses will be binary encoded and can be IPv4 or IPv6 address.

Format
Octet string

Length
6 or 18 bytes depending on the encoded IP address type

ePDG Tunnel Endpoint Port

This field is the ePDG Tunnel endpoint port on SWu interface.

Format
Octet string

Length
2 bytes
Chapter 5
GGSN CDR Field Reference

This chapter provides a reference for CDR fields supported by the system for use in GGSN-CDRs (G-CDRs) and enhanced G-CDRs (eG-CDRs).

A complete list of supported CDR fields is provided in the *GGSN CDR Field Descriptions* chapter of this reference. The specific CDRs reported in G-CDRs/eG-CDRs and their encoding are user-selectable via GTPP dictionaries.

**Important:** This reference document contains information only on standard GTPP dictionaries. For information on custom dictionaries, contact your Cisco account representative.

The category column in all tables use keys described in the following table.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be present in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR for all conditions.</td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR if certain conditions are met.</td>
</tr>
</tbody>
</table>
CDR Fields Supported in G-CDRs

The tables in this section list the G-CDR fields present in the available GTPP dictionaries.

**custom6 Dictionary**

G-CDR fields based on 3GPP TS 32.298 V6.6.0 (2006-12) (R6).

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record:</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- S-CDR(sgsnPDPRecord) 18 (0x12)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- G-CDR(ggsnPDPRecord) 19 (0x13)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- eG-CDR(egsnPDPRecord) 70 (0x46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. The field is missing in case of mobile activated PDP context. Set to TRUE (0xFF) if PDP context was initiated from network side. This field is not yet supported by the SGSN.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>3-8</td>
<td>83</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>4</td>
<td>M</td>
<td>This field provides the current serving GGSN IP Address for the Control Plane, which is equivalent to the configured ggsn-service address on the GGSN. The standard 3GPP 32.298 offers a choice for the encoding of the address to be either in binary or text format. The GGSN encodes the address in binary format and includes the Octet String.</td>
<td>Choice</td>
<td>6</td>
<td>a4</td>
</tr>
<tr>
<td>GGSN IPv4 Binary Address</td>
<td>4-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the GGSN address to identify all records produced in the GGSN involved in a single PDP context. The Charging ID is generated by the GGSN at PDP context activation and is transferred to the context requesting SGSN. At an inter-SGSN routing area update the charging ID is transferred to the new SGSN as part of each active PDP context. The possible values for the charging ID, which are defined in TS 29.060 are 1-4,294,967,295 and those values are encapsulated in following scheme in the CDR-field: 1 - 127 850101-85017F 128 – 32,767 85020080-85027FFF 32,768 – 8,388,607 8503008000-85037FFFFFF 8,388,608 – 2,147,483,647 850400800000-85047FFFFFF 2,147,483,648 – 4,294,967,295 85050080000000-850500FFFFFFFF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGSN Address</td>
<td>6</td>
<td>M</td>
<td>This field contains one or several SGSN IP addresses. For an S-CDR, the SGSN address contains the control plane or user plane address of the current SGSN serving the PDP context. For a G-CDR and eG-CDR, in addition to the current SGSN being used, the field may contain additional SGSN addresses where the PDP context was located before and where it has moved away using the Inter-SGSN Routing Area Update Procedure. The maximum number of addresses in the list is 5.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGSN IPv4 Binary Address</td>
<td>6-0</td>
<td>M</td>
<td>The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>7</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN). It is provided by the SGSN in the Create PDP Context Request message. For GGSN generated records, in case of a configured virtual APN, the virtual APN is included instead, unless this is overridden by the option `gcdr apn-name-to-be-included {gn</td>
<td>virtual}`</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
</table>
| PDP Type              | 8          | M        | This field defines the PDP type, e.g. IP or PPP, as received in the PDP context request from the SGSN. Supported values:  
|                       |            |          | - IP = f121  
<p>|                       |            |          | - PPP = f001                                                                                                                                                                                                  | Octet String | 2           | 88        |
| Served PDP Address    | 9          | O        | This field contains the PDP address of the served IMSI for which the standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAddress.                                                                 | Choice   | 8           | a9        |
| PDP IP Address        | 9-0        | M        | This field contains the IP address for the PDP context.                                                                                                                                                       | Choice   | 6           | a0        |
| PDP IPv4 Binary Address | 9-0-0   | M        | The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the GGSN in binary coding.                                                                  | Octet String | 4           | 80        |
| Dynamic Address Flag  | 11         | O        | This field indicates that the PDP address has been dynamically allocated for that particular PDP context. In this case, the value is set to TRUE and encoded as &quot;FF&quot;. This field is missing if the address allocation method was &quot;static&quot;, i.e. part of PDP context subscription. | Boolean  | 1           | 8b        |
| List of Traffic Volumes | 12        | M        | This list includes one or more Traffic Volume containers related to a &quot;Change of Charging Condition&quot; as described in the next field. The maximum number of containers is configurable. | Sequence | Variable length | ac       |
| ChangeOfCharConditi on | 12-0     | M        | Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes. | Sequence | Variable length | 30       |
| QoS Requested         | 12-0-1     | O        | This field contains the QoS desired by the MS at PDP context activation.                                                                                                                                       | Octet String | 4-15        | 81        |
| QoS Negotiated        | 12-0-2     | O        | This field indicates the applied QoS accepted by the network. The QoS values may only be included in the first container, in later containers the presence depends upon what was changed. | Octet String | 4-15        | 82        |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPRS Uplink data volume</td>
<td>12-0-3</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the uplink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>GPRS Downlink data volume</td>
<td>12-0-4</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the downlink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Change Condition</td>
<td>12-0-5</td>
<td>M</td>
<td>This field defines the reason for closing the container such as tariff time change, QoS change or closing of the CDR. Supported values: qoSChange: 0, tariffTime: 1, recordClosure: 2, failureHandlingContinueOngoing: 3, failureHandlingRetryandTerminateOngoing: 4, failureHandlingTerminateOngoing: 5. FailureHandling is a standard AVP element in DCCA.</td>
<td>Enumerated (Integer)</td>
<td>1</td>
<td>85</td>
</tr>
<tr>
<td>Change time</td>
<td>12-0-6</td>
<td>M</td>
<td>This field is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Failurehandling Continue</td>
<td>12-0-7</td>
<td>O</td>
<td>Failure handling continue element is present if failure handling procedure is executed by GGSN.</td>
<td>Boolean</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>This field contains the time stamp when PDP context is activated in GGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>This field contains the relevant duration in seconds for PDP contexts with range of 0..4294967295 (2^32-1). It is the duration from Record Opening Time to the Change Time. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, round-off) can be configured. It is also possible to configure to use milliseconds in this field instead of seconds.</td>
<td>Integer</td>
<td>1-5</td>
<td>8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR. Supported values: normalRelease: 0, abnormalRelease: 4, volumeLimit: 16, timeLimit: 17, sGSNChange: 18, maxChangeCond: 19, managementIntervention: 20, rATChange: 22, mSTimeZoneChange: 23</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>16</td>
<td>O</td>
<td>This field is included in the CDR when the PDP context is released and when the option <code>gtpp attribute diagnostics</code> is configured. Only the choice of <code>gsm0408Value</code> is used. This field is supported for G-CDRs only (not eG-CDRs).</td>
<td>Choice</td>
<td>3</td>
<td>b0</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>gsm0408Cause</td>
<td>16-0</td>
<td>M</td>
<td>This cause is used in the Diagnostics field and contains one of the following values: &lt;li&gt;36: If the SGSN sends Delete PDP context request&lt;/li&gt; &lt;li&gt;38: If GGSN sends delete PDP context request due to GTP-C/U echo timeout with SGSN&lt;/li&gt; &lt;li&gt;40: If the GGSN sends delete PDP context request due to receiving a RADIUS Disconnect request message.&lt;/li&gt; &lt;li&gt;26: If the GGSN sends delete PDP context request for any other reason</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>17</td>
<td>O</td>
<td>A running sequence number with range 1 through 4294967295 used to link partial records generated by the GGSN for a specific PDP context (characterized with the same Charging ID and GGSN address pair). This field is not present if the first record is also the final record.</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
<tr>
<td>Node ID</td>
<td>18</td>
<td>M</td>
<td>This field contains an identifier string for the node that had generated the CDR. On the ASR5K GGSN, this NodeID field is a printable string of the ndddSTRING format: &lt;li&gt;n: The first digit is the Sessmgr restart counter having a value between 0 and 7.&lt;/li&gt; &lt;li&gt;ddd: The number of the sessmgr instance generating the CDR&lt;/li&gt; &lt;li&gt;STRING: This is a configured Node-ID-Suffix having any string between 1 to 16 characters, defined using the <code>gtpp attribute node-id</code> command.&lt;/li&gt; If this node-id-suffix is not configured, the GGSN uses the GTPP context name as the Node-id-suffix (truncated to 16 characters). For G-CDRs, this field is only included when the option <code>gtpp attribute local-record-sequence-number</code> is configured.</td>
<td>IA5string</td>
<td>5-20</td>
<td>92</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>20</td>
<td>M</td>
<td>For each Node ID, this number with range 1..4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. For G-CDRs, this field is only included when the option <code>gtpp attribute local-record-sequence-number</code> is configured.</td>
<td>Integer</td>
<td>1-5</td>
<td>94</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>APN Selection Mode</td>
<td>21</td>
<td>M</td>
<td>An index indicating how the APN was selected. The following APN selection mode indexes are possible:</td>
<td>Enumerated (Integer)</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 0: MS or network provided APN, subscribed verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 1: MS provided APN, subscription not verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 2: Network provided APN, subscription not verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>22</td>
<td>M</td>
<td>The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message and is TBCD encoded.</td>
<td>BCD encoded octet string</td>
<td>1-9</td>
<td>96</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>23</td>
<td>M</td>
<td>Lists the charging characteristics applied to the PDP context. The GGSN can accept charging characteristics from the SGSN or AAA or use its own configured value. GGSN configured charging characteristics are specified as part of the GGSN Service and are applied for G-CDRs to subscriber PDP contexts through APN templates.</td>
<td>Hex value octet string</td>
<td>2</td>
<td>97</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>24</td>
<td>O</td>
<td>The charging characteristic type that the GGSN applied to the CDR. The following values for this field are defined in 3GPP TS 32.298:</td>
<td>Enumerated</td>
<td>1</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- sGSNSupplied (0) - For GGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- subscriptionSpecific (1) - For SGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- aPNSpecific (2) - For SGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- homeDefault (3) - For SGSN and GGSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- roamingDefault (4) - For SGSN and GGSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- visitingDefault (5) - For SGSN and GGSN</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- SGSN supplied: The GGSN is using the charging characteristics supplied by the SGSN.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Home default: GGSN configured charging characteristics for home subscribers are used. Home subscribers are those that belong to the same PLMN as the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Visiting default: GGSN configured charging characteristics for visiting subscribers are used. Visiting subscribers are those that belong to a different PLMN than the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Roaming default: GGSN configured charging characteristics for roaming subscribers are used. Roaming subscribers are those that are serviced by an SGSN belonging to a different PLMN than the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGSN PLMN Identifier</td>
<td>27</td>
<td>O</td>
<td>RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI and is not identified as a &quot;home&quot; SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.</td>
<td>Octet string</td>
<td>3</td>
<td>9b</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Served IMEISV</td>
<td>29</td>
<td>O</td>
<td>This field contains software version in addition to the IMEI defined before. This software version is encoded in the last byte replacing the spare digit and filler. The structure of the IMEISV is defined in TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>8</td>
<td>9d</td>
</tr>
</tbody>
</table>
| RAT Type                   | 30          | O        | This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station. This field is present in the CDR if provided by SGSN. RAT Type values:  
  • Reserved: 0  
  • UTRAN: 1  
  • GERAN: 2  
  • WLAN: 3  
  • Spare: 4-255 | Integer       | 1            | 9e         |
<p>| MS Time Zone               | 31          | O        | This field contains the &quot;Time Zone&quot; IE that the SGSN may provide to the GGSN during the PDP context activation/modification procedure. It is transparently copied from the message into the CDR. The Time Zone is used to indicate the offset between universal time and local time in steps of 15 minutes of where the MS current resides. It is coded as specified in 3GPP TS 29.060 (which refers to 24.008 for the time zone, which again refers to the TP Service Centre Time Stamp field in 23.040). | Octet string    | 2            | 9f1f       |
| User Location Information  | 32          | O        | The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure. Transparently copied from the PDP context request. | Octet string    | 8            | 9f20       |
| List of Service Data Volumes | 34          | O        | A list of the changes that occurred in charging conditions for all service data flows for the PDP context. | Sequence         |               |            |
| Service Data Volume Block  | 34-0        | O        |                                                                                                                                                                                                          | Sequence       |               |            |
| Rating group               | 34-0-1      | M        | This is the service flow identity and has to be used for differentiated evaluation of user's traffic. This is also known as content-id.                                                                 | Integer         | 1-5           | 81         |
| Charging Rulebase name     | 34-0-2      | M        | The name of the Rulebase used for charging. This is the group name of charging rules.                                                                                                                   | IA5string       | 1-63          | 82         |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result Code</td>
<td>34-0-3</td>
<td>O</td>
<td>The Diameter server sends result-codes for each of the content-id for which quota is requested. The GGSN use this to populate the eG-CDR bucket. This is a Mandatory AVP that comes in response for every quota request for a category.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>Local Sequence number</td>
<td>34-0-4</td>
<td>M</td>
<td>A per service data container sequence number. It starts from 1 for each service, increasing by 1 for each service data container generated for that service within the lifetime of this PDP session.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Time of first usage</td>
<td>34-0-5</td>
<td>M</td>
<td>The time stamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>Time of last usage</td>
<td>34-0-6</td>
<td>M</td>
<td>The time stamp for the last IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Usage time</td>
<td>34-0-7</td>
<td>M</td>
<td>The difference between &quot;time of first usage&quot; and &quot;time of last usage&quot;.</td>
<td>Integer</td>
<td>1-5</td>
<td>87</td>
</tr>
<tr>
<td>Service condition change</td>
<td>34-0-8</td>
<td>M</td>
<td>The reason for closing the service data container for triggers like SGSN change, QoS change, Rat change, time and volume triggers, etc.</td>
<td>Bit string</td>
<td>5</td>
<td>88</td>
</tr>
<tr>
<td>QoS negotiated</td>
<td>34-0-9</td>
<td>O</td>
<td>The negotiated QoS applied for the service data flow.</td>
<td>Octet string</td>
<td>4-15</td>
<td>89</td>
</tr>
<tr>
<td>sgsn-Address</td>
<td>34-0-10</td>
<td>M</td>
<td>The valid SGSN IP address during the service data recording interval.</td>
<td>Choice</td>
<td>6</td>
<td>aa</td>
</tr>
<tr>
<td>SGSN-IPv4-Binary Address</td>
<td>34-0-10-0</td>
<td>M</td>
<td>The octet string included in the field “sgsn-Address” includes either control plane or user plane address of the SGSN in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>SGSN PLMN identifier</td>
<td>34-0-11</td>
<td>O</td>
<td>RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI and is not identified as a &quot;home&quot; SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.</td>
<td>Octet string</td>
<td>3</td>
<td>8b</td>
</tr>
<tr>
<td>FBC Data volume uplink</td>
<td>34-0-12</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the uplink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8c</td>
</tr>
<tr>
<td>FBC data volume downlink</td>
<td>34-0-13</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the downlink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8d</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Time of report</td>
<td>34-0-14</td>
<td>M</td>
<td>A time stamp defining the moment when the service data container is closed.</td>
<td>BCD encoded</td>
<td>9</td>
<td>8e</td>
</tr>
<tr>
<td>RAT Type</td>
<td>34-0-15</td>
<td>O</td>
<td>The valid radio access technology type during the service data recording interval.</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Failure handling Continue</td>
<td>34-0-16</td>
<td>O</td>
<td>A Boolean expression included if the failure handling condition has been executed. This can be either configured on the GGSN using failure-handling CLI inside &quot;credit-control&quot; mode or can be received from the server in the &quot;Credit-Control-Failure-Handling&quot; AVP. Whatever is received from the server will have higher precedence. There is no negotiation with the Diameter server in this regard and the GGSN will use whatever the server provides.</td>
<td>Boolean</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Service Identifier</td>
<td>34-0-17</td>
<td>O</td>
<td>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</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
</tbody>
</table>

Notes:

- The subfields included in other fields are marked MANDATORY even if the main field is optional. For example, the list of service containers is optional, but if there is at least one container, then all subfields for the container that are marked as MANDATORY will be included.
- The field “Served PDP PDN Address Extension"(servedPDPPDNAddressExt) is not part of the 3GPP 32.298 v8.5.0 specification. This field will be available in the CDR only when the CLI command `gtpp attribute served-pdp-pdn-address-extension` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.
- In releases prior to 14.0, the CGISAIChange service condition is present in LOSDV of GGSN CDR even if ULI Change trigger is disabled. In 14.0 and later releases, if the ULI Change trigger is disabled and if the ULI is changed, the CGISAIChange service condition is not present in LOSDV of GGSN CDR.

**ASN.1 Definition for Fields in custom6 Dictionary**

Below is a complete ASN.1 definition of G-CDR fields down to the basic types described in ITU X.690. It is based on the ASN.1 definition in 3GPP TS 32.298, with imported types taken from 3GPP TS 29.002. The definition from the standard has been modified to reflect the fields which are not supported currently on the ASR5K platform, and to reflect other differences such as in the category (mandatory versus optional).

```
GGSN-Charging-DataTypes-REL6 DEFINITIONS IMPLICIT TAGS :=
BEGIN
```
-- ASN.1 definitions of the ASR5K GGSN Charging implementation
--
-- based on 3GPP TS 32.298 v6.4.1
--
-- for some fields, only the values relevant to GGSN charging
-- are shown (such as CallEventRecordType)
--
-- some types are imported from 29.002 and are shown below as well
-- with the definition copied from that standard (such as IMSI)

GPRSCallEventRecord ::= CHOICE
{
    ggsnPDPRecord [21] GGSNPDPRecord
}

-- -------------------------------------------------------------------
-- GGSN record (same definition used for G-CDR and eG-CDR)
-- -------------------------------------------------------------------

GGSNPDPRecord ::= SET
{
    recordType [0] CallEventRecordType,
    networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL,
    servedIMSI [3] IMSI,
    ggsnAddress [4] GSNAddress,
    chargingID [5] ChargingID,
    sgsnAddress [6] SEQUENCE OF GSNAddress,
    accessPointNameNI [7] AccessPointNameNI,
    pdpType [8] PDPType,
servedPDPAddress [9] PDPAddress OPTIONAL,
dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL,
listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition,
recordOpeningTime [13] TimeStamp,
duration [14] CallDuration,
causeForRecClosing [15] CauseForRecClosing,
diagnostics [16] Diagnostics OPTIONAL,
recordSequenceNumber [17] INTEGER OPTIONAL,
nodeID [18] NodeID,
localSequenceNumber [20] LocalSequenceNumber,
apnSelectionMode [21] APNSelectionMode,
servedMSISDN [22] MSISDN,
chargingCharacteristics [23] ChargingCharacteristics,
chChSelectionMode [24] ChChSelectionMode OPTIONAL,
sgsnPLMNIentifier [27] PLMN-Id OPTIONAL,
servedIMEISV [29] IMEI OPTIONAL,
rATType [30] RATType OPTIONAL,
mSTimeZone [31] MSTimeZone OPTIONAL,
userLocationInformation [32] OCTET STRING OPTIONAL,
listOfServiceData [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL

-- ------------------------------------------------------------------

-- Alphabetical listing of all field types above

-- ------------------------------------------------------------------
AccessPointNameNI ::= IA5String (SIZE(1..63))

--

-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is
-- 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs', NI is
-- 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.
--

AccessPointNameOI ::= IA5String (SIZE(1..37))

--

-- Operator Identifier part of APN in dot representation.
-- In the 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs' example, the OI
-- portion is 'mnc022.mcc111.gprs' and is presented in this form
-- in the CDR.
--

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

-- This type is used to represent a number for addressing
-- purposes. It is composed of
-- a) one octet for nature of address, and numbering plan
-- indicator.
-- b) digits of an address encoded as TBCD-String.
-- a) The first octet includes a one bit extension indicator, a
-- 3 bits nature of address indicator and a 4 bits numbering
-- plan indicator, encoded as follows:
-- bit 8: 1 (no extension)
-- bits 765: nature of address indicator
-- 000 unknown
-- 001 international number
-- 010 national significant number
-- 011 network specific number
-- 100 subscriber number
-- 101 reserved
-- 110 abbreviated number
-- 111 reserved for extension
-- bits 4321: numbering plan indicator
-- 0000 unknown
-- 0001 ISDN/Telephony Numbering Plan (Rec ITU-T E.164)
-- 0010 spare
-- 0011 data numbering plan (ITU-T Rec X.121)
-- 0100 telex numbering plan (ITU-T Rec F.69)
-- 0101 spare
-- 0110 land mobile numbering plan (ITU-T Rec E.212)
-- 0111 spare
-- 1000 national numbering plan
-- 1001 private numbering plan
-- 1111 reserved for extension
-- all other values are reserved.
-- b) The following octets representing digits of an address
-- encoded as a TBCD-STRING.

APNSelectionMode::= ENUMERATED
{

--

-- See Information Elements TS 29.060

--

mSorNetworkProvidedSubscriptionVerified (0),

mProvidedSubscriptionNotVerified (1),

GTPP Interface Administration and Reference, StarOS Release 18
CDR Fields Supported in G-CDRs

networkProvidedSubscriptionNotVerified (2)

}

CallDuration ::= INTEGER

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

CallEventRecordType ::= INTEGER

{

  ggsnPDPRecord (19),
  egsnPDPRecord (70)

}

CauseForRecClosing ::= INTEGER

{

  --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for
  -- termination)
  --
  normalRelease (0),
  abnormalRelease (4),
  volumeLimit (16),

}
timeLimit (17),
sGSNChange (18),
maxChangeCond (19),
managementIntervention (20),
rATChange (22),
mSTimeZoneChange (23)
}

CellId ::= OCTET STRING (SIZE(2))

--

-- Coded according to TS 24.008

--

ChangeCondition ::= ENUMERATED
{

--

-- Failure Handling values used in eG-CDR only

--

qoSChange (0),
tariffTime (1),
recordClosure (2),
failureHandlingContinueOngoing (3),
failureHandlingRetryandTerminateOngoing (4),
failureHandlingTerminateOngoing (5)
}

ChangeOfCharCondition ::= SEQUENCE
{

--
-- Used in PDP context record only
-- failureHandlingContinue field used in eG-CDR only
--
qosRequested [1] QoSInformation OPTIONAL,
qosNegotiated [2] QoSInformation OPTIONAL,
dataVolumeGPRSUplink [3] DataVolumeGPRS,
dataVolumeGPRSDownlink [4] DataVolumeGPRS,
changeCondition [5] ChangeCondition,
changeTime [6] Timestamp,
failureHandlingContinue [7] FailureHandlingContinue OPTIONAL
}

ChangeOfServiceCondition ::= SEQUENCE
{
--
-- Used for Flow based Charging service data container
--

ratingGroup [1] RatingGroupId,
chargingRuleBaseName [2] ChargingRuleBaseName,
resultCode [3] ResultCode OPTIONAL,
localSequenceNumber [4] LocalSequenceNumber,
timeOfFirstUsage [5] Timestamp,
timeOfLastUsage [6] Timestamp,
timeUsage [7] CallDuration,
serviceConditionChange [8] ServiceConditionChange,
qoSInformationNeg [9] QoSInformation OPTIONAL,
sgsn-Address [10] GSNAAddress,
sGSNPLMNIdentifier [11] PLMN-Id OPTIONAL,
datavolumeFBCUplink [12] DataVolumeGPRS,
datavolumeFBCDownlink [13] DataVolumeGPRS,
timeOfReport [14] TimeStamp,
rATType [15] RATType OPTIONAL,
failureHandlingContinue [16] FailureHandlingContinue OPTIONAL,
serviceIdentifier [17] ServiceIdentifier OPTIONAL

ChargingCharacteristics ::= OCTET STRING (SIZE(2))
--
-- Bit 0-3: Profile Index
-- Bit 4-15: For Behavior
--

ChargingID ::= INTEGER (0..4294967295)
--
-- Generated in GGSN, part of PDP context, see TS 23.060
-- 0..4294967295 is equivalent to 0..2**32-1
--

ChargingRuleBaseName ::= IA5String (SIZE(1..63))
--
-- identifier for the group of charging rules
-- see Charging-Rule-Base-Name AVP as defined in 3GPP TS 29.210
--

ChChSelectionMode ::= ENUMERATED
{
--
-- values below show the additional, non-standard values

-- requested by customer

sGSNSupplied (0), -- For GGSN only
homeDefault (3), -- For SGSN and GGSN
roamingDefault (4), -- For SGSN and GGSN
visitingDefault (5), -- For SGSN and GGSN
aAASupplied (6), -- For GGSN only, CC provided by AAA
gGGSNOverride (7) -- For GGSN only, CC configured on GGSN

DataVolumeGPRS ::= INTEGER

--

-- The volume of data transferred in octets.
--

Diagnostics ::= CHOICE
{

-- Only the option gsm0408Cause is used for this field
--

gsm0408Cause [0] INTEGER
}

DynamicAddressFlag ::= BOOLEAN

FailureHandlingContinue ::= BOOLEAN

--

-- This parameter is included when the failure handling procedure
-- has been executed and new containers are opened. This
-- parameter shall be included in the first and subsequent
-- containers opened after the failure handling execution.

GSNAddress ::= IPAddress

IMSI ::= TBCD STRING (SIZE (3..8))

-- from 29.002
-- digits of MCC, MNC, MSIN are concatenated in this order.

IMEI ::= TBCD STRING (SIZE (8))

--
-- Refers to International Mobile Station Equipment Identity
-- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
-- If the SVN is not present the last octet shall contain the
-- digit 0 and a filler.
-- If present the SVN shall be included in the last octet.

IPAddress ::= CHOICE
{
  iPBinaryAddress IPBinaryAddress
}

IPBinaryAddress ::= CHOICE
{
  iPBinV4Address [0] OCTET STRING (SIZE(4))
  iPBinV6Address [1] OCTET STRING (SIZE(16))
ISDN-AddressString ::= AddressString

   (SIZE (1..maxISDN-AddressLength))

   --

   -- This type is used to represent ISDN numbers.

   --

LocalSequenceNumber ::= INTEGER (0..4294967295)

   --

   -- Sequence number of the record in this node

   -- 0..4294967295 is equivalent to 0..2**32-1, unsigned integer

   -- in four octets

MSISDN ::= ISDN-AddressString

   --

   -- see definitions below for ISDN-AddressString and AddressString

   -- copied from 29.002

   --

maxISDN-AddressLength INTEGER ::= 9

maxAddressLength INTEGER ::= 20

MSTimeZone ::= OCTET STRING (SIZE (2))

   --

   -- 1.Octet: Time Zone and 2. Octet: Daylight saving time,

   -- see TS 29.060

   --
NetworkInitiatedPDPContext ::= BOOLEAN
   --
   -- Set to true if PDP context was initiated from network side
   --

NodeID ::= IA5String (SIZE(5..20))

PDPAddress ::= CHOICE
   {  
      ipAddress [0] EXPLICIT IPAddress
   }

PDPType ::= OCTET STRING (SIZE(2))
   --
   -- OCTET 1: PDP Type Organization
   -- OCTET 2: PDP Type Number
   -- See TS 29.060
   --

PLMN-Id ::= OCTET STRING (SIZE (3))
   --
   -- This is a 1:1 copy from the Routing Area Identity (RAI) IE
   -- specified in TS 29.060
   -- as follows:
   -- OCTET 1 of PLMN-Id = OCTET 2 of RAI
   -- OCTET 2 of PLMN-Id = OCTET 3 of RAI
   -- OCTET 3 of PLMN-Id = OCTET 4 of RAI

QoSInformation ::= OCTET STRING (SIZE (4..15))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 4) of
-- the "Quality of service Profile" information element specified
-- in 3GPP TS 29.060.
--

RatingGroupId ::= INTEGER
--
-- IP service flow identity (DCCA), range of 4 byte
-- (0...4294967259)
-- see Rating-Group AVP as used in 3GPP TS 32.299
--

RATType ::= INTEGER (0..255)
--
-- This integer is 1:1 copy of the RAT type value as defined in
-- 3GPP TS 29.060.
--

ResultCode ::= INTEGER
--
-- charging protocol return value, range of 4 byte
-- (0...4294967259)
-- see Result-Code AVP as used in 3GPP 29.210
--

ServiceConditionChange ::= BIT STRING

-- Bits 0-5 are cause values for Gn update/release and TTS
-- Bits 6-9 are cause values for service stop
-- Bits 10-14 are cause values for service reauthorization request
-- Bits 15-17 are cause values for quota return
-- Bits 18-20: are cause values for Failure Handling Procedure
-- Bits 21-32: are unused and will always be zero
-- some of the values are non-exclusive
-- serviceIdledOut bit 6 is equivalent to service release by QHT

goSChange (0),
sGSNChange (1),
sGSNPLMNIDChange (2),
tariffTimeSwitch (3),
pDPCookContextRelease (4),
rATChange (5),
serviceIdledOut (6),
qCTExpiry (7),
timeThresholdReached (10),
volumeThresholdReached (11),
timeExhausted (13),
volumeExhausted (14),
continueOngoingSession (18),
retryAndTerminateOngoingSession (19),
terminateOngoingSession (20)

ServiceIdentifier ::= INTEGER (0..4294967295)

--
-- The service identifier is used to identify the service or the
--- service component the service data flow relates to. See
--- Service-Identifier AVP as defined in 3GPP TS 29.210
---

TimeStamp ::= OCTET STRING (SIZE(9))
---

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

TBCDSTRING ::= OCTET STRING

END

---

standard Dictionary


<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>GGSN PDP context record.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>OC</td>
<td>A flag that is present if this is a network-initiated PDP context.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the served party.</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>M</td>
<td>The control plane IP address of the GGSN used.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>PDP context identifier used to identify this PDP context in different records created by GSNs.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>M</td>
<td>List of SGSN addresses used during this record.</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>OM</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
</tr>
<tr>
<td>PDP Type</td>
<td>OM</td>
<td>PDP type, i.e. IP, PPP, or IHOSS:OSP</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>OC</td>
<td>PDP address, i.e. IPv4 or IPv6. This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>OC</td>
<td>Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>OM</td>
<td>A list of changes in charging conditions for this PDP context, each change is time stamped. Charging conditions are used to categorise traffic volumes, such as per tariff period. Initial and subsequently changed QoS and corresponding data values are listed.</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Time stamp when PDP context is activated in this GGSN or record opening time on subsequent partial records.</td>
</tr>
<tr>
<td>Duration</td>
<td>M</td>
<td>Duration of this record in the GGSN.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for the release of record from this GGSN.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>OM</td>
<td>A more detailed reason for the release of the connection.</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number, only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>OM</td>
<td>An index indicating how the APN was selected.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics applied to the PDP context.</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SGSN PLMN Identifier</td>
<td>OM</td>
<td>SGSN PLMN identifier (MCC and MNC) used during this record.</td>
</tr>
</tbody>
</table>
CDR Fields Supported in eG-CDRs

The tables in this section list the eG-CDR fields present in the available GTPP dictionaries.

custom6 Dictionary

eG-CDR fields based on 3GPP TS 32.298 V6.6.0 (2006-12) (R6).

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record:</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• S-CDR(egsnPDPRecord) 18 (0x12)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• G-CDR(ggsnPDPRecord) 19 (0x13)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• eG-CDR(egsnPDPRecord) 70 (0x46)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. The field is missing in case of mobile activated PDP context. Set to TRUE (0xFF) if PDP context was initiated from network side. This field is not yet supported by the SGSN.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>3-8</td>
<td>83</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>4</td>
<td>M</td>
<td>This field provides the current serving GGSN IP Address for the Control Plane, which is equivalent to the configured ggsn-service address on the GGSN. The standard 3GPP 32.298 offers a choice for the encoding of the address to be either in binary or text format. The GGSN encodes the address in binary format and includes the Octet String shown in 0.</td>
<td>Choice</td>
<td>6</td>
<td>a4</td>
</tr>
<tr>
<td>GGSN IPv4 Binary Address</td>
<td>4-0</td>
<td>M</td>
<td></td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the GGSN address to identify all records produced in the GGSN involved in a single PDP context. The Charging ID is generated by the GGSN at PDP context activation and is transferred to the context requesting SGSN. At an inter-SGSN routing area update the charging ID is transferred to the new SGSN as part of each active PDP context. The possible values for the charging ID, which are defined in TS 29.060 are 1-4,294,967,295 and those values are encapsulated in following scheme in the CDR-field: 1 - 127 850101-85017F 128 – 32,767 85020080-85027FFF 32,768 – 8,388,607 8503008000-85037FFFFF 8,388,608 – 2,147,483,647 850400800000-85047FFFFFF 2,147,483,648 – 4,294,967,295 85050080000000- 850500FFFFFFFF</td>
<td>Integer</td>
<td>1-5</td>
<td>85</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>6</td>
<td>M</td>
<td>This field contains one or several SGSN IP addresses. For an S-CDR, the SGSN address contains the control plane or user plane address of the current SGSN serving the PDP context. For a G-CDR and eG-CDR, in addition to the current SGSN being used, the field may contain additional SGSN addresses where the PDP context was located before and where it has moved away using the Inter-SGSN Routing Area Update Procedure. The maximum number of addresses in the list is 5.</td>
<td>Sequence</td>
<td>6-30</td>
<td>a6</td>
</tr>
<tr>
<td>SGSN IPv4 Binary Address</td>
<td>6-0</td>
<td>M</td>
<td>The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Access Point Name</td>
<td>7</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN). It is provided by the SGSN in the Create PDP Context Request message. For GGSN generated records, in case of a configured virtual APN, the virtual APN is included instead, unless this is overridden by the option gcdr apn-name-to-be-included {gn</td>
<td>virtual}</td>
<td>IA5string</td>
<td>1-63</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>PDP Type</td>
<td>8</td>
<td>M</td>
<td>This field defines the PDP type, e.g. IP or PPP, as received in the PDP context request from the SGSN. Supported values: IP = f121, PPP = f001</td>
<td>Octet String</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>9</td>
<td>O</td>
<td>This field contains the PDP address of the served IMSI for which the standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAddress.</td>
<td>Choice</td>
<td>8</td>
<td>a9</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>9-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6</td>
<td>a0</td>
</tr>
<tr>
<td>PDP IPv4 Binary Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the GGSN in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>11</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context. In this case, the value is set to TRUE and encoded as &quot;FF&quot;. This field is missing if the address allocation method was &quot;static&quot;, i.e. part of PDP context subscription.</td>
<td>Boolean</td>
<td>1</td>
<td>8b</td>
</tr>
<tr>
<td>List of Traffic Volumes</td>
<td>12</td>
<td>M</td>
<td>This list includes one or more Traffic Volume containers related to a &quot;Change of Charging Condition&quot; as described in the next field. The maximum number of containers is configurable.</td>
<td>Sequence</td>
<td>ac</td>
<td></td>
</tr>
<tr>
<td>ChangeOfCharCondition</td>
<td>12-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>QoS Requested</td>
<td>12-0-1</td>
<td>O</td>
<td>This field contains the QoS desired by the MS at PDP context activation.</td>
<td>Octet String</td>
<td>4-15</td>
<td>81</td>
</tr>
<tr>
<td>QoS Negotiated</td>
<td>12-0-2</td>
<td>O</td>
<td>This field indicates the applied QoS accepted by the network. The QoS values may only be included in the first container, in later containers the presence depends upon what was changed.</td>
<td>Octet String</td>
<td>4-15</td>
<td>82</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>GPRS Uplink data volume</td>
<td>12-0-3</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the uplink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>GPRS Downlink data volume</td>
<td>12-0-4</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the downlink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| Change Condition      | 12-0-5     | M        | This field defines the reason for closing the container such as tariff time change, QoS change or closing of the CDR. Supported values:  
  - qosChange: 0  
  - tariffTime: 1  
  - recordClosure: 2  
  - failureHandlingContinueOngoing: 3  
  - failureHandlingRetryandTerminateOngoing: 4  
  - failureHandlingTerminateOngoing: 5  
  FailureHandling is a standard AVP element in DCCA.  
  - Terminate: The online session is finished. The associated PDP Context is released (ongoing sessions) or not established (new sessions). Failover for ongoing sessions is not supported. Failover for new sessions is always supported.  
  - Retry&Terminate: The online session is finished. The associated PDP Context is released (ongoing sessions) or not established (new sessions). Failover for ongoing sessions is supported. Failover for new sessions is always supported.  
  - Continue: The online session is finished. The associated PDP Context is established (new sessions) or not released (ongoing sessions). Failover for ongoing sessions is supported. Failover for new sessions is always supported. | Enumerated (Integer) | 1            | 85         |
<p>| Change time           | 12-0-6     | M        | This field is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.                                                                                                                                                                                                                                                   | BCD encoded octet string | 9            | 86         |
| Failure handling      | 12-0-7     | O        | Failure handling continue element is present if failure handling procedure is executed by GGSN.                                                                                                                                                                                                                                                                   | Boolean         | 1            | 87         |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>This field contains the time stamp when PDP context is activated in GGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>This field contains the relevant duration in seconds for PDP contexts with range of 0..4294967295 (2^32-1). It is the duration from Record Opening Time to the Change Time. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured. It is also possible to configure to use milliseconds in this field instead of seconds.</td>
<td>Integer</td>
<td>1-5</td>
<td>8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR. Supported values:   * normalRelease: 0     * abnormalRelease: 4     * volumeLimit: 16     * timeLimit: 17     * sGSNChange: 18     * maxChangeCond: 19     * managementIntervention: 20     * rATChange: 22     * mSTimeZoneChange: 23</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>16</td>
<td>O</td>
<td>This field is included in the CDR when the PDP context is released and when the option <strong>gtpp attribute diagnostics</strong> is configured. Only the choice of <strong>gsm0408Value</strong> is used. This field is supported for G-CDRs only (not eG-CDRs).</td>
<td>Choice</td>
<td>3</td>
<td>b0</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| gsm0408Cause          | 16-0       | M        | This cause is used in the Diagnostics field and contains one of the following values:  
  • 36: If the SGSN sends Delete PDP context request  
  • 38: If GGSN sends delete PDP context request due to GTP-C/U echo timeout with SGSN  
  • 40: If the GGSN sends delete PDP context request due to receiving a RADIUS Disconnect request message.  
  • 26: If the GGSN sends delete PDP context request for any other reason |
| Record Sequence Number| 17         | O        | A running sequence number with range 1 through 4294967295 used to link partial records generated by the GGSN for a specific PDP context (characterized with the same Charging ID and GGSN address pair). This field is not present if the first record is also the final record. |
| Node ID               | 18         | M        | This field contains an identifier string for the node that had generated the CDR. On the ASR5K GGSN, this NodeID field is a printable string of the ndddSTRING format: n: The first digit is the Sessmgr restart counter having a value between 0 and 7.  
  ddd: The number of the sessmgr instance generating the CDR  
  STRING: This is a configured Node-ID-Suffix having any string between 1 to 16 characters, defined using the `gtpp attribute node-id` command.  
  If this node-id-suffix is not configured, the GGSN uses the GTPP context name as the Node-id-suffix (truncated to 16 characters).  
  For G-CDRs, this field is only included when the option `gtpp attribute local-record-sequence-number` is configured. |
| Local Record Sequence Number | 20      | M        | For each Node ID, this number with range 1..4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR.  
  For G-CDRs, this field is only included when the option `gtpp attribute local-record-sequence-number` is configured. | Integer   | 1-5          | 94         |
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>APN Selection Mode</td>
<td>21</td>
<td>M</td>
<td>An index indicating how the APN was selected. The following APN selection mode indexes are possible:</td>
<td>Enumerated (Integer)</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 0: MS or network provided APN, subscribed verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1: MS provided APN, subscription not verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 2: Network provided APN, subscription not verified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>22</td>
<td>M</td>
<td>The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message and is TBCD encoded.</td>
<td>BCD encoded octet string</td>
<td>1-9</td>
<td>96</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>23</td>
<td>M</td>
<td>Lists the charging characteristics applied to the PDP context. The GGSN can accept charging characteristics from the SGSN or AAA or use its own configured value. GGSN configured charging characteristics are specified as part of the GGSN Service and are applied for G-CDRs to subscriber PDP contexts through APN templates.</td>
<td>Hex value octet string</td>
<td>2</td>
<td>97</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| Charging Characteristics Selection Mode | 24         | O        | The charging characteristic type that the GGSN applied to the CDR. The following values for this field are defined in 3GPP TS 32.298:  
- sGSNSupplied (0) - For GGSN only  
- subscriptionSpecific (1) -For SGSN only  
- aPNSpecific (2) - For SGSN only  
- homeDefault (3) - For SGSN and GGSN  
- roamingDefault (4) - For SGSN and GGSN  
- visitingDefault (5) - For SGSN and GGSN  
- SGSN supplied: The GGSN is using the charging characteristics supplied by the SGSN.  
- Home default: GGSN configured charging characteristics for home subscribers are used. Home subscribers are those that belong to the same PLMN as the one on which the GGSN is located.  
- Visiting default: GGSN configured charging characteristics for visiting subscribers are used. Visiting subscribers are those that belong to a different PLMN than the one on which the GGSN is located.  
- Roaming default: GGSN configured charging characteristics for roaming subscribers are used. Roaming subscribers are those that are serviced by an SGSN belonging to a different PLMN than the one on which the GGSN is located. | Enumerate (Integer)      | 1            | 98         |
<p>| SGSN PLMN Identifier        | 27         | O        | RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI and is not identified as a &quot;home&quot; SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead. | Octet string             | 3            | 9b         |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Served IMEISV</td>
<td>29</td>
<td>O</td>
<td>This field contains software version in addition to the IMEI defined before. This software version is encoded in the last byte replacing the spare digit and filler. The structure of the IMEISV is defined in TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>8</td>
<td>9d</td>
</tr>
</tbody>
</table>
| RAT Type                   | 30         | O        | This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station. The field is present in the CDR if provided by SGSN. RAT Type values:  
  - Reserved: 0  
  - UTRAN: 1  
  - GERAN: 2  
  - WLAN: 3  
  - Spare: 4-255                                                                                                                                                                                                                                                                                                                                                                           | Integer           | 1            | 9e         |
<p>| MS Time Zone               | 31         | O        | This field contains the &quot;Time Zone&quot; IE that the SGSN may provide to the GGSN during the PDP context activation/modification procedure. It is transparently copied from the message into the CDR. The Time Zone is used to indicate the offset between universal time and local time in steps of 15 minutes of where the MS current resides. It is coded as specified in 3GPP TS 29.060 (which refers to 24.008 for the time zone, which again refers to the TP Service Centre Time Stamp field in 23.040) | Octet string      | 2            | 9f1f       |
| User Location Information  | 32         | O        | The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure. Transparently copied from the PDP context request.                                                                                                                                                                                                                                                                                               | Octet string      | 8            | 9f20       |
| List of Service Data Volumes | 34      | O        | A list of the changes that occurred in charging conditions for all service data flows for the PDP context                                                                                                                                                                                                                                                                                                                                                        | Sequence          |              |            |
| ChangeOfServiceCondition   | 34-0       | O        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Sequence          |              |            |
| Rating group               | 34-0-1     | M        | This is the service flow identity and has to be used for differentiated evaluation of user’s traffic. Also known as content-id.                                                                                                                                                                                                                                                                                                                           | Integer           | 1-5          | 81         |
| Charging Rulebase name     | 34-0-2     | M        | The name of the Rulebase used for charging. This is the group name of charging rules.                                                                                                                                                                                                                                                                                                                                                                   | IA5string         | 1-63         | 82         |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result Code</td>
<td>34-0-3</td>
<td>O</td>
<td>The result code AVP. This contains the result code after the interconnection with the CRF.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>Local Sequence number</td>
<td>34-0-4</td>
<td>M</td>
<td>A per service data container sequence number. It starts from 1 for each service, increasing by 1 for each service date container generated for that service within the lifetime of this PDP session.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Time of first usage</td>
<td>34-0-5</td>
<td>M</td>
<td>The time stamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded</td>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>Time of last usage</td>
<td>34-0-6</td>
<td>M</td>
<td>The time stamp for the last IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Usage time</td>
<td>34-0-7</td>
<td>M</td>
<td>The difference between “time of first usage” and “time of last usage”.</td>
<td>Integer</td>
<td>1-5</td>
<td>87</td>
</tr>
<tr>
<td>Service condition change</td>
<td>34-0-8</td>
<td>M</td>
<td>The reason for closing the service data container for triggers like SGSN change, QoS change, RAT change, time and volume triggers, etc.</td>
<td>Bit string</td>
<td>5</td>
<td>88</td>
</tr>
<tr>
<td>QoS negotiated</td>
<td>34-0-9</td>
<td>O</td>
<td>The negotiated QoS applied for the service data flow. In 16.0 and earlier releases, if in the CDRs there are multiple LOSDVs with same content-id and different service-identifiers, then the QOS-Info Information Element (IE) is included only in the very first LOSDV and not in the subsequent LOSDVs unless its previous LOSDV is closed for QoS change. In 17.0 and later releases, this implementation has been modified to include QOS-Info in all LOSDVs having different combination of service-id and content-id. Thus if there are multiple LOSDVs with same content-id but different service-id, QOS-Info will be present in every such LOSDV.</td>
<td>Octet string</td>
<td>4-15</td>
<td>89</td>
</tr>
<tr>
<td>sgsn-Address</td>
<td>34-0-10</td>
<td>M</td>
<td>The valid SGSN IP address during the service data recording interval.</td>
<td>Choice</td>
<td>6</td>
<td>aa</td>
</tr>
<tr>
<td>SGSN-IPv4-Binary Address</td>
<td>34-0-10-0</td>
<td>M</td>
<td></td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>SGSN PLMN identifier</td>
<td>34-0-11</td>
<td>O</td>
<td>The valid SGSN PLMN ID during the service data recording interval.</td>
<td>Octet string</td>
<td>3</td>
<td>8b</td>
</tr>
</tbody>
</table>
### CDR Fields Supported in eG-CDRs

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBC Data volume uplink</td>
<td>34-0-12</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the uplink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8c</td>
</tr>
<tr>
<td>FBC data volume downlink</td>
<td>34-0-13</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the downlink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8d</td>
</tr>
<tr>
<td>Time of report</td>
<td>34-0-14</td>
<td>M</td>
<td>A time stamp defining the moment when the service data container is closed.</td>
<td>BCD</td>
<td>9</td>
<td>8e</td>
</tr>
<tr>
<td>RAT Type</td>
<td>34-0-15</td>
<td>O</td>
<td>The valid RAT type during the service data recording interval.</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Failure handling</td>
<td>34-0-16</td>
<td>O</td>
<td>A Boolean expression included if the failure handling condition has been executed.</td>
<td>Boolean</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Service Identifier</td>
<td>34-0-17</td>
<td>O</td>
<td>The service identifier may designate an end user service, a part of an end user service or an arbitrarily formed group thereof.</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
</tbody>
</table>

**Notes:**

- The subfields included in other fields are marked Mandatory even if the main field is optional. For example, the list of service containers is optional, but if there is at least one container, then all subfields for the container that are marked as Mandatory will be included.

- The field “Served PDP PDN Address Extension”(servedPDPPDNAddressExt) is not part of the 3GPP 32.298 v8.5.0 specification. This field will be available in the CDR only when the CLI command `gtpp attribute served-pdp-pdn-address-extension` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.

- Record Extensions (recordExtensions) is a customer-specific field. This field will be available in the CDR only when the CLI command `gtpp trigger direct-tunnel` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.

- In releases prior to 14.0, the CGISAICChange service condition is present in LOSDV of GGSN CDR even if ULI Change trigger is disabled. In 14.0 and later releases, if the ULI Change trigger is disabled and if the ULI is changed, the CGISAICChange service condition is not present in LOSDV of GGSN CDR.

- Rulebase change triggered from any external interface e.g. OCS/PCRF, will generate CDR with closure reason “Management Intervention”. This change is applicable to all standard dictionaries except for custom42 GTPP dictionary as it is customized to suppress interim CDR.

- In releases prior to 16, if there was a LOSDV bucket created between the packet arrival time and service-idle-out expiry time, no data counts were reported. So, a zero-volume LOSDV was generated for service idle timeout scenario. In 16 and later releases, if there are no data counts available for a service flow, the LOSDV for service idle timeout will not be created. The service-idle timeout will be started only when the next data packet arrives.
This behavior change is applicable to eG-CDRs and PGW-CDRs for all GTPP dictionaries except custom5 and custom40 dictionaries.

**ASN.1 Definition for Fields in custom6 Dictionary**

Below is a complete ASN.1 definition of eG-CDR fields down to the basic types described in ITU X.690. It is based on the ASN.1 definition in 3GPP TS 32.298, with imported types taken from 3GPP TS 29.002. The definition from the standard has been modified to reflect the fields which are not supported currently on the ASR5K platform, and to reflect other differences such as in the category (mandatory versus optional).

```
GPRS-PGW-Charging-DataTypes-REL6 DEFINITIONS IMPLICIT TAGS ::= 
BEGIN

-- ASN.1 definitions of the ASR5K GGSN Charging implementation
--
-- based on 3GPP TS 32.298 v6.4.1
--
-- for some fields, only the values relevant to GGSN charging
-- are shown (such as CallEventRecordType)
--
-- some types are imported from 29.002 and are shown below as well
-- with the definition copied from that standard (such as IMSI)

GPRSCallEventRecord ::= CHOICE
{
    ggsnPDPRecord [21] GGSNPDPRecord
}

-- ------------------------------------------------------------------
-- GGSN record (same definition used for G-CDR and eG-CDR)
-- ------------------------------------------------------------------

GGSNPDPRecord ::= SET
{

```plaintext
recordType [0] CallEventRecordType, 

networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL, 

servedIMSI [3] IMSI, 

ggsnAddress [4] EXPLICIT GSNAddress, 

chargingID [5] ChargingID, 

sgsnAddress [6] SEQUENCE OF GSNAddress, 

accessPointNameNI [7] AccessPointNameNI, 

pdpType [8] PDPType, 

servedPDPAddress [9] EXPLICIT PDPAddress OPTIONAL, 

dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL, 

listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition, 

recordOpeningTime [13] TimeStamp, 

duration [14] CallDuration, 

causeForRecClosing [15] CauseForRecClosing, 

diagnostics [16] Diagnostics OPTIONAL, 

recordSequenceNumber [17] INTEGER OPTIONAL, 

nodeID [18] NodeID, 

localSequenceNumber [20] LocalSequenceNumber, 

apnSelectionMode [21] APNSelectionMode, 

servedMSISDN [22] MSISDN, 

chargingCharacteristics [23] ChargingCharacteristics, 

chChSelectionMode [24] ChChSelectionMode OPTIONAL, 

sgsnPLMNIIdentifier [27] PLMN-Id OPTIONAL, 

servedIMEISV [29] IMEI OPTIONAL, 

rATType [30] RATType OPTIONAL, 

mSTimeZone [31] MSTimeZone OPTIONAL, 

userLocationInformation [32] OCTET STRING OPTIONAL, 

listOfServiceData [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL
```
AccessPointNameNI ::= IA5String (SIZE(1..63))

-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is
-- 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs', NI is
-- 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

-- This type is used to represent a number for addressing
-- purposes. It is composed of
-- a) one octet for nature of address, and numbering plan
-- indicator.
-- b) digits of an address encoded as TBCD-String.
-- a) The first octet includes a one bit extension indicator, a
-- 3 bits nature of address indicator and a 4 bits numbering
-- plan indicator, encoded as follows:
-- bit 8: 1 (no extension)
-- bits 765: nature of address indicator
-- 000 unknown
-- 001 international number
-- 010 national significant number
-- 011 network specific number
-- 100 subscriber number
-- 101 reserved
-- 110 abbreviated number
-- 111 reserved for extension
-- bits 4321: numbering plan indicator
-- 0000 unknown
-- 0001 ISDN/Telephony Numbering Plan (Rec ITU-T E.164)
-- 0010 spare
-- 0011 data numbering plan (ITU-T Rec X.121)
-- 0100 telex numbering plan (ITU-T Rec F.69)
-- 0101 spare
-- 0110 land mobile numbering plan (ITU-T Rec E.212)
-- 0111 spare
-- 1000 national numbering plan
-- 1001 private numbering plan
-- 1111 reserved for extension
-- all other values are reserved.
-- b) The following octets representing digits of an address
-- encoded as a TBCD-STRING.

APNSelectionMode::= ENUMERATED

[

--

-- See Information Elements TS 29.060

-- mSorNetworkProvidedSubscriptionVerified (0),
mProvidedSubscriptionNotVerified (1),
networkProvidedSubscriptionNotVerified  (2)

CallDuration ::= INTEGER

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

CallEventRecordType ::= INTEGER

{
  ggsnPDPRecord    (19),
  egsnPDPRecord    (70)
}

CauseForRecClosing ::= INTEGER

{
  --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for
  -- termination)
  --
  normalRelease    (0),
  abnormalRelease  (4),
  volumeLimit      (16),
timeLimit (17),
sGSNChange (18),
maxChangeCond (19),
management Intervention (20),
rATChange (22),
mSTimeZoneChange (23)
}

ChangeCondition ::= ENUMERATED
{
  --
  -- Failure Handling values used in eG-CDR only
  --
  qosChange (0),
tariffTime (1),
recordClosure (2),
failureHandlingContinueOngoing (3),
failureHandlingRetryandTerminateOngoing (4),
failureHandlingTerminateOngoing (5)
}

ChangeOfCharCondition ::= SEQUENCE
{
  --
  -- Used in PDP context record only
  -- failureHandlingContinue field used in eG-CDR only
  --
  qosRequested [1] QoSInformation OPTIONAL,
  qosNegotiated [2] QoSInformation OPTIONAL,
dataVolumeGPRSUplink [3] DataVolumeGPRS,
dataVolumeGPRSDownlink [4] DataVolumeGPRS,
changeCondition [5] ChangeCondition,
changeTime [6] TimeStamp,
failureHandlingContinue [7] FailureHandlingContinue OPTIONAL

ChangeOfServiceCondition ::= SEQUENCE
{
  --
  -- Used for Flow based Charging service data container
  --
  ratingGroup [1] RatingGroupId,
  chargingRuleBaseName [2] ChargingRuleBaseName,
  resultCode [3] ResultCode OPTIONAL,
  localSequenceNumber [4] LocalSequenceNumber,
  timeOfFirstUsage [5] TimeStamp,
  timeOfLastUsage [6] TimeStamp,
  timeUsage [7] CallDuration,
  serviceConditionChange [8] ServiceConditionChange,
  qosInformationNeg [9] QoSInformation OPTIONAL,
  sgsn-Address [10] EXPLICIT GSNAddress,
  sGSNPLMNIIdentifier [11] PLMN-Id OPTIONAL,
  datavolumeFBCUplink [12] DataVolumeGPRS,
  datavolumeFBCDownlink [13] DataVolumeGPRS,
  timeOfReport [14] TimeStamp,
  rATType [15] RATType OPTIONAL,
  failureHandlingContinue [16] FailureHandlingContinue OPTIONAL,
  serviceIdentifier [17] ServiceIdentifier OPTIONAL
}
ChargingCharacteristics ::= OCTET STRING (SIZE(2))

--
-- Bit 0-3: Profile Index
-- Bit 4-15: For Behavior
--

ChargingID ::= INTEGER (0..4294967295)

--
-- Generated in GGSN, part of PDP context, see TS 23.060
-- 0..4294967295 is equivalent to 0..2**32-1
--

ChargingRuleBaseName ::= IA5String (SIZE(1..63))

--
-- identifier for the group of charging rules
-- see Charging-Rule-Base-Name AVP as defined in 3GPP TS 29.210
--

ChChSelectionMode ::= ENUMERATED

{
--
-- values below show the additional, non-standard values
-- requested by customer
--
--
sGSNSupplied       (0),   -- For GGSN only
homeDefault        (3),   -- For SGSN and GGSN
roamingDefault     (4),   -- For SGSN and GGSN
visitingDefault (5), -- For SGSN and GGSN
aAASupplied (6), -- For GGSN only, CC provided by AAA
gGSNOverride (7) -- For GGSN only, CC configured on GGSN

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

Diagnostics ::= CHOICE
   {
      -- Only the option gsm0408Cause is used for this field
      --
      gsm0408Cause [0] INTEGER
   }

DynamicAddressFlag ::= BOOLEAN

FailureHandlingContinue ::= BOOLEAN
   --
   -- This parameter is included when the failure handling procedure
   -- has been executed and new containers are opened. This
   -- parameter shall be included in the first and subsequent
   -- containers opened after the failure handling execution.
   --

GSNAddress ::= IPAddress
IMSI ::= TBCD STRING (SIZE (3..8))
   --
   -- from 29.002
   -- digits of MCC, MNC, MSIN are concatenated in this order.
   --

IMEI ::= TBCD STRING (SIZE (8))
   --
   -- Refers to International Mobile Station Equipment Identity
   -- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
   -- If the SVN is not present the last octet shall contain the
   -- digit 0 and a filler.
   -- If present the SVN shall be included in the last octet.
   --

IPAddress ::= CHOICE
   {
      iPBinaryAddress IPBinaryAddress
   }

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

ISDN-AddressString ::= AddressString
   (SIZE (1..maxISDN-AddressLength))
   --
-- This type is used to represent ISDN numbers.

LocalSequenceNumber ::= INTEGER (0..4294967295)

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

MSISDN ::= ISDN-AddressString

--
-- see definitions below for ISDN-AddressString and AddressString
-- copied from 29.002
--

maxISDN-AddressLength INTEGER ::= 9
maxAddressLength INTEGER ::= 20

MSTimeZone ::= OCTET STRING (SIZE (2))

--
-- 1.Octet: Time Zone and 2. Octet: Daylight saving time,
-- see TS 29.060
--

NetworkInitiatedPDPContext ::= BOOLEAN

--
-- Set to true if PDP context was initiated from network side
--
NodeID ::= IA5String (SIZE(5..20))

PDPAddress ::= CHOICE
{
  ipAddress [0] EXPLICIT IPAddress
}

PDPType ::= OCTET STRING (SIZE(2))
--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP Type Number
-- See TS 29.060
--

PLMN-Id ::= OCTET STRING (SIZE (3))
--
-- This is a 1:1 copy from the Routing Area Identity (RAI) IE
-- specified in TS 29.060
-- as follows:
-- OCTET 1 of PLMN-Id = OCTET 2 of RAI
-- OCTET 2 of PLMN-Id = OCTET 3 of RAI
-- OCTET 3 of PLMN-Id = OCTET 4 of RAI

QoSInformation ::= OCTET STRING (SIZE (4..15))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 4) of
-- the "Quality of service Profile" information element specified
-- in 3GPP TS 29.060.
RatingGroupId ::= INTEGER

--

-- IP service flow identity (DCC), range of 4 byte
-- (0...4294967259)
-- see Rating-Group AVP as used in 3GPP TS 32.299
--

RATType ::= INTEGER (0..255)

--

-- This integer is 1:1 copy of the RAT type value as defined in
-- 3GPP TS 29.060.
--

ResultCode ::= INTEGER

--

-- charging protocol return value, range of 4 byte
-- (0...4294967259)
-- see Result-Code AVP as used in 3GPP 29.210
--

ServiceConditionChange ::= BIT STRING

{
-- Bits 0-5 are cause values for Gn update/release and TTS
-- Bits 6-9 are cause values for service stop
-- Bits 10-14 are cause values for service reauthorization
-- request
-- Bits 15-17 are cause values for quota return
-- Bits 18-20: are cause values for Failure Handling Procedure
-- Bits 21-32: are unused and will always be zero
-- some of the values are non-exclusive
-- serviceIdledOut bit 6 is equivalent to service release by QHT

goSChange (0),
sGSNChange (1),
sGSNPLMNIDChange (2),
tariffTimeSwitch (3),
pDPContextRelease (4),
rATChange (5),
serviceIdledOut (6),
qCTExpiry (7),
timeThresholdReached (10),
volumeThresholdReached (11),
timeExhausted (13),
volumeExhausted (14),
continueOngoingSession (18),
retryAndTerminateOngoingSession (19),
terminateOngoingSession (20)

ServiceIdentifier ::= INTEGER (0..4294967295)

--
-- The service identifier is used to identify the service or the
-- service component the service data flow relates to. See
-- Service-Identifier AVP as defined in 3GPP TS 29.210
--

TimeStamp ::= OCTET STRING (SIZE(9))
The contents of this field are a compact form of the UTCTime format containing local time plus an offset to universal time.

Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

e.g. YYMMDDhhmssShmm

where

YY = Year 00 to 99 BCD encoded
MM = Month 01 to 12 BCD encoded
DD = Day 01 to 31 BCD encoded
hh = hour 00 to 23 BCD encoded
mm = minute 00 to 59 BCD encoded
ss = second 00 to 59 BCD encoded
S = Sign 0 = "+", "-" ASCII encoded

TBCDSTRING ::= OCTET STRING

### custom19 Dictionary

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record:</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- S-CDR(sgsnPDPRecord) 18 (0x12)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- G-CDR(ggsnPDPRecord) 19 (0x13)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- eG-CDR(egsnPDPRecord) 70 (0x46)</td>
<td></td>
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</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. The field is missing in case of mobile activated PDP context. Set to TRUE (0xFF) if PDP context was initiated from network side. This field is not yet supported by the SGSN.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>3-8</td>
<td>83</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>4</td>
<td>M</td>
<td>This field provides the current serving GGSN IP Address for the Control Plane, which is equivalent to the configured ggsn-service address on the GGSN. The standard 3GPP 32.298 offers a choice for the encoding of the address to be either in binary or text format. The GGSN encodes the address in binary format and includes the octet string.</td>
<td>Choice</td>
<td>6</td>
<td>a4</td>
</tr>
<tr>
<td>GGSN IPv4 Binary Address</td>
<td>4-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the GGSN address to identify all records produced in the GGSN involved in a single PDP context. The Charging ID is generated by the GGSN at PDP context activation and is transferred to the context requesting SGSN. At an inter-SGSN routing area update the charging ID is transferred to the new SGSN as part of each active PDP context. The possible values for the charging ID, which are defined in TS 29.060 are 1-4,294,967,295 and those values are encapsulated in following scheme in the CDR-field: 1 - 127  850101-85017F 128 – 32,767  85020080-85027FFF 32,768 – 8,388,607  8503008000-85037FFFF 8,388,608 – 2,147,483,647  85040080000-85047FFFFF 2,147,483,648 – 4,294,967,295  850500800000-850500FFFFFF</td>
<td>Integer</td>
<td>1-5</td>
<td>85</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>SGSN Address</td>
<td>6</td>
<td>M</td>
<td>This field contains one or several SGSN IP addresses. For an S-CDR, the SGSN address contains the control plane or user plane address of the current SGSN serving the PDP context. For a G-CDR and eG-CDR, in addition to the current SGSN being used, the field may contain additional SGSN addresses where the PDP context was located before and where it has moved away using the Inter-SGSN Routing Area Update Procedure. The maximum number of addresses in the list is 5.</td>
<td>Sequence</td>
<td>6-30</td>
<td>a6</td>
</tr>
<tr>
<td>SGSN IPv4 Binary Address</td>
<td>6-0</td>
<td>M</td>
<td>The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>7</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN). It is provided by the SGSN in the Create PDP Context Request message. For GGSN generated records, in case of a configured virtual APN, the virtual APN is included instead, unless this is overridden by the option `gcdr apn-name-to-be-included {gn</td>
<td>virtual}`</td>
<td>IA5string</td>
<td>1-63</td>
</tr>
<tr>
<td>PDP Type</td>
<td>8</td>
<td>M</td>
<td>This field defines the PDP type, e.g. IP or PPP, as received in the PDP context request from the SGSN. Supported values: • IP = f121 • PPP = f001</td>
<td>Octet string</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>9</td>
<td>O</td>
<td>This field contains the PDP address of the served IMSI for which the standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAddress.</td>
<td>Choice</td>
<td>8</td>
<td>a9</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>9-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6</td>
<td>a0</td>
</tr>
<tr>
<td>PDP IPv4 Binary Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the GGSN in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>11</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context. In this case, the value is set to TRUE and encoded as &quot;FF&quot;. This field is missing if the address allocation method was &quot;static&quot;, i.e. part of PDP context subscription.</td>
<td>Boolean</td>
<td>1</td>
<td>8b</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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<td>------------</td>
</tr>
<tr>
<td>List of Traffic Volumes</td>
<td>12</td>
<td>M</td>
<td>This list includes one or more Traffic Volume containers related to a &quot;Change of Charging Condition&quot; as described in the next field. The maximum number of containers is configurable.</td>
<td>Sequence</td>
<td>Variable length</td>
<td>ac</td>
</tr>
<tr>
<td>ChangeOfCharCondition</td>
<td>12-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>Variable length</td>
<td>30</td>
</tr>
<tr>
<td>QoS Requested</td>
<td>12-0-1</td>
<td>O</td>
<td>This field contains the QoS desired by the MS at PDP context activation.</td>
<td>Octet</td>
<td>String</td>
<td>81</td>
</tr>
<tr>
<td>QoS Negotiated</td>
<td>12-0-2</td>
<td>O</td>
<td>This field indicates the applied QoS accepted by the network. The QoS values may only be included in the first container, in later containers the presence depends upon what was changed.</td>
<td>Octet</td>
<td>String</td>
<td>82</td>
</tr>
<tr>
<td>GPRS Uplink data volume</td>
<td>12-0-3</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the uplink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of 2^32 bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>GPRS Downlink data volume</td>
<td>12-0-4</td>
<td>M</td>
<td>This field includes the number of octets transmitted during the use of the packet data services in the downlink direction. The amount of data counted in the GGSN is the payload of the GTP-U protocol at the Gn interface. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP. Note that a maximum of 2^32 bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Change Condition</td>
<td>12-0-5</td>
<td>M</td>
<td>This field defines the reason for closing the container such as tariff time change, QoS change or closing of the CDR. Supported values:</td>
<td>Enumerated (Integer)</td>
<td>1</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• qosChange: 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• tariffTime: 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• recordClosure: 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• failureHandlingContinueOngoing: 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• failureHandlingRetryandTerminateOngoing: 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• failureHandlingTerminateOngoing: 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FailureHandling is a standard AVP element in DCCA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Terminate: The online session is finished. The associated PDP Context is released (ongoing sessions) or not established (new sessions). Failover for ongoing sessions is not supported. Failover for new sessions is always supported.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Retry&amp;Terminate: The online session is finished. The associated PDP Context is released (ongoing sessions) or not established (new sessions). Failover for ongoing sessions is supported. Failover for new sessions is always supported.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Continue: The online session is finished. The associated PDP Context is established (new sessions) or not released (ongoing sessions). Failover for ongoing sessions is supported. Failover for new sessions is always supported.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change time</td>
<td>12-0-6</td>
<td>M</td>
<td>This field is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Failurehandling Continue</td>
<td>12-0-7</td>
<td>O</td>
<td>Failure handling continue element is present if failure handling procedure is executed by GGSN</td>
<td>Boolean</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td>User Location Information</td>
<td>12-0-8</td>
<td>O</td>
<td>The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure. Transparently copied from the GTP message.</td>
<td>Octet string</td>
<td>8</td>
<td>88</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>This field contains the time stamp when PDP context is activated in GGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>This field contains the relevant duration in seconds for PDP contexts with range of 0..4294967295 (2^32-1). It is the duration from Record Opening Time to the Change Time. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured. It is also possible to configure to use milliseconds in this field instead of seconds.</td>
<td>Integer</td>
<td>1-5</td>
<td>8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR. Supported values: normalRelease: 0, abnormalRelease: 4, volumeLimit: 16, timeLimit: 17, sGSNChange: 18, maxChangeCond: 19, managementIntervention: 20, rATChange: 22, mSTimeZoneChange: 23</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>16</td>
<td>O</td>
<td>This field is included in the CDR when the PDP context is released and when the option gtp attribute diagnostics is configured. Only the choice of gsm0408Value is used. This field is supported for G-CDRs only (not eG-CDRs).</td>
<td>Choice</td>
<td>3</td>
<td>b0</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
</tr>
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</tr>
</tbody>
</table>
| gsm0408Cause          | 16-0       | M        | This cause is used in the Diagnostics field and contains one of the following values:  
  - 36: If the SGSN sends Delete PDP context request  
  - 38: If GGSN sends delete PDP context request due to GTP-C/U echo timeout with SGSN  
  - 40: If the GGSN sends delete PDP context request due to receiving a RADIUS Disconnect request message.  
  - 26: If the GGSN sends delete PDP context request for any other reason | Integer  | 1            | 80        |
| Record Sequence Number| 17         | O        | A running sequence number with range 1 through 4294967295 used to link partial records generated by the GGSN for a specific PDP context (characterized with the same Charging ID and GGSN address pair). This field is not present if the first record is also the final record.                                                                                       | Integer  | 1-5          | 91        |
| Node ID               | 18         | M        | This field contains an identifier string for the node that had generated the CDR.  
  On the ASR5K GGSN, this NodeID field is a printable string of the ndddSTRING format:  
  n: The first digit is the Sessmgr restart counter having a value between 0 and 7.  
  ddd: The number of the sessmgr instance generating the CDR  
  STRING: This is a configured Node-ID-Suffix having any string between 1 to 16 characters, defined using the `gtpp attribute node-id` command.  
  If this node-id-suffix is not configured, the GGSN uses the GTPP context name as the Node-id-suffix (truncated to 16 characters).  
  For G-CDRs, this field is only included when the option `gtpp attribute local-record-sequence-number` is configured. | IA5string| 5-20         | 92        |
| Local Record Sequence Number | 20       | M        | For each Node ID, this number with range 1..4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR.  
  For G-CDRs, this field is only included when the option `gtpp attribute local-record-sequence-number` is configured.                                                                                           | Integer  | 1-5          | 94        |
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
</table>
| APN Selection Mode        | 21         | M        | An index indicating how the APN was selected. The following APN selection mode indexes are possible:  
- 0: MS or network provided APN, subscribed verified  
- 1: MS provided APN, subscription not verified  
- 2: Network provided APN, subscription not verified | Enumerated (Integer) | 1            | 95         |
<p>| Served MSISDN             | 22         | M        | The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message and is TBCD encoded. | BCD encoded octet string | 1-9          | 96         |
| Charging Characteristics  | 23         | M        | Lists the charging characteristics applied to the PDP context. The GGSN can accept charging characteristics from the SGSN or AAA or use its own configured value. GGSN configured charging characteristics are specified as part of the GGSN Service and are applied for G-CDRs to subscriber PDP contexts through APN templates. | Hex value octet string | 2            | 97         |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>24</td>
<td>O</td>
<td>The charging characteristic type that the GGSN applied to the CDR. The following values for this field are defined in 3GPP TS 32.298:</td>
<td>Enumerate d (Integer)</td>
<td>1</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• sGSNSupplied (0) - For GGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• subscriptionSpecific (1) - For SGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• aPNSpecific (2) - For SGSN only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• homeDefault (3) - For SGSN and GGSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• roamingDefault (4) - For SGSN and GGSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• visitingDefault (5) - For SGSN and GGSN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• SGSN supplied: The GGSN is using the charging characteristics supplied by the SGSN.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Home default: GGSN configured charging characteristics for home subscribers are used. Home subscribers are those that belong to the same PLMN as the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Visiting default: GGSN configured charging characteristics for visiting subscribers are used. Visiting subscribers are those that belong to a different PLMN than the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Roaming default: GGSN configured charging characteristics for roaming subscribers are used. Roaming subscribers are those that are serviced by an SGSN belonging to a different PLMN than the one on which the GGSN is located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGSN PLMN Identifier</td>
<td>27</td>
<td>O</td>
<td>RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI and is not identified as a &quot;home&quot; SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.</td>
<td>Octet string</td>
<td>3</td>
<td>9b</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Served IMEISV</td>
<td>29</td>
<td>O</td>
<td>This field contains software version in addition to the IMEI defined before. This software version is encoded in the last byte replacing the spare digit and filler. The structure of the IMEISV is defined in TS 23.003.</td>
<td>BCD encoded octet string</td>
<td>8</td>
<td>9d</td>
</tr>
<tr>
<td>RAT Type</td>
<td>30</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station. This field is present in the CDR if provided by SGSN. RAT Type values:  • Reserved: 0  • UTRAN: 1  • GERAN: 2  • WLAN: 3  • Spare: 4-255</td>
<td>Integer</td>
<td>1</td>
<td>9e</td>
</tr>
<tr>
<td>MS Time Zone</td>
<td>31</td>
<td>O</td>
<td>This field contains the &quot;Time Zone&quot; IE that the SGSN may provide to the GGSN during the PDP context activation/modification procedure. It is transparently copied from the message into the CDR. The Time Zone is used to indicate the offset between universal time and local time in steps of 15 minutes of where the MS current resides. It is coded as specified in 3GPP TS 29.060 (which refers to 24.008 for the time zone, which again refers to the TP Service Centre Time Stamp field in 23.040).</td>
<td>Octet string</td>
<td>2</td>
<td>9f1f</td>
</tr>
<tr>
<td>User Location Information</td>
<td>32</td>
<td>O</td>
<td>The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure. TRANSPARENTLY copied from the PDP context request.</td>
<td>Octet string</td>
<td>8</td>
<td>9f20</td>
</tr>
<tr>
<td>List of Service Data Volumes</td>
<td>34</td>
<td>O</td>
<td>A list of the changes that occurred in charging conditions for all service data flows for the PDP context.</td>
<td>Sequence</td>
<td>Variabl e length</td>
<td>bf22</td>
</tr>
<tr>
<td>Service Data Volume Block</td>
<td>34-0</td>
<td>O</td>
<td></td>
<td>Sequence</td>
<td>Variabl e length</td>
<td>30</td>
</tr>
<tr>
<td>Rating group</td>
<td>34-0-1</td>
<td>M</td>
<td>This is the service flow identity and has to be used for differentiated evaluation of user's traffic. This is also known as content-id.</td>
<td>Integer</td>
<td>1-5</td>
<td>81</td>
</tr>
<tr>
<td>Charging Rulebase name</td>
<td>34-0-2</td>
<td>M</td>
<td>The name of the Rulebase used for charging. This is the group name of charging rules.</td>
<td>IA5string</td>
<td>1-63</td>
<td>82</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>Result Code</td>
<td>34-0-3</td>
<td>O</td>
<td>The Diameter server sends result-codes for each of the content-id for which quota is requested. The GGSN use this to populate the eG-CDR bucket. This is a Mandatory AVP that comes in response for every quota request for a category.</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>Local Sequence number</td>
<td>34-0-4</td>
<td>M</td>
<td>A per service data container sequence number. It starts from 1 for each service, increasing by 1 for each service date container generated for that service within the lifetime of this PDP session.</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Time of first usage</td>
<td>34-0-5</td>
<td>M</td>
<td>The time stamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>Time of last usage</td>
<td>34-0-6</td>
<td>M</td>
<td>The time stamp for the last IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Usage time</td>
<td>34-0-7</td>
<td>M</td>
<td>The difference between &quot;time of first usage&quot; and &quot;time of last usage&quot;.</td>
<td>Integer</td>
<td>1-5</td>
<td>87</td>
</tr>
<tr>
<td>Service condition change</td>
<td>34-0-8</td>
<td>M</td>
<td>The reason for closing the service data container for triggers like SGSN change, QoS change, Rat change, time and volume triggers, etc.</td>
<td>Bit string</td>
<td>5</td>
<td>88</td>
</tr>
<tr>
<td>QoS negotiated</td>
<td>34-0-9</td>
<td>O</td>
<td>The negotiated QoS applied for the service data flow.</td>
<td>Octet string</td>
<td>4-15</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In 16.0 and earlier releases, if in the CDRs there are multiple LOSDVs with same content-id and different service-identifiers, then the QOS-Info Information Element (IE) is included only in the very first LOSDV and not in the subsequent LOSDVs unless its previous LOSDV is closed for QoS change.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In 17.0 and later releases, this implementation has been modified to include QOS-Info in all LOSDVs having different combination of service-id and content-id. Thus if there are multiple LOSDVs with same content-id but different service-id, QOS-Info will be present in every such LOSDV.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sgsn-Address</td>
<td>34-0-10</td>
<td>M</td>
<td>The valid SGSN IP address during the service data recording interval.</td>
<td>Choice</td>
<td>6</td>
<td>aa</td>
</tr>
<tr>
<td>SGSN-IPv4-Binary Address</td>
<td>34-0-10-0</td>
<td>M</td>
<td>The octet string included in the field “sgsn-Address” includes either control plane or user plane address of the SGSN in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Field</td>
<td>Tag number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in Byte</td>
<td>ASN1 Code</td>
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</tr>
<tr>
<td>SGSN PLMN identifier</td>
<td>34-0-11</td>
<td>O</td>
<td>RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI and is not identified as a &quot;home&quot; SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.</td>
<td>Octet string</td>
<td>3</td>
<td>8b</td>
</tr>
<tr>
<td>FBC Data volume uplink</td>
<td>34-0-12</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the uplink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8c</td>
</tr>
<tr>
<td>FBC data volume downlink</td>
<td>34-0-13</td>
<td>M</td>
<td>The number of octets transmitted during the use of the packet data services in the downlink direction.</td>
<td>Integer</td>
<td>1-5</td>
<td>8d</td>
</tr>
<tr>
<td>Time of report</td>
<td>34-0-14</td>
<td>M</td>
<td>A time stamp defining the moment when the service data container is closed.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8e</td>
</tr>
<tr>
<td>RAT Type</td>
<td>34-0-15</td>
<td>O</td>
<td>The valid radio access technology type during the service data recording interval.</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Failurehandling Continue</td>
<td>34-0-16</td>
<td>O</td>
<td>A Boolean expression included if the failure handling condition has been executed. This can be either configured on the GGSN using failure-handling CLI inside &quot;credit-control&quot; mode or can be received from the server in the &quot;Credit-Control-Failure-Handling&quot; AVP. Whatever is received from the server will have higher precedence. There is no negotiation with the Diameter server in this regard and the GGSN will use whatever the server provides.</td>
<td>Boolean</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Service Identifier</td>
<td>34-0-17</td>
<td>O</td>
<td>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</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
<tr>
<td>User Location Information</td>
<td>34-0-20</td>
<td>O</td>
<td>The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure. Transiently copied from the GTP message</td>
<td>Octet string</td>
<td>8</td>
<td>94</td>
</tr>
</tbody>
</table>
Table: GGSN CDR Field Reference

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in Byte</th>
<th>ASN1 Code</th>
</tr>
</thead>
</table>
| Time Quota Mechanism   | 34-0-22    | O        | 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.  
  - Base Time Interval identifies the length of the base time interval, for controlling the reporting of time based usage, in seconds | Sequence   | Variablen length | 96         |

Notes:

- LOTV related changes:
  - A new IE is included for LOTV container i.e. User location information.
  - The list of traffic data volumes now supports RAI and CGI/SAI changes, i.e. whenever RAI and/or CGI/SAI changes are detected; it will result in a “List of Traffic Data Volumes” container being added to the CDR, if location reporting is required and a report of CGI/SAI change is received.

- LOSDV related changes:
  - 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.
    - Base Time Interval identifies the length of the base time interval, for controlling the reporting of time based usage, in seconds.
  - User location information will be included in the LOSDV container in the R7 eG-CDRs.
  - The “Service Change Condition” cause changes are as follows:  
    - Time limit eG-CDRs where the corresponding service change condition now has been changed to “Time Limit”. Earlier there was no specific service change condition and instead “Time Exhausted” was used.
    - Volume limit eG-CDRs where the corresponding service change condition now has been changed to “Volume Limit”. Earlier there was no specific service change condition and instead “Volume Exhausted” was used.
    - eG-CDRs that are generated as a result of MS-TimeZone change will have service change condition as “Record closure”.
  - custom19 dictionary has Rel. 7 related changes.

- The field “Served PDP PDN Address Extension”(servedPDPPDNAddressExt) is not part of the 3GPP 32.298 v8.5.0 specification. This field will be available in the CDR only when the CLI command gtpp attribute served-pdp-pdn-address-extension is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.
• Record Extensions (recordExtensions) is a customer-specific field. This field will be available in the CDR only when the CLI command `gtpp trigger direct-tunnel` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.

• In releases prior to 14.0, the CGISAIChange service condition is present in LOSDV of GGSN CDR even if ULI Change trigger is disabled. In 14.0 and later releases, if the ULI Change trigger is disabled and if the ULI is changed, the CGISAIChange service condition is not present in LOSDV of GGSN CDR.

• Rulebase change triggered from any external interface e.g. OCS/PCRF, will generate CDR with closure reason “Management Intervention”. This change is applicable to all standard dictionaries except for custom42 GTPP dictionary as it is customized to suppress interim CDR.

• In releases prior to 16, if there was a LOSDV bucket created between the packet arrival time and service-idle-out expiry time, no data counts were reported. So, a zero-volume LOSDV was generated for service idle timeout scenario. In 16 and later releases, if there are no data counts available for a service flow, the LOSDV for service idle timeout will not be created. The service-idle timeout will be started only when the next data packet arrives.

This behavior change is applicable to eG-CDRs and PGW-CDRs for all GTPP dictionaries except custom5 and custom40 dictionaries.

ASN.1 Definition for Fields in custom19 Dictionary

Below is a complete ASN.1 definition of eG-CDR fields down to the basic types described in ITU X.690. It is based on the ASN.1 definition in 3GPP TS 32.298, with imported types taken from 3GPP TS 29.002.

```
GGSN-Charging-DataTypes-REL7 DEFINITIONS IMPLICIT TAGS ::= 
BEGIN
   -- ASN.1 definitions of the Cisco GGSN Charging implementation
   --
   -- based on 3GPP TS 32.298 v7.4.0
   --
   -- for some fields, only the values relevant to GGSN charging
   -- are shown (such as CallEventRecordType)
   --
   -- some types are imported from 29.002 and are shown below as well
   -- with the definition copied from that standard (such as IMSI)
   GPRSRecord ::= CHOICE
   {
```

egsnPDPRecord [70] EGSNPDPRecord

EGSNPDPRecord ::= SET

{
  recordType [0] CallEventRecordType,
  networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL,
  servedIMSI [3] IMSI,
  ggsnAddress [4] EXPLICIT GSNAddress,
  chargingID [5] ChargingID,
  sgsnAddress [6] SEQUENCE OF GSNAddress,
  accessPointNameNI [7] AccessPointNameNI,
  pdpType [8] PDPType,
  servedPDPAddress [9] EXPLICIT PDPAddress OPTIONAL,
  dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL,
  listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition,
  recordOpeningTime [13] TimeStamp,
  duration [14] CallDuration,
  causeForRecClosing [15] CauseForRecClosing,
  diagnostics [16] Diagnostics OPTIONAL,
  recordSequenceNumber [17] INTEGER OPTIONAL,
  nodeID [18] NodeID,
  localSequenceNumber [20] LocalSequenceNumber,
  apnSelectionMode [21] APNSelectionMode,
  servedMSISDN [22] MSISDN,
  chargingCharacteristics [23] ChargingCharacteristics,
  chChSelectionMode [24] ChChSelectionMode OPTIONAL,
  sgsnPLMNIIdentifier [27] PLMN-Id OPTIONAL,
  servedIMEISV [29] IMEI OPTIONAL,
rATType [30] RATType OPTIONAL,
mSTimeZone [31] MSTimeZone OPTIONAL,
userLocationInformation [32] OCTET STRING OPTIONAL,
listOfServiceData [34] SEQUENCE OF ChangeOfServiceCondition OPTIONAL
}

-- Alphabethical listing of all field types above

AccessPointNameNI ::= IA5String (SIZE(1..63))

-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is
-- 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs', NI is
-- 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

-- This type is used to represent a number for addressing
-- purposes. It is composed of
-- a) one octet for nature of address, and numbering plan
-- indicator.
-- b) digits of an address encoded as TBCD-String.
-- a) The first octet includes a one bit extension indicator, a
-- 3 bits nature of address indicator and a 4 bits numbering
-- plan indicator, encoded as follows:
-- bit 8: 1 (no extension)
-- bits 765: nature of address indicator
-- 000 unknown
-- 001 international number
-- 010 national significant number
-- 011 network specific number
-- 100 subscriber number
-- 101 reserved
-- 110 abbreviated number
-- 111 reserved for extension
-- bits 4321: numbering plan indicator
-- 0000 unknown
-- 0001 ISDN/Telephony Numbering Plan (Rec ITU-T E.164)
-- 0010 spare
-- 0011 data numbering plan (ITU-T Rec X.121)
-- 0100 telex numbering plan (ITU-T Rec F.69)
-- 0101 spare
-- 0110 land mobile numbering plan (ITU-T Rec E.212)
-- 0111 spare
-- 1000 national numbering plan
-- 1001 private numbering plan
-- 1111 reserved for extension
-- all other values are reserved.
-- b) The following octets representing digits of an address
-- encoded as a TBCD-STRING.

APNSelectionMode ::= ENUMERATED
{

--

-- See Information Elements TS 29.060

-- mSorNetworkProvidedSubscriptionVerified (0),
mSProvidedSubscriptionNotVerified (1),
networkProvidedSubscriptionNotVerified (2)

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

CallEventRecordType ::= INTEGER
{
  ggsnPDPRecord (19),
  egsnPDPRecord (70)
}

CauseForRecClosing ::= INTEGER
{
  --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for
  -- termination)
  --
  normalRelease (0),
  abnormalRelease (4),
```plaintext
volumeLimit (16),
timeLimit (17),
sGSNChange (18),
maxChangeCond (19),
managementIntervention (20),
rATChange (22),
mSTimeZoneChange (23)
}

ChangeCondition ::= ENUMERATED
{
  --
  -- Failure Handling values used in eG-CDR only
  --
  qoSChange (0),
tariffTime (1),
recordClosure (2),
failureHandlingContinueOngoing (3),
failureHandlingRetryAndTerminateOngoing (4),
failureHandlingTerminateOngoing (5),
  --
  -- New values from 3GPP Rel 7.
  -- Supported in Release 8.1 in custom19 dictionary only
  --
cGI-SAIChange (6),
rAIChange (7)
}

ChangeOfCharCondition ::= SEQUENCE
```

ChangeCondition ::= ENUMERATED
{
  --
  -- Failure Handling values used in eG-CDR only
  --
  qoSChange (0),
tariffTime (1),
recordClosure (2),
failureHandlingContinueOngoing (3),
failureHandlingRetryAndTerminateOngoing (4),
failureHandlingTerminateOngoing (5),
  --
  -- New values from 3GPP Rel 7.
  -- Supported in Release 8.1 in custom19 dictionary only
  --
cGI-SAIChange (6),
rAIChange (7)
}

ChangeOfCharCondition ::= SEQUENCE
```
{  
  --
  -- Used in PDP context record only
  -- failureHandlingContinue field used in eGCDR only
  --
  qosRequested [1] QoSInformation OPTIONAL,
  qosNegotiated [2] QoSInformation OPTIONAL,
  dataVolumeGPRSUplink [3] DataVolumeGPRS,
  dataVolumeGPRSDownlink [4] DataVolumeGPRS,
  changeCondition [5] ChangeCondition,
  changeTime [6] TimeStamp,
  failureHandlingContinue [7] FailureHandlingContinue OPTIONAL,
  --
  -- New value from 3GPP Rel 7.
  -- Supported in Release 8.1 in custom19 dictionary only
  --
  userLocationInformation [8] OCTET STRING OPTIONAL
}

ChangeOfServiceCondition ::= SEQUENCE
{
  --
  -- Used for Flow based Charging service data container
  --
  ratingGroup [1] RatingGroupId,
  chargingRuleBaseName [2] ChargingRuleBaseName,
  resultCode [3] ResultCode OPTIONAL,
  localSequenceNumber [4] LocalSequenceNumber,
  timeOfFirstUsage [5] TimeStamp,
timeOfLastUsage [6] TimeStamp,
timeUsage [7] CallDuration,
serviceConditionChange [8] ServiceConditionChange,
qoSInformationNeg [9] QoSInformation OPTIONAL,
sgsn-Address [10] EXPLICIT GSNAddress,
sGSNPLMNIdentifier [11] PLMN-Id OPTIONAL,
datavolumeFBCUplink [12] DataVolumeGPRS,
datavolumeFBCDownlink [13] DataVolumeGPRS,
timeOfReport [14] TimeStamp,
rATType [15] RATType OPTIONAL,
failureHandlingContinue [16] FailureHandlingContinue OPTIONAL,
serviceIdentifier [17] ServiceIdentifier OPTIONAL,

--
-- New values from 3GPP Rel 7.
-- Supported in Release 8.1 in custom19 dictionary only
--
userLocationInformation [20] OCTET STRING OPTIONAL,
timeQuotaMechanism [22] TimeQuotaMechanism OPTIONAL
}

ChargingCharacteristics ::= OCTET STRING (SIZE(2))

--
-- Bit 0-3: Profile Index
-- Bit 4-15: For Behavior
--

ChargingID ::= INTEGER (0..4294967295)

--
-- Generated in GGSN, part of PDP context, see TS 23.060
-- 0..4294967295 is equivalent to 0..2**32-1
--

ChargingRuleBaseName := IA5String (SIZE(1..63))
--
-- identifier for the group of charging rules
-- see Charging-Rule-Base-Name AVP as defined in 3GPP TS 29.210
--

ChChSelectionMode ::= ENUMERATED
{
  --
  -- values below show the additional, non-standard values
  -- requested by VFD2
  --
  sGSNSupplied      (0), -- For GGSN only
  homeDefault       (3), -- For SGSN and GGSN
  roamingDefault    (4), -- For SGSN and GGSN
  visitingDefault   (5)  -- For SGSN and GGSN
}

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

Diagnostics ::= CHOICE
{
  -- Only the option gsm0408Cause is used for this field
gsm0408Cause [0] INTEGER

DynamicAddressFlag ::= BOOLEAN

FailureHandlingContinue ::= BOOLEAN

--
-- This parameter is included when the failure handling procedure
-- has been executed and new containers are opened. This
-- parameter shall be included in the first and subsequent
-- containers opened after the failure handling execution.
--

GSNAddress ::= IPAddress

IMSI ::= TBCDSTRING (SIZE (3..8))

--
-- from 29.002
-- digits of MCC, MNC, MSIN are concatenated in this order.
--

IMEI ::= TBCDSTRING (SIZE (8))

--
-- Refers to International Mobile Station Equipment Identity
-- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
-- If the SVN is not present the last octet shall contain the
-- digit 0 and a filler.
-- If present the SVN shall be included in the last octet.
--

IPAddress ::= CHOICE
{
  iPBinaryAddress IPBinaryAddress
}

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

ISDN-AddressString ::= AddressString
                       (SIZE (1..maxISDN-AddressLength))
--
--  This type is used to represent ISDN numbers.
--

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

MSISDN ::= ISDN-AddressString
--
--  see definitions below for ISDN-AddressString and AddressString
--  copied from 29.002
--
maxISDN-AddressLength INTEGER ::= 9
maxAddressLength INTEGER ::= 20

MSTimeZone ::= OCTET STRING (SIZE (2))

--
-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060
--

NetworkInitiatedPDPContext ::= BOOLEAN

--
-- Set to true if PDP context was initiated from network side
--

NodeID ::= IA5String (SIZE(5..20))

PDPAddress ::= CHOICE
{
  iPAddress [0] EXPLICIT IPAddress
}

PDPType ::= OCTET STRING (SIZE(2))

--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP Type Number
-- See TS 29.060
--

PLMN-Id ::= OCTET STRING (SIZE (3))
This is a 1:1 copy from the Routing Area Identity (RAI) IE specified in TS 29.060 as follows:
- OCTET 1 of PLMN-Id = OCTET 2 of RAI
- OCTET 2 of PLMN-Id = OCTET 3 of RAI
- OCTET 3 of PLMN-Id = OCTET 4 of RAI

QoSInformation ::= OCTET STRING (SIZE (4..15))

This octet string is a 1:1 copy of the contents (i.e. starting with octet 4) of the "Quality of service Profile" information element specified in 3GPP TS 29.060.

RatingGroupId ::= INTEGER

IP service flow identity (DCCA), range of 4 byte (0...4294967259)
see Rating-Group AVP as used in 3GPP TS 32.299

RATType ::= INTEGER (0..255)

This integer is 1:1 copy of the RAT type value as defined in 3GPP TS 29.060.
ResultCode ::= INTEGER

--
-- charging protocol return value, range of 4 byte
-- (0...4294967259)
-- see Result-Code AVP as used in 3GPP 29.210
--

ServiceConditionChange ::= BIT STRING

{ 
  -- Bits 0-5 are cause values for Gn update/release and TTS
  -- Bits 6-9 are cause values for service stop
  -- Bits 10-14 are cause values for service reauthorization
  -- request
  -- Bits 15-17 are cause values for quota return
  -- Bits 18-20: are cause values for Failure Handling Procedure
  -- Bits 21-32: are unused in custom 6 and will always be zero
  -- some of the values are non-exclusive
  -- serviceIdledOut bit 6 is equivalent to service release by QHT
  qosChange (0),
  sGSNChange (1),
  sGSNPLMNIDChange (2),
  tariffTimeSwitch (3),
  pDPContextRelease (4),
  rATChange (5),
  serviceIdledOut (6),
  qCTExpiry (7),
  timeThresholdReached (10),
  volumeThresholdReached (11),
  timeExhausted (13),
}
volumeExhausted (14),
timeout (15),
continueOngoingSession (18),
retryAndTerminateOngoingSession (19),
terminateOngoingSession (20),
--
-- New values from 3GPP Rel 7.
-- Supported in custom19 dictionary only
--
recordClosure (24), -- eG-CDR closure
timeLimit (25), -- intermediate recording
volumeLimit (26) -- intermediate recording

ServiceIdentifier ::= INTEGER (0..4294967295)
--
-- The service identifier is used to identify the service or the
-- service component the service data flow relates to. See
-- Service-Identifier AVP as defined in 3GPP TS 29.210
--
TimeQuotaMechanism ::= SEQUENCE
{
--
-- New field from 3GPP Rel 7.
-- Supported in Release 8.1 in custom19 dictionary only
--
timeQuotaType [1] TimeQuotaType,
baseTimeInterval [2] INTEGER
}
TimeQuotaType ::= ENUMERATED
{
  --
  -- New field from 3GPP Rel 7.
  -- Supported in Release 8.1 in custom19 dictionary only
  --
  dtp (0),
  ctp (1)
}

TimeStamp ::= OCTET STRING (SIZE(9))

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

end

standard Dictionary

eG-CDR fields for TS 32.215 v 4.6.0 (R4).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>GPRS GGSN PDP context record.</td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>C</td>
<td>Present if this is a network-initiated PDP context.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied).</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>O</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>M</td>
<td>The IP address of the GGSN used.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>PDP context identifier used to identify this PDP context in different records created by GSNs.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>M</td>
<td>List of SGSN addresses used during this record.</td>
</tr>
<tr>
<td>Access Point Name</td>
<td>M</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
</tr>
<tr>
<td>Network Identifier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>O</td>
<td>An index indicating how the APN was selected.</td>
</tr>
<tr>
<td>PDP Type</td>
<td>M</td>
<td>PDP type, i.e. IP, PPP, or IHOSS:OSP.</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>M</td>
<td>PDP address, i.e. IPv4 or IPv6 address.</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>C</td>
<td>Indicates whether served PDP address is dynamic, which is allocated during PDP context activation.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>M</td>
<td>A list of changes in charging conditions for this PDP context, each 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 listed. In GSM, data volumes are in octets above the GTP 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.</td>
</tr>
<tr>
<td>Important: Only one LOTV container per eG-CDR.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Time stamp when this record was opened.</td>
</tr>
<tr>
<td>Duration</td>
<td>M</td>
<td>Duration of this record in the GGSN.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for the release of record from this GGSN.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number, only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>O</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>O</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>C</td>
<td>The Charging Characteristics flag retrieved from subscriber's data as described in TS 32.015 sub clause 6.1.6.5.</td>
</tr>
</tbody>
</table>
Chapter 6
GGSN CDR Field Descriptions

This chapter describes the CDR fields supported by the system for use in GGSN-CDRs (G-CDRs) and enhanced GCDRs (eG-CDRs).

The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

All G-CDRs and eG-CDRs are encoded using the ASN.1 format and are sent to the charging gateway function (CGF) using the GPRS Tunneling Protocol Prime (GTPP) as defined in the following standards:

- 3GPP TS 29.060
- 3GPP TS 32.015
- 3GPP TS 32.215
- 3GPP TS 32.251
- 3GPP TS 32.298 v 6.2.0 (for G-CDRs)
- 3GPP TS 32.298 v 6.4.1 (for eG-CDRs)

---

**Important**: The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the `gtpp attributes` command in the *Command Line Interface Reference*. 
CDR Fields

Access Point Name Network Identifier

The network identifier portion of the Access Point Name (APN). The APN typically corresponds to a registered Internet domain name and represents the external Packet Data Network (PDN) that the GGSN is connected to.

**Format**
IA5 string

**Length**
1–65 bytes

APN Selection Mode

An index indicating how the APN was selected.

The following APN selection mode indexes are possible:

- 0: MS or network provided APN, subscribed verified
- 1: MS provided APN, subscription not verified
- 2: Network provided APN, subscription not verified

**Format**
Unsigned integer

**Length**
1 byte

CAMEL Information

Set of CAMEL information related to PDP context. This field is present if CAMEL Charging Information is received by the GGSN in the GTP Create PDP context request.

**Important:** Presently E-GCDRs does not support this field.

**Format**
Octet string

Cause for Record Closing

The reason the record is released from the GGSN.

Some of the possible reasons are as follows:

- `normalRelease (0):` The PDP context was terminated normally through a PDP context release (end of context or SGSN change) or a GPRS detach.
• abnormalRelease (4): The PDP context was abnormally terminated.
• cAMELInitCallRelease (5)
• volumeLimit (16): The PDP context was terminated due to exceeding volume limit.
• timeLimit (17): The PDP context was terminated due to exceeding time limit.
• sGSNChange (18): The PDP context was terminated due to change in SGSN.
• maxChangeCond (19): The PDP context was terminated due to exceeding the changed condition limit.
• managementIntervention (20): The record was closed due to an O&M request, or change in rulebase triggered from any external interface e.g. OCS, PCRF.
• intraSGSNIntersystemChange (21)
• rATChange (22): The PDP context was terminated due to change in RAT.
• mSTimeZoneChange (23): The PDP context was terminated due to change in time zone of MS.
• unauthorizedRequestingNetwork (52)
• unauthorizedLCSClient (53)
• positionMethodFailure (54)
• unknownOrUnreachableLCSClient (58)
• listofDownstreamNodeChange (59)
• Partial record generation: A partial CDR was generated for reasons such as the reaching of data volume or time (duration) limits, or reaching the maximum number of charging condition changes.

**Important:** Please note that the following fields – cAMELInitCallRelease (5), unauthorizedRequestingNetwork (52), unauthorizedLCSClient (53), positionMethodFailure (54), unknownOrUnreachableLCSClient (58), and listofDownstreamNodeChange (59) are currently not supported.

**Charging Characteristics**

Lists the charging characteristics applied to the PDP context.

The GGSN can accept charging characteristics from the SGSN or use its own. GGSN configured charging characteristics are specified as part of the GGSN Service and are applied to subscriber PDP contexts through APN templates. Refer to the Administration and Configuration Guide for information on configuring GGSN-based charging characteristics.

**Format**

Unsigned integer

**Length**

1 byte
Charging ID

The GGSN-generated value used to identify this PDP context.

**Format**

Unsigned integer

**Length**

1–4 bytes

ChSelectionMode

The charging characteristic type that the GGSN applied to the CDR.

The following values for this field are supplied:

- Home default: GGSN configured charging characteristics for home subscribers are used. Home subscribers are those that belong to the same PLMN as the one on which the GGSN is located.
- Visiting default: GGSN configured charging characteristics for visiting subscribers are used. Visiting subscribers are those that belong to a different PLMN than the one on which the GGSN is located.
- Roaming default: GGSN configured charging characteristics for roaming subscribers are used. Roaming subscribers are those that are serviced by an SGSN belonging to a different PLMN than the one on which the GGSN is located.
- SGSN supplied: The GGSN is using the charging characteristics supplied by the SGSN.

**Format**

Enumerated integer

**Length**

1 byte

Diagnostics

This field is included in the CDR when the PDP context is released.

This field is supported both in GCDRs and E-GCDRs. However, this field will be populated in E-GCDRs only when `gtpp attribute diagnostics` command is configured in gtp group. It will contain one of the following values:

- 36: If the SGSN sends Delete PDP context request
- 38: If GGSN sends delete PDP context request due to GTP-C/U echo timeout with SGSN
- 40: If the GGSN sends delete PDP context request due to receiving a RADIUS Disconnect request message.
- 26: If the GGSN sends delete PDP context request for any other reason

**Format**

Unsigned integer

**Length**

1–4 bytes
Direct Tunnel Related Record Extensions

This Information Element (IE) will be added as part of record extension of the CDRs and only one IE added for the Direct Tunnel (DT) indication in a CDR. It records the volumes and RNC addresses in DT mode. GGSN includes this field in the CDR whenever tunnel mode of PDP context switches from two tunnel to one tunnel.

**Important:** This is a customer-specific field available in custom6 and custom19 eG-CDRs as part of the Direct Tunnel feature. This feature can be controlled through the CLI command `gtpp trigger direct-tunnel`. By default, this field is disabled.

This IE will not be added in the CDRs if PDP context in two tunnel mode since last partial CDR generation.

The new IE for Direct tunnel indication contains following field:

- extensionType - Extension type of the IE.
- Length - Length of the IE.
- saDTuplink - Total volume of uplink data passed over DT mode.
- saDTdownlink - Total volume of downlink data passed over DT mode.
- saRNCaddresslist - List of RNC's address which are formed direct tunnel with GGSN.

Example: `{extensionType: 7 Length: 93 {saDTuplink: 0x334 saDTdownlink: 0xf348 saRNCaddresslist {1.1.1.1 2.2.2.2 3.3.3.3 4.4.4.4 5.5.5.5}}}

**ASN.1 Definition**

```asn1
-- Note the customer-specific definition of the recordExtensions.

EGSNPDPRecord ::= SET

{...
  recordExtensions[19] ContentInfo OPTIONAL,
}

ContentInfo ::= SEQUENCE

{
  extensionType [0] INTEGER,
  length [1] INTEGER,
  saDTuplink [23] DataVolumeGPRS OPTIONAL,
  saDTdownlink [24] DataVolumeGPRS OPTIONAL,
  saRNCaddresslist [25] SEQUENCE SIZE (5) OF GSNAddress OPTIONAL
}
```
**Format**
- Sequence
**Length**
- Variable

---

### Duration

The time period, in seconds, that the record existed in the GGSN. It is the duration from Record Opening Time to record closure. For partial records, only the duration of the individual partial record is provided.

**Important:** For custom40 GTPP dictionary, the duration is first calculated based on the actual opening and closing times of the record, and then rounded off. For all other GTPP dictionaries, the opening and closing times are first rounded off and then used for the calculation of duration.

**Format**
- Unsigned integer
**Length**
- 1–4 bytes

---

### Dynamic Address Flag

The presence of this field indicates that the **Served PDP Address** was dynamically assigned during context activation.

**Format**
- Boolean
**Length**
- 1 byte

---

### External Charging Identifier

A charging identifier received from an external, non-GPRS entity.

**Important:** This field is not supported at this time.

**Format**
- Octet string

---

### GGSN Address

The binary-represented IPv4 address of the GGSN used.

**Format**
- Hex value octet string
**Length**
GGSN CDR Field Descriptions

CDR Fields

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confirm your actions

4 bytes

IMS Signalling Context

Indicates whether or not the PDP context is used for IMS signaling based on the setting of the "IM CN Subsystem Signalling Flag" conveyed via the "Activate PDP context request" message from the MS to the network.

Important: This field is not supported at this time.

Format
Octet string

List of Service Data Volumes

A list of the changes that occurred in charging conditions for all service data flows for the PDP context.

The first container includes an optional field “QoS Negotiated”. In the following containers “QoS Negotiated” is present if the previous change condition is "QoS change".

In 16.0 and earlier releases, if in the CDRs there are multiple LOSDVs with same content-id and different service-identifiers, then the QOS-Info Information Element (IE) is included only in the very first LOSDV and not in the subsequent LOSDVs unless its previous LOSDV is closed for QoS change.

In 17.0 and later releases, this implementation has been modified to include QOS-Info in all LOSDVs having different combination of service-id and content-id. Thus if there are multiple LOSDVs with same content-id but different service-id, QOS-Info will be present in every such LOSDV.

Important: This behavior change is applicable to Rel.8 and Rel.10 compliant GTPP dictionaries.

In releases prior to 18.0, the customer-specific GTPP dictionaries “custom38” and “custom39” have restriction of one Service Data Container per CDR. In 18.0 and later releases, this restriction is removed for these two dictionaries and the number of containers per CDR is configurable through the CLI “gtpp egcdr losdv-max-containers”. Note that the default value of max_losdv is 10 and max_losdv attribute is configurable for both custom38 and custom39 dictionaries. Default value of max_lotv in GTPP group is 8 and max_lotv is now configurable.

The list will include one or more of the following fields:

- Service Identifier: 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. Present only if the rating group is online (DCCA) charged.
- Rating Group: This is the service flow identity and has to be used for differentiated evaluation of user’s traffic. This is also known as content-id.
- Charging Rulebase Name: The name of the Rulebase used for charging. This is the group name of charging rules.

Important: The maximum length of charging rulebase name in the List of Service Data Volumes (LOSDVs) can be trimmed. For more information, refer to the gtppp egcdr charging-
CDR Fields

**rulebase-name-max-char-length** command in the *Context Configuration Mode Commands* chapter of the *Command Line Interface Reference Guide*.

- Result Code: The result code AVP. This contains the result code after the interconnection with the CRF. Present only if the rating group is online (DCCA) charged.
- Local Sequence No: A per service data container sequence number. It starts from 1 for each service, increasing by 1 for each service date container generated for that service within the lifetime of this PDP session.
- Time of first usage: The time stamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.
- Time of last usage: The time stamp for the last IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.
- Usage time: The difference between “time of first usage” and “time of last usage”.
- User Location Information: The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure.
- Service change condition: The reason for closing the service data container for triggers like SGSN change, QoS change, RAT change, time and volume triggers, etc.
- QoS Negotiated: The negotiated QoS applied for the service data flow.
- SGSN-address: The valid SGSN IP address during the service data recording interval.
- SGSN PLMN identifier: The valid SGSN PLMN Id during the service data recording interval.
- FBC data volume uplink: The number of octets transmitted during the use of the packet data services in the uplink direction.
- FBC data volume downlink: The number of octets transmitted during the use of the packet data services in the downlink direction.
- Time of Report: A time stamp defining the moment when the service data container is closed.
- RAT Type: The valid radio access technology type during the service data recording interval.
- Failure handling Continue: A Boolean expression included if the failure handling condition has been executed. Present only if the rating group is online (DCCA) charged and if failure handling procedure is executed by DCCA.

**Format**

- Service Identifier: Integer
- Rating Group: Integer
- Charging Rulebase Name: IA5 octet string
- Result Code: Integer
- Local Seq No: Integer
- Time of first usage: BCD encoded octet string
- Time of last usage: BCD encoded octet string
- Usage time: Unsigned integer
- User Location Information: Octet String
- Service change condition: Bit string
- QoS negotiated: Octet string
- Sgsn-address: Hex value octet string
• SGSN PLMN identifier: Hex value octet string
• FBC data volume uplink: Integer
• FBC data volume downlink: Integer
• Time of Report: BCD encoded octet string
• Rat Type: Integer (1-255)
• Failurehandling Continue: Boolean

**Important:** The maximum length of charging rulebase name in the List of Service Data Volumes (LOSDVs) can be trimmed. For more information, refer to the `gtpp egcdr charging-rulebase-name-max-char-length` command in the `Context Configuration Mode Commands` chapter of the `Command Line Interface Reference Guide`.

**Important:** When encoding the Service Change Condition bit string, the following rule is applied:“In a primitive encoding, the first contents octet gives the number of bits by which the length of the bit string is less than the next multiple of eight (this is called the ‘number of unused bits’). The second and following contents octets give the value of the bit string, converted to an octet string.” [As stated in *A Layman's Guide to a Subset of ASN.1, BER, and DER - Burton S. Kaliski* section 5.4] For example, serviceConditionChange is set to "88 0403 0400 00" to continue the ongoing session case. "03" represents the number of unused bits according to ASN.1 encoding which indicates that the octet following the length octet actually gives the number of unused bits.

In 12.3 and earlier releases, when the CLI command `gtpp egcdr service-data-flow threshold interval` was configured to ‘n’ seconds, the difference between “timeOfFirstUsage” and “timeOfReport” of LOSDV was always ‘n’ seconds for the LOSDVs closed due to “service-data-flow” threshold. Here, changeTime of LOSDV was reported.
incorrectly. It was always timeOfFirstUsage + ‘n’. This does not hold true when the traffic for a particular content ID was not continuous.

In StarOS release 14.0 and later, when the command `gtpp egcdr service-data-flow threshold interval` is configured to ‘n’ seconds, the difference between “timeOfFirstUsage” and “timeOfReport” of LOSDV can be any value between 1 and ‘n’ seconds depending on the continuity of traffic. If the traffic is not continuous, the difference is less than ‘n’ seconds. And if the traffic is continuous the difference will be ‘n’ seconds. When this CLI command is configured in the GTPP Server Group Configuration mode, each LOSDV will be closed at configured regular interval after the arrival of first packet.

### List of Traffic Data Volumes

A list of the changes that occurred in the charging conditions for this PDP context.

The list will include one or more containers each including the following fields:

- **QoS negotiated**: Quality of service (QoS) has been negotiated. The initial and final corresponding data values are listed. This is only added for the first container and the container after a QoS change.
- **Uplink volume**: The number of octets (uncompressed) received from the MS. The initial and final corresponding data values are listed.
- **Downlink volume**: The number of octets (uncompressed) transmitted to the MS. The initial and final corresponding data values are listed.
- **Change Condition**: Identifies the reason that the container was closed such as tariff time change, QoS change, or closing of the CDR.
- **Change Time**: A time stamp identifying the time at which the volume container or the CDR closed.
- **User Location Information**: Identifies the location of the user known at the time when container is created.

For GPRS, data volumes are in octets above the GTP layer and are separated for uplink and downlink traffic. In UMTS, data volumes are in octets above the GTP-U layer and are separated for uplink and downlink traffic.

**Format**

- QoS negotiated: Octet String
- Uplink volume: Integer
- Downlink volume: Integer
- Change Condition: Integer
- Change Time: BCD encoded octet string
- User Location Information: Octet String

**Length**

- QoS negotiated: 12 bytes
- Uplink volume: 4 bytes
- Downlink volume: 4 bytes
- Change Condition: 1 byte
- Change Time: 9 bytes
- User Location Information: 6 - 13 bytes
Local Record Sequence Number

For a Node ID, this number is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR.

**Format**
- Unsigned integer

**Length**
- 1–4 bytes

MS Time Zone

The “Time Zone” IE that the SGSN may provide to the GGSN during the PDP context activation/modification procedure.

**Format**
- Hex value octet string

**Length**
- 2 bytes

Network Initiated PDP Context

The presence of this field indicates that the PDP context was initiated by the network.

**Format**
- Boolean

**Length**
- 1 byte

Node ID

The identifier string for the GGSN that had generated the CDR. Node ID along with local record sequence number uniquely identifies a CDR.

**Format**
- Octet string

**Length**
- 1–16 bytes

PDP Type

The PDP context type. The PDP types supported by the GGSN are IP or PPP (including IHOSS:OSP).

**Format**
- Hex value octet string

**Length**
- 2 bytes
**PSFurnishChargingInformation**

This field contains charging information sent by the OCS in the Diameter Credit Control Credit-Control-Answer messages as defined in 3GPP TS 32.251.

**Important:** The Furnish Charging Information (FCI) feature is currently applicable to all GTPP dictionaries that are compliant to 3GPP Rel.7 and 3GPP Rel.8 standard. Note that custom43 (rel. 8 compliant) dictionary has additional custom handling with respect to free format data encoding and FCI change trigger for CDR generation. This feature is CLI-controlled.

Note that inclusion of this field in the CDR for any given GTPP dictionary is controlled through the CLI command `gtpp attribute furnish-charging-information` in the GTPP Server Group Configuration mode. PGW-CDR and eG-CDR will contain FCI based on the GTPP group configuration.

For dictionaries other than custom43, whenever FCI changes, a new Free-Format-Data (FFD) value is either appended to existing FFD or overwritten on the current FFD for online charging session depending on Append-Free-Format-Data (AFFD) flag. CDR is not generated upon FCI change.

FCI is supported in main CDR as well as in LOSDV. Whenever a trigger (volume, time, RAT, etc.) happens current available FFD at command level is added to the main body of the CDR. The same FFD at command level is added to the main body of the next CDRs until it is not appended or overwritten by next Credit-Control-Answer message at command level.

The command level FCI implementation for custom43 dictionary can be outlined as follows:

- Whenever FCI changes at main command level PGW-CDR will be generated. This PGW-CDR will include the old FCI value. The Cisco proprietary value for change condition trigger will be 301 (FCI_CHANGE).
- Translation for the PS-Free-Format-Data in CDR will be conversion of hexadecimal values in ASCII format (for numbers 0 to 9) to decimal values as integers.
- PS-Append-Free-Format-Data always OVERWRITE at command level (main body of CDR).

**Important:** Note the above described behavior applies only to command level PS FCI.

**Format**

- Sequence

**Length**

- Variable

**Radio Access Technology (RAT) Type**

The SGSN may include the RAT Type IE along with User Location Information IE, and MS Time Zone IE if they are available. The RAT Type IE shall not be included for the MS-initiated PDP Context Modification procedure.

**Format**

- Integer (1-255)

**Length**

- 1 byte
Record Extensions

A set of network operator or manufacturer specific extensions which may be added to the record if provided. It is used for reporting flows and volumes consumed, and also for passing key information about the session into the downstream charging systems.

**Important:** This field is customer specific. Service Level CDR is also the part of Record Extension.

Record Opening Time

The timestamp at which the PDP context was activated on the GGSN.

**Format**
- BCD encoded octet string

**Length**
- 9 bytes

Record Sequence Number

A running sequence number used to link partial records generated by the GGSN for a specific PDP context (characterized with the same Charging ID and GGSN address pair). This field is only present for partial records.

**Format**
- Unsigned integer

**Length**
- 1–4 bytes

Record Type

Indicates the GGSN PDP context record type. From the GGSN, this will be G-CDR.

**Format**
- Integer

**Length**
- 1–4 bytes

Served IMEISV

The International Mobile Equipment Identity and Software Version Number (IMEISV) of the MS, if available. Releases prior to 12.0, this attribute accepts only digits 0 through 9. Release 12.0 onwards, this attribute supports alphanumeric characters i.e. 0 to 9 and A-F.

**Format**
- BCD encoded octet string

**Length**
- 8 bytes
Served IMSI

The International Mobile Subscriber Identity (IMSI) of the MS. The IMSI is formatted in accordance with 3GPP TS 23.003. This will be present if the Anonymous Access Indicator is FALSE or not supplied.

Format
BCD encoded octet string

Length
3 to 8 bytes

Served MSISDN

The Mobile Station (MS) ISDN number (MSISDN) of the subscriber.

Format
BCD encoded octet string

Length
1–9 bytes

Served PDP Address

The binary-represented IPv4/IPv6 address associated with the PDP context for the CDR. This address could either be static or dynamically assigned.

Format
Hex value octet string

Length
4 bytes for IPv4 address
16 bytes for IPv6 address

Served PDP PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4v6 is used, and the IPv6 dress is included in Served PDP Address or Served PDP PDN Address.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

Important: Note that this field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Rel.9 attribute and it can be present in Rel.7 or Rel.8 dictionary if enabled through the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

ASN.1 Definition:
-- This field was made available in GGSN Record. If the above mentioned CLI is enabled
-- we can treat this field to be available in GGSNPDPRecord or EGSNPDPRecord.

```markdown
-ggsnPDPRecord ::= SET
{
  .
  .
  .
  .
  servedPDPPDNAddressExt [45] PDPAddress OPTIONAL
}
```

**Format**
- Octet string

**Length**
- 8 bytes

---

## Service Level CDR

It is a sequence of CSG fields.

It has one or more containers having following fields:

- Session ID: A unique 0-128 byte session id that is assigned to each user session. A user going to multiple services will be assigned a unique session id for each service. Diameter session ID is filled in this field.
- Service ID: It is an OCTET string which denotes the name of the Service. Rating group ID is filled in this field.
- Service IP Volume Usage: IP level volume usage. When this volume is calculated all the L4-L7 headers are counted, i.e. volume equals length of IP packet.
- Quota Server Flags: used to notify the receiver of various conditions or actions of the quota server.
- Qualified Usage: Specifies qualified usage and defining units of service. It is used for credit-control.
- TimeOfFirstUsage: The time stamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.

---

**Important:** There are some more fields in the Service Level CDR which are mapped to other existing fields. Those fields include: Cause, Service Start Timestamp, UserIndex or UserIndexIPv6, or UserDualStackIPv4, and Billing Plan ID.

---

**Format**
- Session ID: Octet String
- Service ID: Octet String
- Service IP Volume Usage: Sequence
- Quota Server Flags: Integer
• Qualified Usage: Sequence
• TimeOfFirstUsage: BCD encoded octet string

Length
• Session ID: 0-128 bytes
• Service ID: 0-128 bytes
• Service IP Volume Usage: 0-24 bytes
• Quota Server Flags: 0-4 bytes
• Qualified Usage: 0-13 bytes
• TimeOfFirstUsage: 9 bytes

SGSN Address

A list of all of the SGSN IPv4 addresses (binary-represented) used over the duration of the CDR. The address(es) can be either user or control-plane addresses.

Format
Hex value octet string

Length
4 bytes per address

SGSN PLMN Identifier

RAI (optionally supplied by SGSN in the GTP create PDP context request) is used as SGSN PLMN Identifier value. It is omitted if the SGSN does not supply the RAI.

Format
Hex value octet string

Length
3 bytes

User Location Information

The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure.

Format
Octet string

Length
8 bytes
Chapter 7
P-GW CDR Field Reference

This chapter provides a reference for CDR fields supported by the system for use in PGW-CDRs.
A complete list and descriptions of supported CDR fields is provided in the P-GW CDR Field Descriptions chapter of this reference.

Important: This reference document contains information only on standard GTPP dictionaries. For information on custom dictionaries, contact your Cisco account representative.

The category column in all tables uses keys described in the following table.

Table 29. Dictionary Table Key

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be present in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable: Mandatory</td>
<td>A field that an operator has provisioned and must be included in the CDR for all conditions.</td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable: Conditional</td>
<td>A field that an operator has provisioned and must be included in the CDR if certain conditions are met.</td>
</tr>
</tbody>
</table>
custom24 Dictionary

In releases prior to 15, PGW-CDR fields are based on 3GPP TS 32.298 V8.5.0. In release 15 and later, PGW-CDR fields are fully compliant to 3GPP spec 32.298 V9.6.0 and partially compliant to Release 11 spec of 3GPP TS 32.298.

<table>
<thead>
<tr>
<th>Field</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size (in bytes)</th>
<th>ASN1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>P-GW IP CAN bearer record</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied)</td>
<td>BCD encoded octet string</td>
<td>3-8</td>
<td>83</td>
</tr>
<tr>
<td>P-GW Address</td>
<td>4</td>
<td>M</td>
<td>The control plane IP address of the P-GW used.</td>
<td>Octet String</td>
<td>6 or 18 bytes (depending on v4 or v6 address)</td>
<td>a4</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs</td>
<td>Integer</td>
<td>1-5</td>
<td>85</td>
</tr>
<tr>
<td>Serving Node Address</td>
<td>6</td>
<td>M</td>
<td>List of serving node control plane IP addresses (e.g. SGSN, MME, etc.) used during this record.</td>
<td>Sequence</td>
<td>6-98 or 18-292 bytes</td>
<td>a6</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>7</td>
<td>OM</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
<td>IA5string</td>
<td>1-63</td>
<td>87</td>
</tr>
<tr>
<td>PDP/PDN Type</td>
<td>8</td>
<td>OM</td>
<td>Indicates PDP type (IP, PPP, or IHOSS:OSP) or PDN type (IPv4, IPv6, or IPv4v6).</td>
<td>Octet string</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Served PDP/PDN Address</td>
<td>9</td>
<td>OC</td>
<td>IP address allocated for the PDP context / PDN connection (IPv4 or IPv6), if available.</td>
<td>Octet string</td>
<td>8 or 20</td>
<td>a9</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>11</td>
<td>OC</td>
<td>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.</td>
<td>Boolean</td>
<td>1</td>
<td>8b</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>Timestamp when IP CAN bearer is activated in this P-GW or record opening time on subsequent partial records.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>Duration of this record in the P-GW.</td>
<td>Integer</td>
<td>1-5</td>
<td>8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>The reason for the release of a record from this P-GW.</td>
<td>Integer</td>
<td>1</td>
<td>8f</td>
</tr>
<tr>
<td>Field</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>16</td>
<td>OC</td>
<td>Includes a more detailed technical reason (as defined in TS 32.250) for the release of the connection.</td>
<td>Integer</td>
<td>1-5</td>
<td>b0</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>17</td>
<td>C</td>
<td>Partial record sequence number, only present in case of partial records.</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
<tr>
<td>Node ID</td>
<td>18</td>
<td>OM</td>
<td>Name of the recording entity.</td>
<td>IA5string</td>
<td>1-20</td>
<td>92</td>
</tr>
<tr>
<td>Local Sequence Number</td>
<td>20</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
<td>Integer</td>
<td>1-5</td>
<td>94</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>21</td>
<td>OM</td>
<td>An index indicating how the APN was selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>22</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
<td>BCD encoded octet string</td>
<td>1-9</td>
<td>96</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>23</td>
<td>M</td>
<td>The Charging Characteristics applied to the IP CAN bearer.</td>
<td>Octet string</td>
<td>2</td>
<td>97</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>24</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>98</td>
</tr>
<tr>
<td>Serving Node PLMN Identifier</td>
<td>27</td>
<td>OM</td>
<td>Serving node PLMN Identifier (MCC and MNC) used during this record, if available.</td>
<td>Octet string</td>
<td>3</td>
<td>9b</td>
</tr>
<tr>
<td>PS Furnish Charging Information</td>
<td>28</td>
<td>OC</td>
<td>This field contains charging information sent by the OCS in the Diameter Credit Control Credit-Control-Answer messages as defined in 3GPP TS 32.251.</td>
<td>Sequence</td>
<td>Variable</td>
<td>BC</td>
</tr>
<tr>
<td>PS Free Format Data</td>
<td>28-0-1</td>
<td>OC</td>
<td>This field contains charging information sent by the OCS in the Diameter Credit Control Credit-Control-Answer messages as defined in TS 32.251. 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.</td>
<td>Sequence</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>Field</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>PS Free Format Append Indicator</td>
<td>28-0-2</td>
<td>OC</td>
<td>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.</td>
<td>Sequence</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>Served IMEISV</td>
<td>29</td>
<td>OC</td>
<td>IMEISV of the ME, if available.</td>
<td>BCD encoded octet string</td>
<td>8</td>
<td>9d</td>
</tr>
<tr>
<td>RAT Type</td>
<td>30</td>
<td>OC</td>
<td>Indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.</td>
<td>Integer</td>
<td>1</td>
<td>9e</td>
</tr>
<tr>
<td>MS Time Zone</td>
<td>31</td>
<td>OC</td>
<td>Indicates the offset between universal time and local time in steps of 15 minutes where the MS currently resides.</td>
<td>Octet string</td>
<td>2</td>
<td>9f1f</td>
</tr>
<tr>
<td>User Location Information</td>
<td>32</td>
<td>OC</td>
<td>Contains the User Location Information of the MS as defined in TS 29.060 for GPRS case, and in TS 29.274 for EPC case, if available.</td>
<td>Octet string</td>
<td>5-13</td>
<td>9f20</td>
</tr>
<tr>
<td>List of Service Data</td>
<td>34</td>
<td>OM</td>
<td>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.</td>
<td>Sequence</td>
<td>Variable</td>
<td>bf22</td>
</tr>
<tr>
<td>Data Service Volume Block</td>
<td>34-0</td>
<td>OM</td>
<td>Service data container associated with a service condition change on a service data flow (categorized per rating group or per combination of the rating group and service id) within this IP CAN bearer.</td>
<td>Sequence</td>
<td>Variable</td>
<td>30</td>
</tr>
<tr>
<td>Rating Group</td>
<td>34-0-1</td>
<td>OM</td>
<td>Service flow identity also known as content-ID</td>
<td>Integer</td>
<td>1-5</td>
<td>81</td>
</tr>
<tr>
<td>Charging Rulebase Name</td>
<td>34-0-2</td>
<td>OC</td>
<td>Name of the Rulebase used for charging</td>
<td>IA5string</td>
<td>1-16</td>
<td>82</td>
</tr>
<tr>
<td>Result Code</td>
<td>34-0-3</td>
<td>OC</td>
<td>Result code shared by OCS</td>
<td>Integer</td>
<td>1-5</td>
<td>83</td>
</tr>
<tr>
<td>Local Sequence Number (LOSD)</td>
<td>34-0-4</td>
<td>OC</td>
<td>Service data container sequence number</td>
<td>Integer</td>
<td>1-5</td>
<td>84</td>
</tr>
<tr>
<td>Time of First Usage</td>
<td>34-0-5</td>
<td>OC</td>
<td>Timestamp for the first IP packet to be transmitted for the service data flow</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>Field</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Time of Last Usage</td>
<td>34-0-6</td>
<td>OC</td>
<td>Timestamp for the last IP packet to be transmitted for the service data flow</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>86</td>
</tr>
<tr>
<td>Time Usage</td>
<td>34-0-7</td>
<td>OC</td>
<td>Difference in seconds within range of 0 to 4294967295 between &quot;time of first usage&quot; and &quot;time of last usage&quot;</td>
<td>Integer</td>
<td>1-5</td>
<td>87</td>
</tr>
<tr>
<td>Service Condition Change</td>
<td>34-0-8</td>
<td>OC</td>
<td>Reason for closing the service data container</td>
<td>Bit string</td>
<td>5</td>
<td>88</td>
</tr>
<tr>
<td>QoS Information Negotiated</td>
<td>34-0-9</td>
<td>OC</td>
<td>Authorized QoS for the IP-CAN bearer</td>
<td>Sequence</td>
<td>Variable</td>
<td>a9</td>
</tr>
<tr>
<td>Serving Node Address (LOS D)</td>
<td>34-0-10</td>
<td>OC</td>
<td>IP address of the serving node (SGSN/S-GW) control plane</td>
<td>Octet string</td>
<td>6 or 18</td>
<td>aa</td>
</tr>
<tr>
<td>Data Volume FBC Uplink</td>
<td>34-0-12</td>
<td>OC</td>
<td>Number of octets received in the uplink direction for this container</td>
<td>Integer</td>
<td>1-5</td>
<td>8c</td>
</tr>
<tr>
<td>Data Volume FBC Downlink</td>
<td>34-0-13</td>
<td>OC</td>
<td>Number of octets transmitted in the downlink direction for this container</td>
<td>Integer</td>
<td>1-5</td>
<td>8d</td>
</tr>
<tr>
<td>Time of Report</td>
<td>34-0-14</td>
<td>OM</td>
<td>Timestamp defining the moment when the service data container is closed</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>8e</td>
</tr>
<tr>
<td>Failure Handling Continue</td>
<td>34-0-16</td>
<td>OC</td>
<td>Identifier for failure handling</td>
<td>Boolean</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Service Identifier</td>
<td>34-0-17</td>
<td>OC</td>
<td>Identifier for a service</td>
<td>Integer</td>
<td>1-5</td>
<td>91</td>
</tr>
<tr>
<td>PS Furnish Charging Information</td>
<td>34-0-18</td>
<td>OC</td>
<td>This field includes charging information per rating group in case it is sent by OCS.</td>
<td>Sequence</td>
<td>Variable</td>
<td>b2</td>
</tr>
<tr>
<td>User Location Information (LOS D)</td>
<td>34-0-20</td>
<td>OC</td>
<td>Location of the user known at the time when container is created</td>
<td>Octet string</td>
<td>6-13</td>
<td>94</td>
</tr>
<tr>
<td>Serving node Type</td>
<td>35</td>
<td>M</td>
<td>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.</td>
<td>Sequence of serving Node Type</td>
<td>3-48</td>
<td>bf23</td>
</tr>
<tr>
<td>Served MNNAI</td>
<td>36</td>
<td>OC</td>
<td>Mobile Node Identifier in NAI format (based on IMSI), if available.</td>
<td>Set</td>
<td>Variable</td>
<td>bf24</td>
</tr>
<tr>
<td>P-GW PLMN Identifier</td>
<td>37</td>
<td>OC</td>
<td>PLMN identifier (MCC MNC) of the P-GW.</td>
<td>Octet string</td>
<td>3</td>
<td>9f25</td>
</tr>
<tr>
<td>Start Time</td>
<td>38</td>
<td>OC</td>
<td>The time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.</td>
<td>Octet string</td>
<td>9</td>
<td>9f26</td>
</tr>
<tr>
<td>Field</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 Code</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Stop Time</td>
<td>39</td>
<td>OC</td>
<td>The time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.</td>
<td>Octet string</td>
<td>9</td>
<td>9f27</td>
</tr>
<tr>
<td>PDN Connection Id</td>
<td>41</td>
<td>OM</td>
<td>PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.</td>
<td>Integer</td>
<td>1-5</td>
<td>9f29</td>
</tr>
<tr>
<td>Served PDP PDN Address Extension</td>
<td>45</td>
<td>OC</td>
<td>This field contains the IPv4 address allocated for the PDP context/PDN connection when dual-stack IPv4-IPv6 is used.</td>
<td>Octet string</td>
<td>8</td>
<td>bf2d</td>
</tr>
</tbody>
</table>

Notes:

- The field “Served PDP PDN Address Extension”(servedPDPPDNAddressExt) is not part of the 3GPP 32.298 v8.5.0 specification. This field will be available in the CDR only when the CLI command `gtpp attribute served-pdp-pdn-address-extension` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.

- The PGW-CDR field “PS Furnish Charging Information” is available in the custom24 GTPP dictionary only when the CLI command `gtpp attribute furnish-charging-information` is configured in the GTPP Server Group Configuration mode.

  This field is also available in all 3GPP Rel.7 and Rel.8 dictionaries.

- In releases prior to 14.0, for a non-GBR bearer, MBR and GBR values were populated in PGW-CDR. In 14.0 and later releases, as per the standard specification for a non-GBR bearer, MBR and GBR values should be set to 0. Only for custom24 GTPP dictionary if “gtpp attribute apn-ambr” CLI command is configured then APN AMBR values are populated in MBR fields of PGW-CDR.

- In releases prior to 14.0, the CGISAIChange service condition is present in LOSDV of PGW-CDR even if ULI Change trigger is disabled. In 14.0 and later releases, if the ULI Change trigger is disabled and if the ULI is changed, the CGISAIChange service condition is not present in LOSDV of PGW-CDR.

- Rulebase change triggered from any external interface e.g. OCS/PCRF, will generate CDR with closure reason “Management Intervention”. This change is applicable to all standard dictionaries except for custom42 GTPP dictionary as it is customized to suppress interim CDR.

- In releases prior to 15.0, when a call is cleared from the chassis, the field “causeForRecordClosing” in a PGW-CDR shows “Normal Release”. In 15.0 and later releases, the behavior has been changed to comply with 3GPP specifications. That is, the default “causeForRecordClosing” in PGW-CDR will be “Management Intervention”. To support this, new keywords have been added to the CLI command “gtpp egcdr” to control the value of “causeForRecordClosing” of PGW-CDR when a call is cleared from the chassis.

  Important: This behavioral change is limited to PGW-CDR Release 8 dictionaries only.

- In releases prior to 16, if there was a LOSDV bucket created between the packet arrival time and service-idle-out expiry time, no data counts were reported. So, a zero-volume LOSDV was generated for service idle timeout scenario. In 16 and later releases, if there are no data counts available for a service flow, the LOSDV for service idle timeout will not be created. The service-idle timeout will be started only when the next data packet arrives.
This behavior change is applicable to eG-CDRs and PGW-CDRs for all GTPP dictionaries except custom5 and custom40 dictionaries.

**ASN.1 Definition for Fields in custom24 Dictionary**

The following section provides a complete ASN.1 definition of PGW-CDR. It is based on the ASN.1 definition in 3GPP TS 32.298.

```asn.1
GPRS-PGW-Charging-DataTypes-REL8 DEFINITIONS IMPLICIT TAGS ::= BEGIN

GPRSRecord ::= CHOICE

--

-- Record values 20, 22..27 are specific
-- Record values 76..77 are MBMS specific
-- Record values 78..79 are EPC specific

{ pgwRecord[79] PGWRecord }

PGWRecord ::= SET

{ recordType [0] RecordType,
  servedIMSI [3] IMSI,
  p-GWAddress [4] GSNAddress,
}
```
chargingID
servingNodeAddress
accessPointNameNI
pdpPDNType
servedPDPDNAddress
dynamicAddressFlag
recordOpeningTime
duration
causeForRecClosing
diagnostics
recordSequenceNumber
nodeID
localSequenceNumber
apnSelectionMode
servedMSISDN
chargingCharacteristics
chChSelectionMode
servingNodePLMNIentifier
pSFurnishChargingInformation
servedIMEISV
rATType
mSTimeZone
userLocationInformation
listOfServiceData
servingNodeType
servedMNNAI
p-GWPLMNIentifier
startTime
stopTime [39] TimeStamp OPTIONAL,
pDNConnectionID [41] ChargingID OPTIONAL,
servedPDPPDNAddressExt [45] PDPAddress OPTIONAL

} 

AccessPointNameNI::= IA5String (SIZE(1..63))

--

-- Network Identifier part of APN in dot representation.

-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'

-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR..

APNSelectionMode::= ENUMERATED

{

--

-- See Information Elements TS 29.060, TS 29.274 or TS 29.275

--

mSorNetworkProvidedSubscriptionVerified (0),
mSProvidedSubscriptionNotVerified (1),
networkProvidedSubscriptionNotVerified (2)

}

CallDuration::= INTEGER

--

-- The call duration is counted in seconds.

-- For successful calls /sessions / PDP contexts, this is the chargeable duration.

-- For call attempts this is the call holding time.

--
CauseForRecClosing ::= INTEGER

{
--
-- In PGW-CDR and SGW-CDR the value servingNodeChange is used for partial
record
-- generation due to Serving Node Address list Overflow
-- In SGSN servingNodeChange indicates the SGSN change
--
-- LCS related causes belong to the MAP error causes acc. TS 29.002 [60]
--
-- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
-- All cause values are not relevent to SGW. Refer the spec to find out
the
-- cause values for SGW.
normalRelease (0),
abnormalRelease (4),
volumeLimit (16),
timeLimit (17),
servingNodeChange (18),
maxChangeCond (19),
managementIntervention (20),
rATChange (22),
mSTimeZoneChange (23),
sGSNPLMNIDChange (24)
}

ChangeOfServiceCondition ::= SEQUENCE
--
-- Used for Flow based Charging service data container
--

ratingGroup [1] RatingGroupId,
chargingRuleBaseName [2] ChargingRuleBaseName OPTIONAL,
resultCode [3] ResultCode OPTIONAL,
localSequenceNumber [4] LocalSequenceNumber OPTIONAL,
timeOfFirstUsage [5] TimeStamp OPTIONAL,
timeOfLastUsage [6] TimeStamp OPTIONAL,
timeUsage [7] CallDuration OPTIONAL,
serviceConditionChange [8] ServiceConditionChange,
qoSInformationNeg [9] EPCQoSInformation OPTIONAL,
servingNodeAddress [10] GSNAddress OPTIONAL,
datavolumeFBCUplink [12] DataVolumeGPRS OPTIONAL,
datavolumeFBCDownlink [13] DataVolumeGPRS OPTIONAL,
timeOfReport [14] TimeStamp,
failureHandlingContinue [16] FailureHandlingContinue OPTIONAL,
serviceIdentifier [17] ServiceIdentifier OPTIONAL,
psFurnishChargingInformation [18] PSFurnishChargingInformation OPTIONAL,
userLocationInformation [20] OCTET STRING OPTIONAL
}

ChargingCharacteristics ::= OCTET STRING (SIZE(2))

--
-- Bit 0-3: Profile Index
-- Bit 4-15: Behavior
--

ChargingID ::= INTEGER (0..4294967295)

--
-- Generated in P-GW, part of IP CAN bearer
-- 0..4294967295 is equivalent to 0..2**32-1
--

ChargingRuleBaseName ::= IA5String (SIZE(1..63))

--
-- identifier for the group of charging rules
-- see Charging-Rule-Base-Name AVP as defined in TS 29.212
--

ChChSelectionMode ::= ENUMERATED
{
  servingNodeSupplied (0), -- For S-GW/P-GW
  homeDefault (3), -- For SGSN, S-GW and P-GW
  roamingDefault (4), -- For SGSN, S-GW and P-GW
  visitingDefault (5) -- For SGSN, S-GW and P-GW
}

DataVolumeGPRS ::= INTEGER

--
-- The volume of data transferred in octets.
--

DynamicAddressFlag ::= BOOLEAN
EPCQoSInformation ::= SEQUENCE
{
  --
  -- See TS 29.212 for more information
  --
  qCI [1] INTEGER,
  maxRequestedBandwithUL [2] INTEGER OPTIONAL,
  maxRequestedBandwithDL [3] INTEGER OPTIONAL,
  guaranteedBitrateUL [4] INTEGER OPTIONAL,
  guaranteedBitrateDL [5] INTEGER OPTIONAL,
  aRP [6] INTEGER OPTIONAL
}

FailureHandlingContinue ::= BOOLEAN
  --
  -- This parameter is included when the failure handling procedure has been
  -- executed and new
  -- containers are opened. This parameter shall be included in the first and
  -- subsequent
  -- containers opened after the failure handling execution.
  --

GSNAddress ::= IPAddress

--IA5String ::= OCTET STRING

NodeID ::= IA5String (SIZE(1..20))
PDPAddress ::= CHOICE
{    
ipAddress [0] IPAddress
    --
    -- eTSIAddress as specified in 32.298 is not supported
    --
}

PDPType ::= OCTET STRING (SIZE(2))
    --
    -- OCTET 1: PDP Type Organization
    -- OCTET 2: PDP Type Number
    -- See TS 29.060 for GTP, TS 29.274 for eGTP and TS 29.275 for PMIP
    --

PLMN-Id ::= OCTET STRING (SIZE (3))
    --
    -- This is a 1:1 copy from the Routing Area Identity (RAI) IE
    -- specified in TS 29.060
    -- as follows:
    -- OCTET 1 of PLMN-Id = OCTET 2 of RAI
    -- OCTET 2 of PLMN-Id = OCTET 3 of RAI
    -- OCTET 3 of PLMN-Id = OCTET 4 of RAI
    --

RatingGroupId ::= INTEGER
RATType ::= INTEGER (0..255)
--
-- This integer is 1:1 copy of the RAT type value as defined in TS 29.060
-- for GTP,
-- TS 29.274 for eGTP and TS 29.275 for PMIP.
--

RecordType ::= INTEGER
{
  -- Record values 0..17 are CS specific.
  -- The contents are defined in TS 32.250

  pGWRecord (85)
}

ResultCode ::= INTEGER
  -- charging protocol return value, range of 4 byte (0...4294967259)
  -- see Result-Code AVP as used in 3GPP 32.299
  --

ServiceConditionChange ::= BIT STRING
{
  qosChange (0),  -- bearer modification
  sGSNChange (1),  -- bearer modification
  sGSNPMLMIDChange (2),  -- bearer modification
  tariffTimeSwitch (3),  -- tariff time change
  pDPContextRelease (4),  -- bearer release
}
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rATChange</td>
<td>(5), bearer modification</td>
</tr>
<tr>
<td>serviceIdledOut</td>
<td>(6), IP flow idle out, DCCA QHT expiry</td>
</tr>
<tr>
<td>reserved1</td>
<td>(7), old: QCTexpiry is no report event</td>
</tr>
<tr>
<td>configurationChange</td>
<td>(8), configuration change</td>
</tr>
<tr>
<td>serviceStop</td>
<td>(9), IP flow termination</td>
</tr>
<tr>
<td>dCCATimeThresholdReached</td>
<td>(10), DCCA quota reauthorization</td>
</tr>
<tr>
<td>dCCAVolumeThresholdReached</td>
<td>(11), DCCA quota reauthorization</td>
</tr>
<tr>
<td>dCCAServiceSpecificUnitThresholdReached</td>
<td>DCCA quota reauthorization</td>
</tr>
<tr>
<td>dCCATimeExhausted</td>
<td>(13), DCCA quota reauthorization</td>
</tr>
<tr>
<td>dCCAVolumeExhausted</td>
<td>(14), DCCA quota reauthorization</td>
</tr>
<tr>
<td>dCCAValidityTimeout</td>
<td>(15), DCCA quota validity time (QVT expiry)</td>
</tr>
<tr>
<td>reserved2</td>
<td>(16), reserved due to no use</td>
</tr>
<tr>
<td>dCCAReauthorisationRequest</td>
<td>(17), DCCA quota reauthorization request by OCS</td>
</tr>
<tr>
<td>dCCACreateOngoingSession</td>
<td>(18), DCCA failure handling (CCFH), continue IP flow</td>
</tr>
<tr>
<td>dCCAReplayAndTerminateOngoingSession</td>
<td>(CCFH), terminate IP flow after DCCA retry</td>
</tr>
<tr>
<td>dCCATerminateOngoingSession</td>
<td>(20), DCCA failure handling, terminate IP flow</td>
</tr>
<tr>
<td>cGI-SAIClange</td>
<td>(21), bearer modification</td>
</tr>
<tr>
<td>rAIClange</td>
<td>(22), bearer modification</td>
</tr>
<tr>
<td>dCCAServiceSpecificUnitExhausted</td>
<td>(23), DCCA quota reauthorization</td>
</tr>
<tr>
<td>recordClosure</td>
<td>(24), PGW-CDR closure</td>
</tr>
<tr>
<td>timeLimit</td>
<td>(25), intermediate recording</td>
</tr>
<tr>
<td>volumeLimit</td>
<td>(26), intermediate recording</td>
</tr>
<tr>
<td>serviceSpecificUnitLimit</td>
<td>(27), intermediate recording</td>
</tr>
<tr>
<td>envelopeClosure</td>
<td>(28),</td>
</tr>
</tbody>
</table>
eCGIChange (29), -- bearer modification. “ECGI Change”

tAIChange (30), -- bearer modification. “TAI Change”

userLocationChange (31) -- bearer modification. “User Location Change”

} 

ServiceIdentifier ::= INTEGER (0..4294967295) 

-- 

-- The service identifier is used to identify the service or the 
-- service component the service data flow relates to. See 
-- Service-Identifier AVP as defined in 3GPP TS 29.212

ServingNodeType ::= ENUMERATED 

{
  sGSN (0),
  pMIPSGW (1),
  gTPSGW (2),
  ePDG (3),
  hSGW (4),
  mME (5)
}

SubscriptionID ::= SET 

{
  subscriptionIDType [0] SubscriptionIDType,
  subscriptionIDDatum [1] UTF8String
}

GTPP Interface Administration and Reference, StarOS Release 18
SubscriptionIDType ::= ENumerated
{
  eND-USER-E164 (0),
  eND-USER-IMSI  (1),
  eND-USER-SIP-URI (2),
  eND-USER-NAI  (3),
  eND-USER-PRIVATE (4)
}

Diagnostics ::= CHOICE
{
  -- Only the option gsm0408Cause is used for this field
  --
  gsm0408Cause [0] INTEGER
}

IPAddress ::= CHOICE
{
  iPBInBinaryAddress iPBInBinaryAddress
  --Currently only IPBinaryAddress is supported in PGWCDR
}

IPBinaryAddress ::= CHOICE
{
  iPBInV4Address [0] OCTET STRING (SIZE(4)),
  iPBInV6Address [1] OCTET STRING (SIZE(16))
}
LocalSequenceNumber ::= INTEGER (0..4294967295)
  
  -- Sequence number of the record in this node
  -- 0..4294967295 is equivalent to 0..2**32-1, unsigned integer in four octets

MSISDN::= ISDN-AddressString

  --
  -- See TS 23.003

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

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

TBCDSTRING ::= OCTET STRING
ISDN-AddressString ::= OCTET STRING
IMEI ::= TBCDSTRING (SIZE(8))
IMSI ::= TBCDSTRING (SIZE(3..8))

END
Chapter 8
P-GW CDR Field Descriptions

This chapter describes the CDR fields supported by the system for use in PGW-CDRs.

The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

All PGW-CDRs are encoded using the ASN.1 format and are sent to the charging gateway function (CGF) using the GPRS Tunneling Protocol Prime (GTPP) as defined in the following standards:

- 3GPP TS 29.060
- 3GPP TS 32.015
- 3GPP TS 32.215
- 3GPP TS 32.251 (v8.5.0, v8.6.0)
- 3GPP TS 32.298 (v8.4.0, v8.5.0) (PGW-CDRs)

**Important**: The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the `gtpp attributes` command in the *Command Line Interface Reference*. 
CDR Fields

Access Point Name Network Identifier

The network identifier portion of the Access Point Name (APN). This APN is sent to the S-GW by the MME and is relayed to the P-GW in the EGTP Create Session Request message.

The APN string may consist of alphabetic characters (“A...Z”, “a...z”), digits (“0...9”) and the dash “-”.

Format
IA5 string

Length
1–63 bytes

APN Selection Mode

An index indicating how the APN was selected.

The following APN selection mode indexes are possible:

- 0: MS or network provided APN, subscription verified
- 1: MS provided APN, subscription not verified
- 2: Network provided APN, subscription not verified

Format
Enumerated

Length
1 byte

Cause for Record Closing

This field contains a reason for the closure of the CDR.

Some of the possible reasons are as follows:

- normalRelease (0): The PDP context was terminated normally through a PDP context release (end of context or SGSN change) or a GPRS detach.
- abnormalRelease (4): The PDP context was abnormally terminated.
- volumeLimit (16): The PDP context was terminated due to exceeding volume limit.
- timeLimit (17): The PDP context was terminated due to exceeding time limit.
- servingNodeChange (18): The PDP context was terminated due to Serving Node Address List Overflow.
- maxChangeCond (19): The PDP context was terminated due to exceeding the changed condition limit.
- managementIntervention (20): The record was closed due to an O&M request, or change in rulebase triggered from any external interface e.g. OCS, PCRF.
- rATChange (22): The PDP context was terminated due to change in RAT.
- mSTimeZoneChange (23): The PDP context was terminated due to change in time zone of MS.
- PLMNChange (24): The PDP context was terminated due to change of PLMN-ID.
- Ocs_Unreachable (302): The PDP context was terminated due to change of PLMN-ID.
- Ocs_Reachable (303): The PDP context was terminated due to change of PLMN-ID.
- Ocs_Status_Unknown (304): The PDP context was terminated due to change of PLMN-ID.
- Partial record generation: A partial CDR was generated for reasons such as the reaching of data volume or time (duration) limits, or reaching the maximum number of charging condition changes.

Note that the Ocs_Unreachable (302), Ocs_Reachable (303), and Ocs_Status_Unknown (304) Cause for Record Closing reasons are applicable only to custom45 GTPP dictionary for P-GW.

**Format**

Integer

**Length**

1 byte

### Charging Characteristics

List the charging characteristics applied to the PDP context by the P-GW.

**Important:** For the custom42 GTPP dictionary, release 14.0 onwards, the Charging Characteristics (CC) field with the value greater than 9 should be encoded in hexadecimal format instead of decimal format.

**Format**

Octet string

**Length**

2 bytes

### Charging Characteristics Selection Mode

This field specifies how the Charging Characteristics were selected.

Supported values:
- servingNodeSupplied (0)
- homeDefault (3)
- roamingDefault (4)
- visitingDefault (5)
- AAASupplied (6)
- GWOverride (7)

**Note:** The values AAASupplied (6) and GWOverride (7) are only supported in the custom40 GTPP dictionary.

**Format**

Enumerated

**Length**

...
Charging ID

This field contains a charging identifier, which can be used together with the P-GW address to identify all records involved in a single bearer context. The Charging ID is generated by the P-GW during bearer context activation and is transferred to the context requesting P-GW.

**Format**
- Integer

**Length**
- 1–5 bytes

Diagnostics

This field is included in the CDR when the bearer is released and when the option `gtpp attribute diagnostics` is configured.

**Format**
- Integer

**Length**
- Variable

Network Specific Cause (GTPP custom34 Dictionary)

Customer-specific field included when the optional Diagnostics field is included for GTPP custom34 dictionary.

Network Specific Cause ::= Management Extension Sequence

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Format</th>
<th>ASN.1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>identifier</td>
<td>OBJECT IDENTIFIER for diagnostics</td>
<td>OCTET STRING</td>
<td>6</td>
</tr>
<tr>
<td>significance</td>
<td>BOOLEAN DEFAULT FALSE</td>
<td>BOOLEAN</td>
<td>81</td>
</tr>
<tr>
<td>information</td>
<td>SEQUENCE OF CauseInformation</td>
<td>A2</td>
<td></td>
</tr>
<tr>
<td>CauseInformation</td>
<td>SEQUENCE</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>msgTimestamp</td>
<td>message TimeStamp</td>
<td>TimeStamp</td>
<td>81</td>
</tr>
<tr>
<td>msgType</td>
<td>message Type</td>
<td>INTEGER</td>
<td>82</td>
</tr>
<tr>
<td>msgSourceIp</td>
<td>Source IP Address</td>
<td>IP Address</td>
<td>A3</td>
</tr>
<tr>
<td>msgCause</td>
<td>Cause Code</td>
<td>OCTET STRING</td>
<td>84</td>
</tr>
<tr>
<td>abnormalTerminationCause</td>
<td>Abnormal Termination Cause Code</td>
<td>ENUM</td>
<td>83</td>
</tr>
</tbody>
</table>

Format
- Management Extensions
**Length**

Always included when the optional Diagnostics field is included.

---

**Duration**

This field contains the duration in seconds for the record. The value is reset for each new partial CDR.

This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured.

*Important:* For custom40 GTPP dictionary, the duration is first calculated based on the actual opening and closing times of the record, and then rounded off. For all other GTPP dictionaries, the opening and closing times are first rounded off and then used for the calculation of duration.

**Format**

Integer

**Length**

1–5 bytes

---

**Dynamic Address Flag**

This field indicates that the PDN address has been dynamically allocated for that particular IP CAN bearer (PDN connection). This field is missing if the address is static.

**Format**

Boolean

**Length**

1 byte

---

**List of Service Data**

This list includes one or more service data containers. Each container is associated with a service condition change on a service data flow (categorized per rating group or per combination of the rating group and service ID) within this IP CAN bearer.

In releases prior to 18.0, the customer-specific GTPP dictionaries “custom38” and “custom39” have restriction of one Service Data Container per CDR. In 18.0 and later releases, this restriction is removed for these two dictionaries and the number of containers per CDR is configurable through the CLI “gtpp egcdr losdv-max-containers”. Note that the default value of max_losdv is 10 and max_losdv attribute is configurable for both custom38 and custom39 dictionaries. Default value of max_lotv in GTPP group is 8 and max_lotv is now configurable.

**Format**

Sequence

**Length**

Variable
Data Service Volume Block

This is a service data container. A container is associated with a service condition change on a service data flow (categorized per rating group or per combination of the rating group and service id) within this IP CAN bearer.

A service data container may include the fields in the following subsections.

<table>
<thead>
<tr>
<th>Format</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Variable</td>
</tr>
</tbody>
</table>

Charging Rulebase Name

The name of the Rulebase used for charging. This is the group name of charging rules.

<table>
<thead>
<tr>
<th>Format</th>
<th>IA5string</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1–63 bytes</td>
</tr>
</tbody>
</table>

Data Volume FBC Downlink

The number of octets transmitted during the use of the packet data services in the downlink direction.

<table>
<thead>
<tr>
<th>Format</th>
<th>Integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1–5 bytes</td>
</tr>
</tbody>
</table>

Data Volume FBC Uplink

The number of octets received during the use of the packet data services in the uplink direction.

<table>
<thead>
<tr>
<th>Format</th>
<th>Integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1–5 bytes</td>
</tr>
</tbody>
</table>

Failure Handling Continue

This parameter is included when the failure handling procedure has been executed and new containers are opened. This parameter shall be included in the first and subsequent containers opened after the failure handling execution.

<table>
<thead>
<tr>
<th>Format</th>
<th>Boolean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1 byte</td>
</tr>
</tbody>
</table>
Local Sequence Number (LOSDV)

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

**Format**

Integer

**Length**

1–5 bytes

QoS Information Negotiated

For an IP-CAN bearer-specific container, this contains the authorized QoS for the IP-CAN bearer. The first container for each QCI/ARP pair includes this field. In the following containers this field is present if the previous change condition is “QoS change”.

This field contains a sequence of the following subfields:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Value</th>
<th>Format</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>qCI</td>
<td>1</td>
<td>Integer</td>
<td></td>
</tr>
<tr>
<td>maxRequestedBandwithUL</td>
<td>2</td>
<td>Integer</td>
<td>Optional</td>
</tr>
<tr>
<td>maxRequestedBandwithDL</td>
<td>3</td>
<td>Integer</td>
<td>Optional</td>
</tr>
<tr>
<td>guaranteedBitrateUL</td>
<td>4</td>
<td>Integer</td>
<td>Optional</td>
</tr>
<tr>
<td>guaranteedBitrateDL</td>
<td>5</td>
<td>Integer</td>
<td>Optional</td>
</tr>
<tr>
<td>ARP</td>
<td>6</td>
<td>Integer</td>
<td>Optional</td>
</tr>
</tbody>
</table>

**Format**

Sequence

**Length**

Variable

Allocation and Retention Priority (ARP)

The ARP contains information about the priority level (scalar), the pre-emption capability (flag) and the pre-emption vulnerability (flag). The primary purpose of ARP is to decide whether a bearer establishment or modification request can be accepted, or needs to be rejected due to resource limitations (typically available radio capacity for GBR bearers). Range: 1-127.

**Format**

Integer

**Length**

1–5 bytes

Guaranteed Bit Rate (GBR) Downlink
The GBR denotes the downlink bit rate that can be expected to be provided by a GBR bearer.

**Format**
Integer

**Length**
1–5 bytes

---

**Guaranteed Bit Rate (GBR) Uplink**

The GBR denotes the uplink bit rate that can be expected to be provided by a GBR bearer.

**Format**
Integer

**Length**
1–5 bytes

---

**Maximum Bit Rate (MBR) Downlink**

The MBR limits the downlink bit rate that can be expected to be provided by a GBR bearer (for example, excess traffic may get discarded by a rate shaping function).

**Important**: Note that, if the CLI command `gtpp attribute apn-ambr` is configured in the GTPP Server Configuration mode, the values of APN-AMBR attribute will be populated in the PGW-CDR in the custom24 GTPP dictionary.

**Format**
Integer

**Length**
1–5 bytes

---

**Maximum Bit Rate (MBR) Uplink**

The MBR limits the uplink bit rate that can be expected to be provided by a GBR bearer.

**Important**: Note that, if the CLI command `gtpp attribute apn-ambr` is configured in the GTPP Server Configuration mode, the values of APN-AMBR attribute will be populated in the PGW-CDR in the custom24 GTPP dictionary.

**Format**
Integer

**Length**
1–5 bytes

---

**Quality Class Identifier (QCI)**
A QCI is a scalar that is used as a reference to access node-specific parameters that control bearer level packet forwarding treatment (for example, scheduling weights, admission thresholds, queue management thresholds, link layer protocol configuration, etc.), and that have been pre-configured by the operator owning the access node (for example, eNodeB). Value Range: 1-9.

**Format**
- Integer

**Length**
- 1–5 bytes

---

**Rating Group**

This is the service flow identity and must be used for differentiated evaluation of user’s traffic. This is also known as content-id.

**Format**
- Integer

**Length**
- 1–5 bytes

---

**Result Code**

This is filled by OCS on Gy interface.

The following are the values as per RFC 3588 and 4006 (Other Result Codes not defined in the RFCs can also be seen in the Result Code field if sent by OCS):

- DIAMETER_SUCCESS 2001
- DIAMETER_LIMITED_SUCCESS 2002
- DIAMETER_COMMAND_UNSUPPORTED 3001
- DIAMETER_UNABLE_TO_DELIVER 3002
- DIAMETER_REALM_NOT_SERVED 3003
- DIAMETER_TOO_BUSY 3004
- DIAMETER_LOOP_DETECTED 3005
- DIAMETER_REDIRECT_INDICATION 3006
- DIAMETER_APPLICATION_UNSUPPORTED 3007
- DIAMETER_INVALID_HDR_BITS 3008
- DIAMETER_INVALID_AVP_BITS 3009
- DIAMETER_UNKNOWN_PEER 3010
- DIAMETER_AUTHENTICATION_REJECTED 4001
- DIAMETER_OUT_OF_SPACE 4002
- ELECTION_LOST 4003
- DIAMETER_END_USER_SERVICE_DENIED 4010
- DIAMETER_CREDIT_CONTROL_NOT_APPLICABLE 4011
- DIAMETER_CREDIT_LIMIT_REACHED 4012
- DIAMETER_AVP_UNSUPPORTED 5001
- DIAMETER_UNKNOWN_SESSION_ID 5002
- DIAMETER_AUTHORIZATION_REJECTED 5003
- DIAMETER_INVALID_AVP_VALUE 5004
- DIAMETER_MISSING_AVP 5005
- DIAMETER_RESOURCES_EXCEEDED 5006
- DIAMETER_CONTRADICTING_AVPS 5007
- DIAMETER_AVP_NOT_ALLOWED 5008
- DIAMETER_AVP_OCCURS_TOO_MANY_TIMES 5009
- DIAMETER_NO_COMMONAPPLICATION 5010
- DIAMETER_UNSUPPORTED_VERSION 5011
- DIAMETER_UNABLE_TO_COMPLY 5012
- DIAMETER_INVALID_BIT_IN_HEADER 5013
- DIAMETER_INVALID_AVP_LENGTH 5014
- DIAMETER_INVALID_MESSAGE_LENGTH 5015
- DIAMETER_INVALID_AVP_BIT_COMBO 5016
- DIAMETER_NO_COMMON_SECURITY 5017
- DIAMETER_USER_UNKNOWN 5030
- DIAMETER_RATING_FAILED 5031

**Format**
Integer

**Length**
1–5 bytes

**Service Condition Change**

The reason for closing the service data container for triggers like SGSN change, QoS change, RAT change, time and volume triggers, etc.

**Bit Setting regarding TS 32.298:**
- qoSChange (0), bearer modification
- sGSNChange (1), bearer modification
- sGSNPLMNIDChange (2), bearer modification
- tariffTimeSwitch (3), tariff time change
- pDPContextRelease (4), bearer release
- rATChange (5), bearer modification
- serviceIdleOut (6), IP flow idle out, DCCA QHT expiry
- reserved (7), old: QCTexpiry is no report event
- configurationChange (8), configuration change
- serviceStop (9), IP flow termination
- dCCATimeThresholdReached (10), DCCA quota reauth.
- dCCAVolumeThresholdReached (11), DCCA quota reauth.
- dCCAServiceSpecificUnitThresholdReached (12), DCCA quota reauth.
- dCCATimeExhausted (13), DCCA quota reauth.
- dCCAVolumeExhausted (14), DCCA quota reauth.
- dCCAVValidityTimeout (15), DCCA quota validate time (QVT expiry)
- reserved (16), reserved due to no use case, old: return Requested is covered by (17), (18)
- dCCAReauthorisationRequest (17), DCCA quota reauthorisation request by OCS
- dCCAContinueOngoingSession (18), DCCA failure handling continue IP flow
- dCCARetryAndTerminateOngoingSession (19), DCCA failure handling terminate IP flow after DCCA retry
- dCCATerminateOngoingSession (20), DCCA failure handling, terminate IP flow
- cGISAIChange (21), bearer modification
- rAIChange (22), bearer modification
- dCCAServiceSpecificUnitExhausted (23), DCCA quota reauthorisation
- recordClosure (24), PGW-CDR closure
- timeLimit (25), intermediate recording
- volumeLimit (26), intermediate recording
- serviceSpecificUnitLimit (27), intermediate recording
- envelopeClosure (28)
- eCGIChange (29), bearer modification. “ECGI Change”
- tAIChange (30), bearer modification. “TAI Change”
- userLocationChange (31) bearer modification. “User Location Change”

Releases prior to 14.0, the CGISAIClange service condition exists in LOSDV of PGW-CDR even if ULI Change trigger is disabled. In releases 14.0 and beyond, if the ULI Change trigger is disabled and if the ULI is changed, the CGISAIClange service condition is not present in LOSDV of PGW-CDR.

**Format**

Bit string

**Length**

5 bytes

**Service Identifier**
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.

**Format**

Integer

**Length**

1–5 bytes

---

**Serving Node Address (LOSDV)**

This field contains the serving node (for example, SGSN/S-GW) control plane IP address.

**Format**

Octet string

**Length**

6 or 18 bytes (depending on v4 or v6 address)

---

**Time of First Usage**

The timestamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.

**Format**

BCD encoded octet string

**Length**

9 bytes

---

**Time of Last Usage**

The timestamp for the last IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.

**Format**

BCD encoded octet string

**Length**

9 bytes

---

**Time of Report**

A timestamp defining the moment when the service data container is closed.

**Format**

BCD encoded octet string

**Length**

9 bytes

---

**Time Usage**

The difference in seconds within the range of 0.to.4294967295 between “time of first usage” and “time of last usage”.

### User Location Information (LOSDV)

This field indicates details of where the UE is currently located (SAI, TAI, RAI, CGI, ECGI or access-specific user location information).

- **Format**: Octet string
- **Length**: 6–13 bytes

### Local Sequence Number

This field contains a unique sequence number associated with the Node ID field and independent of the bearer context.

- **Format**: Integer
- **Length**: 1–5 bytes

### Low Access Priority Indicator

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

- **Important**: This attribute field is currently available only in custom35 and custom40 GTPP dictionaries for PGW-CDRs when the CLI command “gtpp attribute lapi” is configured in GTPP Server Group Configuration mode.

- **Format**: Null
- **Length**: 1 Byte

### MS Time Zone

The “Time Zone” IE that the SGSN may provide to the P-GW during the PDP context activation/modification procedure.

- **Format**: Octet string
- **Length**: 2 bytes
**Node ID**

This field contains an identifier string for the node that had generated the CDR.

On the Cisco P-GW, this Node ID field is a printable string in the format ndddSTRING:

<table>
<thead>
<tr>
<th>Format Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>The first digit is the Sessmgr restart counter having a value between 0 and 7.</td>
</tr>
<tr>
<td>ddd</td>
<td>The number of the session manager instances generating the CDR.</td>
</tr>
<tr>
<td>STRING</td>
<td>This is a configured Node-ID-Suffix having any string between 1 and 16 characters, defined using the <strong>gtpp attribute node-id</strong> command. If this node-id-suffix is not configured, the P-GW uses the active-charging service name as the Node-id-suffix (truncated to 16 characters). This field is only included when the option <strong>gtpp attribute local-record-sequence-number</strong> is configured.</td>
</tr>
</tbody>
</table>

**Format**

IA5string

**Length**

1–20 bytes

**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 the Charging Id of the first IP-CAN bearer activated within the PDN connection. Together with P-GW address, this uniquely identifies the PDN connection.

**Format**

Integer

**Length**

1–5 bytes

**PDP PDN Type**

--- **OCTET 1: PDP Type Organization**

<table>
<thead>
<tr>
<th>Spare '1111'</th>
<th>PDP Type Organization Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDP Type Organization</td>
<td>Value</td>
</tr>
<tr>
<td>ETSI</td>
<td>0</td>
</tr>
<tr>
<td>IETF</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: In LTE, only IETF is supported.
-- OCTET 2: PDP/PDN Type Number

<table>
<thead>
<tr>
<th>Bits</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>0</th>
<th>1</th>
<th>IPv4</th>
<th>0</th>
<th>1</th>
<th>0</th>
<th>IPv6</th>
<th>0</th>
<th>1</th>
<th>1</th>
<th>IPv4/IPv6</th>
</tr>
</thead>
<tbody>
<tr>
<td>v6</td>
<td>Bits 8-4 of octet are spare and are coded as zero.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Format
Octet string

Length
2 bytes

P-GW Address

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.

Format
Octet string

Length
6 or 18 bytes (depending on v4 or v6 address)

P-GW PLMN Identifier

This field is the P-W 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].

Format
Octet string

Length
3 bytes

PSFurnishChargingInformation

This field contains charging information sent by the OCS in the Diameter Credit Control Credit-Control-Answer messages as defined in 3GPP TS 32.251.

Important: The Furnish Charging Information (FCI) feature is currently applicable to all GTPP dictionaries that are compliant to 3GPP Rel.7 and 3GPP Rel.8 standard. Note that custom43 (rel. 8 compliant) dictionary has additional custom handling with respect to free format data encoding and FCI change trigger for CDR generation. This feature is CLI-controlled.

Note that inclusion of this field in the CDR for any given GTPP dictionary is controlled through the CLI command gtpp attribute furnish-charging-information in the GTPP Server Group Configuration mode. PGW-CDR and eG-CDR will contain FCI based on the GTPP group configuration.

For dictionaries other than custom43, whenever FCI changes, a new Free-Format-Data (FFD) value is either appended to existing FFD or overwritten on the current FFD for online charging session depending on Append-Free-Format-Data (AFFD) flag. CDR is not generated upon FCI change.
FCI is supported in main CDR as well as in LOSDV. Whenever a trigger (volume, time, RAT, etc.) happens current available FFD at command level is added to the main body of the CDR. The same FFD at command level is added to the main body of the next CDRs until it is not appended or overwritten by next Credit-Control-Answer message at command level.

The command level FCI implementation for custom43 dictionary can be outlined as follows:

- Whenever FCI changes at main command level PGW-CDR will be generated. This PGW-CDR will include the old FCI value. The Cisco proprietary value for change condition trigger will be 301 (FCI_CHANGE).
- Translation for the PS-Free-Format-Data in CDR will be conversion of hexadecimal values in ASCII format (for numbers 0 to 9) to decimal values as integers.
- PS-Append-Free-Format-Data always OVERWRITE at command level (main body of CDR).

**Important:** Note the above described behavior applies only to command level PS FCI.

**RAT Type**

Holds the value of RAT Type, as provided to S-GW and P-GW, described in TS 29.274 for eGTP case.

<table>
<thead>
<tr>
<th>RAT Types</th>
<th>Values (Decimal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;reserved&gt;</td>
<td>0</td>
</tr>
<tr>
<td>UTRAN</td>
<td>1</td>
</tr>
<tr>
<td>GERAN</td>
<td>2</td>
</tr>
<tr>
<td>WLAN</td>
<td>3</td>
</tr>
<tr>
<td>GAN</td>
<td>4</td>
</tr>
<tr>
<td>HSPA Evolution</td>
<td>5</td>
</tr>
<tr>
<td>EUTRAN</td>
<td>6</td>
</tr>
<tr>
<td>&lt;spare&gt;</td>
<td>7-255</td>
</tr>
</tbody>
</table>

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

**Format**

Integer

**Length**

1 byte
### Record Extension (GTPP custom34 Dictionary)

Proprietary field used to report a RAN cause code and packet counts. In 16.0 and later releases, the IE “packet count” in the Record Extension field of custom34 and custom35 dictionaries has been changed as “packetCount”.

**Important:** Note that, in releases prior to 14.0, the RAN and NAS cause codes were not included in PGW-CDR when Delete Bearer Command is received, instead were included when Delete Session Command is received. In 14.0 and later releases, these cause codes are populated in the PGW-CDRs for custom34 GTPP dictionary during Delete Bearer Command.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Format</th>
<th>ASN.1 Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>recordExtensions (#19)</td>
<td>ManagementExtensions</td>
<td>SET OF ManagementExtension</td>
<td>0xB3</td>
</tr>
<tr>
<td>ManagementExtension</td>
<td>SEQUENCE of RAN Causecode</td>
<td>OCTET STRING</td>
<td>0x30</td>
</tr>
<tr>
<td>identifier</td>
<td>OBJECT IDENTIFIER for RAN cause code</td>
<td>OCTET STRING</td>
<td>0x6</td>
</tr>
<tr>
<td>significance</td>
<td>BOOLEAN DEFAULT FALSE</td>
<td>BOOLEAN</td>
<td>0xA1</td>
</tr>
<tr>
<td>information</td>
<td>SEQUENCE OF CauseInformation</td>
<td>OCTET STRING</td>
<td>0xA2</td>
</tr>
<tr>
<td>CausesInformation</td>
<td>SEQUENCE</td>
<td>OCTET STRING</td>
<td>0xA2</td>
</tr>
<tr>
<td>msgTimestamp</td>
<td>message TimeStamp</td>
<td>TimeStamp</td>
<td>0x81</td>
</tr>
<tr>
<td>msgType</td>
<td>message Type</td>
<td>INTEGER</td>
<td>0x82</td>
</tr>
<tr>
<td>msgSourceIp</td>
<td>Source IP Address</td>
<td>IP Address</td>
<td>0x83</td>
</tr>
<tr>
<td>msgCause</td>
<td>Cause Code</td>
<td>OCTET STRING</td>
<td>0x84</td>
</tr>
<tr>
<td>recordExtensions</td>
<td>ManagementExtensions</td>
<td>SET OF ManagementExtension</td>
<td>0xB3</td>
</tr>
<tr>
<td>ManagementExtension</td>
<td>uplink packet count SEQUENCE</td>
<td>OCTET STRING</td>
<td>0x30</td>
</tr>
<tr>
<td>identifier</td>
<td>OBJECT IDENTIFIER for uplink data</td>
<td>OCTET STRING</td>
<td>0x6</td>
</tr>
<tr>
<td>significance</td>
<td>BOOLEAN DEFAULT FALSE</td>
<td>BOOLEAN</td>
<td>0xA1</td>
</tr>
<tr>
<td>information</td>
<td>ANY DEFINED BY identifier</td>
<td>INTEGER</td>
<td>0x2</td>
</tr>
<tr>
<td>identifier value</td>
<td>uplink packet count</td>
<td>INTEGER</td>
<td>0x2</td>
</tr>
<tr>
<td>ManagementExtension</td>
<td>downlink packet count SEQUENCE</td>
<td>OCTET STRING</td>
<td>0x30</td>
</tr>
<tr>
<td>identifier</td>
<td>OBJECT IDENTIFIER for downlink data</td>
<td>OCTET STRING</td>
<td>0x6</td>
</tr>
<tr>
<td>significance</td>
<td>BOOLEAN DEFAULT FALSE</td>
<td>BOOLEAN</td>
<td>0xA1</td>
</tr>
<tr>
<td>information</td>
<td>ANY DEFINED BY identifier</td>
<td>INTEGER</td>
<td>0x2</td>
</tr>
<tr>
<td>identifier value</td>
<td>downlink packet count</td>
<td>INTEGER</td>
<td>0x2</td>
</tr>
</tbody>
</table>

**Format**

Management Extensions
Length
Variable

Record Extension (GTPP custom38 Dictionary)
List of Service Level CDRs.
Format
Sequence
Length
Variable

Service Level CDR (GTPP custom38 Dictionary)
A sequence of CSG fields.
Format
Sequence
Length
Variable

Quota Server Flags (GTPP custom38 Dictionary)
Used to notify the receiver of various conditions or actions of the quota server:
- Flags Value: 0x00000001
- Description: Passthru used
Format
Integer
Length
0–4 bytes

Qualified Usage (GTPP custom38 Dictionary)
Specifies qualified usage and defining units of service. Used for credit-control.
Format
Integer
Length
0–19 bytes

Usage (GTPP custom38 Dictionary)
Holds the value of number of quadrans used.
Format
Octet string
Length
8 bytes

Units (GTPP custom38 Dictionary)

- 1 = Seconds
- 2 = Bytes IP
- 3 = Bytes TCP
- 4 = Transactions
- 5 = Seconds transaction

Format
Integer
Length
1 byte

Service ID (GTPP custom38 Dictionary)

An octet string which denotes the name of the Service. Rating Group of PGW-CDR (service data) will be used for this information.

Format
Octet string
Length
0–128

Service IP Volume Usage (GTPP custom38 Dictionary)

IP level volume usage. When this volume is calculated, all the L4-L7 headers are counted (i.e., volume equals length of IP packet).

Format
Sequence
Length
0–24 bytes

Cumulative IP Bytes Uploaded (GTPP custom38 Dictionary)

Holds the cumulative value of IP bytes uploaded.

Format
Integer
Length
0–4 bytes

**Cumulative IP Bytes Downloaded (GTPP custom38 Dictionary)**

Holds the cumulative value of IP bytes downloaded.

**Format**
Integer

**Length**
0–4 bytes

**Delta IP Bytes Uploaded (GTPP custom38 Dictionary)**

Holds the value of delta of IP bytes uploaded.

**Delta IP Bytes Downloaded (GTPP custom38 Dictionary)**

Holds the value of delta of IP bytes downloaded.

**Session ID (GTPP custom38 Dictionary)**

A unique session ID that is assigned to each user session. A user going to multiple services will be assigned a unique session ID for each service.

**Format**
Octet string

**Length**
0–128 bytes

**Time of First Usage (GTPP custom38 Dictionary)**

The timestamp for the first IP packet to be transmitted for the service data flow referred to the current instance of Service Condition Change.

**Format**
BCD encoded octet string

**Length**
9 bytes

**Record Opening Time**

This field contains the timestamp when a PDP context is activated in PGW or when a subsequent record is opened after a partial record.
The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, or round-off) this field is translated to only show full seconds.

TimeStamp ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

For example: YYMMDDhhmmsShhmm

<table>
<thead>
<tr>
<th>Format Variable</th>
<th>Meaning</th>
<th>Encoding Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>YY</td>
<td>Year 00 to 99</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>MM</td>
<td>Month 01 to 12</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>DD</td>
<td>Day 01 to 31</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>ss</td>
<td>Second 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>S</td>
<td>Sign 0 = “+”, “-”</td>
<td>ASCII encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
</tbody>
</table>

Format

- \text{BCD encoded octet string}

Length

- 9 bytes

Record Sequence Number

A running sequence number within the range of 1 to 4294967296 used to link partial records generated by the P-GW for a specific IP-CAN bearer context (characterized with the same Charging ID and P-GW address). This field is not present if the first record is also the final record.

Format

- Integer

Length

- 1–5 bytes

Record Type

This field identifies the type of the record:

- PGW-CDR (pgwPDPRecord) 85 (0x55)
Served IMEISV

This field contains the International Mobile Equipment Identity (IMEISV) of the equipment served.

The structure of the IMEI is defined in TS 23.003.

The IMEI is composed of the following elements:

- Type Allocation Code (TAC). Its length is 8 digits.
- Serial Number (SNR) is an individual serial number uniquely identifying each equipment within each TAC. Its length is 6 digits.
- Software Version Number (SVN) identifies the software version number of the mobile equipment. Its length is 2 digits.

If SV is not available, a filler digit “f” is added after the spare digit to fill up the last byte. Spare digit: this digit shall be zero, when transmitted by the MS.

Format

BCD encoded octet string

Length

8 bytes

Served IMSI

The International Mobile Subscriber Identity (IMSI) of the MS. The IMSI is formatted in accordance with 3GPP TS 23.003. This will be present if the Anonymous Access Indicator is FALSE or not supplied.

The IMSI is formatted in accordance with 3GPP TS 23.003.

Format

BCD encoded octet string

Length

3–8 bytes

Served MNNAI

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

SubscriptionID ::= SET

{
    subscriptionIDType [0] SubscriptionIDType, 
    subscriptionIDDData [1] UTF8String
}
SubscriptionIDType ::= ENUMERATED
{
END_USER_E164 (0),
END_USER_IMSI (1),
END_USER_SIP_URI (2),
END_USER_NAI (3),
END_USER_PRIVATE (4)
}
The type will be END_USER_NAI.
For IMSI: 123456789012345 mcc=123 mnc=045
subscriptionIDData is a string will be
0123456789012345@nai.epc.mnc045.mcc123.3gppnetwork.org

**Format**
Set

**Length**
Variable (Max 62)

---

**Served MSISDN**

The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create Session Request message.

The MSISDN is TBCD encoded as shown in the example below:3GPP TS 23.003 (CCITT Rec. E 213)

ServedMSISDN ::= OCTET STRING (SIZE(1..9))

subscriber identification MSISDN
octet 1 : bit 8 (msb): extension bit
= 1 : no extension
other : not relevant

bit 7..5 : type of number
= 000 : unknown
= 001 : international number
= 010 : national significant number
= 011 : network specific number
= 100 : subscriber number
= 101 : reserved
= 110 : abbreviated number
= 111 : reserved for extension
bit 4..1: numbering plan indicator
  = 0001: ISDN/Telephony Numbering Plan (Rec CCITT E.164)
  other: not relevant

octet 2..9: \( \leq 16 \) digits TBCD-String (twisted)
substructure (without spares or fillers):
  1..3 digits - country code (CC)
  (only international number)
  3 digits - national destination code (NDC)
  \( \leq 10 \) digits - subscriber number (SN)
  first and intermediate octet = 2 digits
  last octet = 2 digits or 1 digit + 1 fill digit H'F

As per 3GPP TS 29.274 v 8.11.0, “MSISDN value contains only the actual MSISDN number (does not contain the ‘nature of address indicator’ octet, which indicates ‘international number’ as in 3GPP TS 29.002 [37]) and is encoded as TBCD digits.”
To comply with this, octet 1 (nature of address indicator) is not added in the encoded value of MSISDN.

For example:
MSISDN: '491720400305'
encoded: H'94 71 02 04 30 50

**Format**
  BCD encoded octet string.

**Length**
  1–9 bytes

---

**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 of type IP version 4 (PDN Type is IPv4) or IP version 6 (PDN Type is IPv6 or IPv4v6). 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.

**Format**
  Octet string

**Length**
  The length can vary based on whether the encoded IP address is IPv4 or IPv6.
Served PDP PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4v6 is used, and the IPv6 address is included in Served PDP Address or Served PDP PDN Address.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**Important:** Note that this field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Rel.9 attribute and it can be present in Rel.7 or Rel.8 dictionary if enabled through the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**ASN.1 Definition:**

```plaintext
-- This field was made available in PGWRecord in Release 8. If the above mentioned CLI is enabled
-- we can treat this field to be available in GGSNPDRecord or EGSNPDPRecord.
-- PGWRecord ::= SET
{
...
  servedPDPPDNAddressExt [45] PDPAddress OPTIONAL
}
```

**Format**
Octet string

**Length**
8 bytes

Serving Node Address

The serving node control plane IP address of the S-GW used during this record. This is a list of IP addresses. If the list overflows with a configured number of IP addresses, a CDR with “serving node Change” as cause for record closure will be generated. The serving node addresses that are listed here are sequentially mapped to the serving node types listed in the field “Serving node Types”.

**Format**
Sequence of IPv4 or IPv6 addresses.

**Length**
6-98 or 18-292 bytes (depending on IPv4 or IPv6 address; for 1-16 S-GW/SGSN addresses)
Serving Node PLMN Identifier

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

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

**Format**
Octet string

**Length**
3 bytes

Serving Node Type

These fields contain one or several serving node types in the control plane of an S-GW or P-GW, which have been connected during the record. The serving node types listed here are sequentially mapped to the serving node addresses listed in the field “Serving node Address”.

The possible values are:

```
ServingNodeType ::= ENUMERATED {
  sGSN       (0),
  pMIPSGW    (1),
  gTPSGW     (2),
  ePDG       (3),
  hSGW       (4),
  mME        (5)
}
```

**Format**
Sequence of serving Node Type

**Length**
3-48; variable length format (based on number of nodes connected during this period)

Start Time

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

In releases prior to 14.0, for P-GW service, the “startTime” attribute is added only to the first CDR of the default bearer of the IP-CAN session. In this case, if the first CDR was lost, the start time of the session remained unknown. Releases beyond 14.0, the “startTime” attribute is present in every PGW-CDR of the default bearer. Hence, if for any reason the first CDR is lost, the start time of the session can still be retrieved through the subsequent PGW-CDRs.
The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism this is translated into the timestamp which only shows the full seconds.

The format is shown below.

\[
\text{TimeStamp} ::= \text{OCTET STRING (SIZE(6))}
\]

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

For example: YYMMDDhhmmssShhmm

<table>
<thead>
<tr>
<th>Format Variable</th>
<th>Meaning</th>
<th>Encoding Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>YY</td>
<td>Year 00 to 99</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>MM</td>
<td>Month 01 to 12</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>DD</td>
<td>Day 01 to 31</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>ss</td>
<td>Second 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>S</td>
<td>Sign 0 = “+”, “-”</td>
<td>ASCII encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
</tbody>
</table>

**Format**  
BCD encoded octet string

**Length**  
9 bytes

---

**Stop Time**

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

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.

The format is shown below.

\[
\text{TimeStamp} ::= \text{OCTET STRING (SIZE(6))}
\]

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

For example: YYMMDDhhmmssShhmm
### Format Variable

<table>
<thead>
<tr>
<th>Format Variable</th>
<th>Meaning</th>
<th>Encoding Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>YY</td>
<td>Year 00 to 99</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>MM</td>
<td>Month 01 to 12</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>DD</td>
<td>Day 01 to 31</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>ss</td>
<td>Second 00 to 59</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>S</td>
<td>Sign 0 = “+”, “-”</td>
<td>ASCII encoded</td>
</tr>
<tr>
<td>hh</td>
<td>Hour 00 to 23</td>
<td>BCD encoded</td>
</tr>
<tr>
<td>mm</td>
<td>Minute 00 to 59</td>
<td>BCD encoded</td>
</tr>
</tbody>
</table>

- **Format**: BCD encoded octet string
- **Length**: 9 bytes

### TWAN ULI

This field contains the location information of UE in a Trusted WLAN Access Network (TWAN).

- **Format**: Octet string
- **Length**: 38 bytes

### User Location Information

This field contains the User Location Information of the MS as defined in TS 29.060 for GPRS case, and in TS 29.274 for EPC case (e.g. CGI, SAI, RAI TAI and ECGI), if available.

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

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.

The flags ECGI, TAI, RAI, SAI and CGI in octet 5 indicate if the corresponding fields are present in the IE or not. If one of these flags is set to “0”, the corresponding field is not present at all. The respective identities are defined in 3GPP TS 23.003.

The following subclauses specify the coding of the different identities. For each identity, if an Administration decides to include only two digits in the MNC, then bits 5 to 8 of octet 7 are coded as “1111”. 

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GTPP Interface Administration and Reference, StarOS Release 18
**CGI field:** The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

The Cell Identity (CI) consists of 2 octets. Bit 8 of Octet 11 is the most significant bit and bit 1 of Octet 12 the least significant bit. The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

**SAI field:** The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

The Service Area Code (SAC) consists of 2 octets. Bit 8 of Octet 11 is the most significant bit and bit 1 of Octet 12 the least significant bit. The SAC is defined by the operator.

**RAI field:** The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

The Routing Area Code (RAC) consists of 2 octets. Only Octet 11 contains the RAC. Octet 12 is coded as all 1’s (11111111). The RAC is defined by the operator.

**TAI field:** The Tracking Area Code (TAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

**ECGI field:** The E-UTRAN Cell Identifier (ECI) consists of 28 bits. Bit 4 of octet 10 is the most significant bit and bit 1 of Octet 11 the least significant bit. The coding of the E-UTRAN cell identifier is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

In releases prior to 16.0, only a fixed number of combinations of User Location Information (ULI) identity types is supported. That is, Release 10 ULI values were only partially populated in PGW-CDRs as the ULI identity type combinations "CGI & RAI" and "SAI & RAI" introduced in 3GPP Release 10 specification were not supported. In 16.0 and later releases, Release 10 ULI values are populated as received in PGW-CDRs. This support is extended to Create Session Request, Create Bearer Response, Modify Bearer Request and Delete Session Requests.

---

**Important:** This behavior change is applicable to Release 10 GTPP dictionaries for P-GW.

**Format**
- Octet string

**Length**
- 6–13 bytes
Chapter 9
SGSN CDR Field Reference

This chapter provides a reference for CDR fields supported by the system for use in SGSN.

Listed below are the types of CDRs supported by SGSN:

- SGSN CDRs (S-CDRs)
- Mobility CDRs (M-CDRs)
- Mobile originated SMS CDRs (S-SMO-CDRs)
- Mobile terminated SMS CDRs (S-SMT-CDRs)
- Mobile terminated location request CDRs (LCS-MT-CDRs)
- Mobile originated location request CDRs (LCS-MO-CDRs)

The SGSN provides CDRs that are compliant to the specifications identified in this chapter. When necessary and required, modifications to the standardized behavior can be implemented in different dictionaries which can be selected in the configuration file. This provides the flexibility to adapt to a customer's needs, e.g. to a legacy post-processing billing interface, while keeping the standard behavior for other needs.

A complete list and descriptions of supported CDR fields is provided in the *SGSN CDR Field Descriptions* chapter of this reference.

**Important:** This reference document contains information only on standard GTPP dictionaries. For more information on custom dictionaries, contact your Cisco account representative.

The category column in all tables use keys described in the following table.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be present in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR for all conditions.</td>
</tr>
<tr>
<td></td>
<td>Mandatory</td>
<td></td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR if certain conditions are met.</td>
</tr>
<tr>
<td></td>
<td>Conditional</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Added in Charging Gateway</td>
<td>A field included in the Charging Gateway.</td>
</tr>
</tbody>
</table>
# CDR Fields Supported in S-CDRs

The tables in this section list the S-CDR fields present in the available GTPP dictionaries.

## standard Dictionary

S-CDR fields in this dictionary are based on 3GPP TS 32.215 v 4.5.0 (R4).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN PDP context record.</td>
</tr>
<tr>
<td>Network Initiated PDP Context</td>
<td>OC</td>
<td>A flag that is present if this is a network-initiated PDP context.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the served party.</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>OC</td>
<td>The IMEI of the ME, if available.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>OM</td>
<td>The IP address of the current SGSN.</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>OM</td>
<td>The Mobile Station Network Capability.</td>
</tr>
<tr>
<td>Routing Area Code (RAC)</td>
<td>OM</td>
<td>RAC at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Location Area Code (LAC)</td>
<td>OM</td>
<td>LAC at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>OM</td>
<td>Cell identity for GSM or Service Area Code (SAC) for UMTS at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>PDP context identifier used to identify this PDP context in different records created by GSNs.</td>
</tr>
<tr>
<td>GGSN Address Used</td>
<td>M</td>
<td>The control plane IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP context.</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>OM</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
</tr>
<tr>
<td>PDP Type</td>
<td>OM</td>
<td>PDP type, i.e. IP, PPP, IHOSS:OSP.</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>OC</td>
<td>PDP address of the served IMSI, i.e. IPv4 or IPv6. This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>OM</td>
<td>A list of changes in charging conditions for this PDP context, each change is time stamped. Charging conditions are used to categorise traffic volumes, such as per QoS/tariff period. Initial and subsequently changed QoS and corresponding data volumes are listed.</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Time stamp when PDP context is activated in this SGSN or record opening time on subsequent partial records.</td>
</tr>
<tr>
<td>Duration</td>
<td>M</td>
<td>Duration of this record in the SGSN.</td>
</tr>
<tr>
<td>SGSN Change</td>
<td>C</td>
<td>Present if this is first record after SGSN change.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for closure of the record from this SGSN.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>OM</td>
<td>A more detailed reason for the release of the connection.</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number in this SGSN. Only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>OM</td>
<td>An index indicating how the APN was selected.</td>
</tr>
<tr>
<td>Access Point Name Operator Identifier</td>
<td>OM</td>
<td>The Operator Identifier part of the APN.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics applied to the PDP context.</td>
</tr>
<tr>
<td>System Type</td>
<td>OC</td>
<td>Indicates the type of air interface used, e.g. UTRAN. This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface.</td>
</tr>
<tr>
<td>RNC Unsent Downlink Volume</td>
<td>OC</td>
<td>The downlink data volume which the RNC has not sent to MS. This field is present when the RNC has provided unsent downlink volume count at RAB release.</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
</tbody>
</table>

**custom6 Dictionary**

S-CDR fields in this dictionary are based on 3GPP TS 32.298 v6.4.1 (R6).

**Important:** In custom6 the IP address is encoded in text format.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record.</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party.</td>
<td>BCD encoded</td>
<td>3 - 8</td>
<td>83</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>4</td>
<td>O</td>
<td>This field contains the international mobile equipment identity (IMEI) of the equipment served.</td>
<td>BCD encoded</td>
<td>8</td>
<td>84</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>5</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>A5</td>
</tr>
<tr>
<td>SGSN Text IPv4 Address</td>
<td>5-0</td>
<td>M</td>
<td>This field represents the IPv4 text address.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>6</td>
<td>O</td>
<td>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.</td>
<td>Octet string</td>
<td>1 - 8</td>
<td>86</td>
</tr>
<tr>
<td>Routing Area</td>
<td>7</td>
<td>O</td>
<td>This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located.</td>
<td>Octet string</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td>Location Area Code</td>
<td>8</td>
<td>O</td>
<td>This field contains the Location Area Code (LAC) of the location area in which the served party is currently located.</td>
<td>Octet string</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>9</td>
<td>O</td>
<td>For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008, and for UMTS it is defined as the Service Area Code in TS 25.413.</td>
<td>Octet string</td>
<td>2</td>
<td>89</td>
</tr>
<tr>
<td>Charging ID</td>
<td>10</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the GGSN address to identify all records produced in the GGSN involved in a single PDP context. The Charging ID is generated by the GGSN at PDP context activation and is transferred to the context requesting SGSN.</td>
<td>Octet string</td>
<td>1 - 5</td>
<td>8a</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>11</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>AB</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>------------------------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>GGSN Text IPV4 Address</td>
<td>11-0</td>
<td>M</td>
<td>This field represents the IPv4 text address.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>12</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 63</td>
<td>8c</td>
</tr>
<tr>
<td>PDP Type</td>
<td>13</td>
<td>O</td>
<td>This field defines the PDP type, e.g. IP or PPP</td>
<td>Octet string</td>
<td>2</td>
<td>8d</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>14</td>
<td>O</td>
<td>This field contains the PDP address of the served IMSI, for which the standard 3GPP TS 32.298 allows a choice of either IP Address or ETSI Address.</td>
<td>Choice</td>
<td>11 - 19</td>
<td>ae</td>
</tr>
<tr>
<td>Served PDP IP Address</td>
<td>14-0</td>
<td>M</td>
<td>Only the choice of IP Address is supported by the SGSN for the field described above.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>a0</td>
</tr>
<tr>
<td>Served PDP IPV4 Text Address</td>
<td>14-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in text coding.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>List of Traffic Volumes</td>
<td>15</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td></td>
<td>af</td>
</tr>
<tr>
<td>Change Of Charging Condition</td>
<td>15-0</td>
<td>M</td>
<td>The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation.</td>
<td>Octet string</td>
<td>4 - 12</td>
<td>81</td>
</tr>
<tr>
<td>QoS Negotiated</td>
<td>15-0-2</td>
<td>O</td>
<td>QoS Negotiated indicates the applied QoS accepted by the network.</td>
<td>Octet string</td>
<td>4 - 12</td>
<td>82</td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>15-0-3</td>
<td>M</td>
<td>It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>83</td>
</tr>
<tr>
<td>Data volume GPRS Downlink</td>
<td>15-0-4</td>
<td>M</td>
<td>It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>84</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| Change Condition           | 15-0-5     | M        | The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container: Supported values:  
  - qoSChange 0  
  - tariffTime 1  
  - recordClosure 2 |
<p>| Change time                | 15-0-6     | M        | Change Time is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.                                                                                               | BCD encoded octet string   | 6            | 86         |
| Record Opening Time        | 16         | M        | This field contains the time stamp when a PDP context is activated in SGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms. |
| Duration                   | 17         | M        | This field indicates the call duration.                                                                                                                                                                   | Integer                    | 1 - 5        | 91         |
| SGSN Change                | 18         | O        | This field is present only in the S-CDR to indicate that this is the first record after an inter-SGSN routing area update.                                                                                 | Boolean                    | 1            | 92         |
| Cause for Record Closing   | 19         | M        | This field contains a reason for the closure of the CDR.                                                                                                                                                  | Integer                    | 1            | 93         |
| DiagnosticsSM              | 20         | O        | This field contains the system internal reasons for the PDP context deactivation at Session Management Level.                                                                                             | Choice                     | 3            | B4         |
| gsm0408Cause               | 20 - 0     | M        | This cause is used in the Diagnostics field.                                                                                                                                                              | Integer                    | 1            | 80         |
| Record Sequence Number     | 21         | O        | A running sequence number with range 1-4294967295 used to link partial records generated by the SGSN for a specific PDP context (characterized with the same Charging ID and GGSN address). This field is not present if the first record is also the final record. |
| Node ID                    | 22         | O        | This field contains an identifier string for the node that had generated the CDR.                                                                                                                        | IA5 string                 | 5 - 20       | 96         |
| Record Extensions          | 23         | O        | This field contains a reason for the closure of the CDR.                                                                                                                                                  | Set                        | 1 - n        | 97         |</p>
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Record Sequence</td>
<td></td>
<td></td>
<td>For each Node ID, this number with range 1 - 4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. This field is only included when the option gtp attribute local-record-sequence number is configured. By configuring gtp single-source centralized-lrsn-creation the local record sequence number will be incremented for S-CDRs.</td>
<td></td>
<td>1 - 5</td>
<td>98</td>
</tr>
<tr>
<td>Number</td>
<td>24</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>25</td>
<td>O</td>
<td>This field indicates how the APN was selected.</td>
<td>Enumerated integer</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>Access Point Name Operator</td>
<td></td>
<td></td>
<td>This field contains the Operator Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 37</td>
<td>9a</td>
</tr>
<tr>
<td>Identifier</td>
<td>26</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>27</td>
<td>O</td>
<td>The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.</td>
<td>BCD encoded</td>
<td>1 - 9</td>
<td>9b</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>28</td>
<td>M</td>
<td>Lists the charging characteristics applied to the PDP context by the SGSN.</td>
<td>Hex value octet string</td>
<td>2</td>
<td>9c</td>
</tr>
<tr>
<td>RAT Type</td>
<td>29</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.</td>
<td>Integer</td>
<td>1</td>
<td>9d</td>
</tr>
<tr>
<td>cAMELInformationPDP</td>
<td>30</td>
<td>O</td>
<td>This field is supported if Ge interface is supported. CLI gtpp attribute camel-info needs to be enabled to populate this field.</td>
<td></td>
<td>1 - n</td>
<td>be</td>
</tr>
<tr>
<td>SCF Address</td>
<td>30-0</td>
<td>O</td>
<td>This identifier refers to the network address (E.164 number) of the subscriber related SCP. Address is defined in HLR as part of CAMEL subscription information. The address is BCD encoded.</td>
<td>Address string</td>
<td>1 - 11</td>
<td>81</td>
</tr>
<tr>
<td>Service Key</td>
<td>30-1</td>
<td>O</td>
<td>This parameter describes in case of usage of a CAMEL the service key. Service key is defined in HLR as part of CAMEL subscription information.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>82</td>
</tr>
<tr>
<td>defaultTransactionHandling</td>
<td>30-2</td>
<td>O</td>
<td>This field indicates whether or not a CAMEL encountered a default GPRS-handling or SMS-handling.</td>
<td>Enumerated integer</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>cAMELAccessPointNameNI</td>
<td>30-3</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>--------------------------------</td>
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<td>----------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>cAMELAccessPointNameOI</td>
<td>30-4</td>
<td>O</td>
<td>This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements &quot;Level of CAMEL service&quot; field.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>85</td>
</tr>
<tr>
<td>NumberOfDPEncountered</td>
<td>30-5</td>
<td>O</td>
<td>This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements &quot;Level of CAMEL service&quot; field.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>86</td>
</tr>
<tr>
<td>Level Of Camel Service</td>
<td>30-6</td>
<td>O</td>
<td>This field describes briefly the complexity of CAMEL invocation.</td>
<td>Bit string</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>freeFormatData</td>
<td>30-7</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>fFDAppendIndicator</td>
<td>30-8</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>RNC Unsent Volume</td>
<td>31</td>
<td>O</td>
<td>This field contains the unsent downlink (from RNC to MS) data volume in bytes.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>9f1f</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>32</td>
<td>O</td>
<td>This field specifies how the Charging Characteristics was selected</td>
<td>Enumerated integer</td>
<td>1</td>
<td>9f20</td>
</tr>
<tr>
<td>Selection Mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>33</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>9f21</td>
</tr>
<tr>
<td>ServedPDP PDN Address Extension</td>
<td>36</td>
<td>O</td>
<td>This field contains the IPv4 address allocated for the PDP context/PDN connection when dual-stack IPv4-IPv6 is used.</td>
<td>Octet string</td>
<td>8</td>
<td>bf2d</td>
</tr>
</tbody>
</table>

Notes:
- The field “Served PDP PDN Address Extension”(servedPDPPDNAddressExt) is not part of the 3GPP 32.298 v8.5.0 specification. This field will be available in the CDR only when the CLI command `gtpp attribute served-pdp-pdn-address-extension` is configured in the GTPP Server Group Configuration Mode. This field is disabled by default. For more information on this command, refer to the Command Line Interface Reference.

**ASN.1 Definition for Fields in custom6 Dictionary**

The following section provides the complete ASN.1 definition of all S-CDR related fields in this dictionary.

```
GPRS-SGSN-Charging-DataType-REL6 DEFINITIONS IMPLICIT TAGS ::= 
BEGIN

--ObjectInstance

--FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) version1 (1) protocol (3)}
```
GPRSRecord ::= CHOICE

{  
  sgsnPDPRecord[20] SGSNPDPRecord
}

ManagementExtension ::= SEQUENCE

{  
  identifier OBJECT IDENTIFIER,
  significance [1] BOOLEAN DEFAULT FALSE,
  information [2] ANY DEFINED BY identifier
}

ManagementExtensions ::= SET OF ManagementExtension

ServiceKey ::= INTEGER (0..2147483647)

DefaultGPRS-Handling ::= ENUMERATED

{  
  continueTransaction (0),
  releaseTransaction (1)
SGSNPDPRecord ::= SET {
  recordType [0] RecordType,
  networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL,
  servedIMSI [3] IMSI,
  servedIMEI [4] IMEI OPTIONAL,
  sgsnAddress [5] GSNAddress OPTIONAL,
  msNetworkCapability [6] MSNetworkCapability OPTIONAL,
  routingArea [7] RoutingAreaCode OPTIONAL,
  locationAreaCode [8] LocationAreaCode OPTIONAL,
  cellIdentifier [9] CellId OPTIONAL,
  chargingID [10] ChargingID,
  ggsnAddressUsed [11] GSNAddress,
  accessPointNameNI [12] AccessPointNameNI OPTIONAL,
  pdpType [13] PDPType OPTIONAL,
  servedPDPAddress [14] PDPAddress OPTIONAL,
  listOfTrafficVolumes [15] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
  recordOpeningTime [16] TimeStamp,
  duration [17] CallDuration,
  sgsnChange [18] SGSNChange OPTIONAL,
  causeForRecClosing [19] CauseForRecClosing,
  diagnostics [20] Diagnostics OPTIONAL,
  recordSequenceNumber [21] INTEGER OPTIONAL,
  nodeID [22] NodeID OPTIONAL,
  recordExtensions [23] ManagementExtensions OPTIONAL,
  localSequenceNumber [24] LocalSequenceNumber OPTIONAL,
}
apnSelectionMode [25] APNSelectionMode OPTIONAL,
accessPointNameOI [26] AccessPointNameOI OPTIONAL,
servedMSISDN [27] MSISDN OPTIONAL,
chargingCharacteristics [28] ChargingCharacteristics,
rATType [29] RATType OPTIONAL,
cAMELInformationPDP [30] CAMELInformationPDP OPTIONAL,
rNCUnsentDownlinkVolume [31] DataVolumeGPRS OPTIONAL,
chChSelectionMode [32] ChChSelectionMode OPTIONAL,
dynamicAddressFlag [33] DynamicAddressFlag OPTIONAL
}

-- GPRS DATA TYPES
--
maxAddressLength INTEGER ::= 20

AccessPointNameNI::= IA5String (SIZE(1..63))
--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR..
--

AccessPointNameOI::= IA5String (SIZE(1..37))
--
-- Operator Identifier part of APN in dot representation.
-- In the 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs' example, the OI portion is 'mnc022.mcc111.gprs'
-- and is presented in this form in the CDR.

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

APNSelectionMode::= ENUMERATED
[
  --
  -- See Information Elements TS 29.060
  --
  mSorNetworkProvidedSubscriptionVerified(0),
  mSProvidedSubscriptionNotVerified(1),
  networkProvidedSubscriptionNotVerified(2)
]

CAMELAccessPointNameNI::= AccessPointNameNI

CAMELAccessPointNameOI::= AccessPointNameOI

CAMELInformationPDP::= SET
[
  sCFAddress[1]                          SCFAddress OPTIONAL,
  serviceKey[2]                          ServiceKey OPTIONAL,
  defaultTransactionHandling[3]         DefaultGPRS-Handling OPTIONAL,
  CAMELAccessPointNameNI[4]              CAMELAccessPointNameNI OPTIONAL,
  CAMELAccessPointNameOI[5]              CAMELAccessPointNameOI OPTIONAL,
  NumberOfDPEncountered[6]              NumberOfDPEncountered OPTIONAL,
levelOfCAMELService[7] LevelOfCAMELService OPTIONAL,
freeFormatData[8] FreeFormatData OPTIONAL,
FFDAppendIndicator[9] FFDAppendIndicator OPTIONAL
}

CauseForRecClosing ::= INTEGER
{
  --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- LCS related causes belong to the MAP error causes acc. TS 29.002
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
  --
  normalRelease (0),
  abnormalRelease (4),
  cAMELInitCallRelease (5),
  volumeLimit (16),
  timeLimit (17),
  sGSNChange (18),
  maxChangeCond (19),
  managementIntervention (20),
  intraSGSNIntersystemChange (21),
  rATChange (22),
  mSTimeZoneChange (23),
  unauthorizedRequestingNetwork (52),
  unauthorizedLCSClient (53),
  positionMethodFailure (54),
unknownOrUnreachableLCSClient (58),
listofDownstreamNodeChange (59)
}

ChangeCondition ::= ENUMERATED
[
  --
  -- Failure Handling values used in eGCDR only
  --
  qosChange (0),
tariffTime (1),
recordClosure (2),
failureHandlingContinueOngoing (3),
failureHandlingRetryandTerminateOngoing (4),
failureHandlingTerminateOngoing (5)
]

ChangeOfCharCondition ::= SEQUENCE
[
  --
  -- Used in PDP context record only
  -- failureHandlingContinue field used in eGCDR only
  --
  qosRequested[1] QoSInformation OPTIONAL,
  qosNegotiated[2] QoSInformation OPTIONAL,
dataVolumeGPRSUplink[3] DataVolumeGPRS,
dataVolumeGPRSDownlink[4] DataVolumeGPRS,
changeCondition[5] ChangeCondition,
]
ChargingCharacteristics ::= OCTET STRING (SIZE(2))
   --
   -- SIZEBit 0-3: Profile Index
   -- IndexBit 4-15: For Behavior
   --

ChargingID ::= INTEGER (0..4294967295)
   --
   -- Generated in GGSN, part of PDP context, see TS 23.060
   -- 0..4294967295 is equivalent to 0..2**32-1
   --

ChChSelectionMode ::= ENUMERATED
{
   sGSSNSupplied(0), -- For GGSN only
   subscriptionSpecific(1), -- For SGSN only
   aPNSpecific(2), -- For SGSN only
   homeDefault(3), -- For SGSN and GGSN
   roamingDefault(4), -- For SGSN and GGSN
   visitingDefault(5) -- For SGSN and GGSN
}

DataVolumeGPRS ::= INTEGER
   --
   -- The volume of data transferred in octets.
   --
DynamicAddressFlag::= BOOLEAN

GSNAddress::= IPAddress

IA5String ::= [UNIVERSAL 22] IMPLICIT OCTET STRING

IMSI ::= TBCD-STRING (SIZE (3..8))
--
-- from 29.002
-- digits of MCC, MNC, MSIN are concatenated in this order.
--

IMEI ::= TBCD-STRING (SIZE (8))
--
-- Refers to International Mobile Station Equipment Identity
-- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
-- If the SVN is not present the last octet shall contain the
-- digit 0 and a filler.
-- If present the SVN shall be included in the last octet.
--

ISDN-AddressString ::= OCTET STRING

ETSIAddress::= AddressString
--
-- First octet for nature of address, and numbering plan indicator (3 for X.121)
-- Other octets TBCD
FFDAppendIndicator ::= BOOLEAN

FreeFormatData ::= OCTET STRING (SIZE(1..160))
  --
  -- Free formatted data as sent in the FurnishChargingInformationGPRS
  -- see TS 29.078
  --

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
  -- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
  --
  -- Set to true if PDP context was initiated from network side
  --

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

NumberOfDPEncountered ::= INTEGER

PDPAddress ::= CHOICE
{
  iPAddress[0] IPAddress,
  eTSIAddress [1] ETSIAddress
}

-- See TS 29.002
--

GTPP Interface Administration and Reference, StarOS Release 18
PDPType ::= OCTET STRING (SIZE(2))
--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP Type Number
-- See TS 29.060
--

QoSInformation ::= OCTET STRING (SIZE (4..15))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 4) of the "Quality of
-- service Profile" information element specified in TS 29.060

RATType ::= INTEGER (0..255)
--
-- This integer is 1:1 copy of the RAT type value as defined in TS 29.060
--

ResultCode ::= INTEGER
--
-- charging protocol return value, range of 4 byte (0..4294967259)
-- see Result-Code AVP as used in 3GPP 29.210
--

RoutingAreaCode ::= OCTET STRING (SIZE(1))
--
-- See TS 24.008
SGSNChange ::= BOOLEAN

-- present if first record after inter SGSN routing area update
-- in new SGSN

RecordType ::= INTEGER
{
  sgsnPDPRecord(18)
}

Diagnostics ::= CHOICE
{
  gsm0408Cause[0] INTEGER
}

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

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

   --
   -- IP address in the familiar "dot" notation
   --
   iPTextV4Address[2] IA5String (SIZE(7..15)),
   iPTextV6Address[3] IA5String (SIZE(15..45))

LevelOfCAMELService ::= BIT STRING

   { basic(0),
     callDurationSupervision(1),
     onlineCharging(2)
   }

LocalSequenceNumber ::= INTEGER (0..4294967295)

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

LocationAreaAndCell ::= SEQUENCE

   { locationAreaCode[0] LocationAreaCode,
     cellId[1] CellId
   }

LocationAreaCode ::= OCTET STRING (SIZE(2))
MSISDN ::= ISDN-AddressString

MSTimeZone ::= OCTET STRING (SIZE (2))

---
-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060

TBCD-STRING ::= OCTET STRING

TimeStamp ::= OCTET STRING (SIZE(9))

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

CellId ::= OCTET STRING (SIZE(2))

--

-- Coded according to TS 24.008

--

SCFAddress ::= AddressString

--

-- See TS 29.002

--

custom8 Dictionary

S-CDR fields in this dictionary are based on 3GPP TS 32.298 v7.4.0 specification.

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN PDP context record.</td>
</tr>
<tr>
<td>Network Initiated PDP Context</td>
<td>OC</td>
<td>A flag that is present if this is a network-initiated PDP context.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the served party.</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>OC</td>
<td>The IMEI of the ME, if available.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>OM</td>
<td>The IP address of the current SGSN.</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>OM</td>
<td>The mobile station Network Capability.</td>
</tr>
<tr>
<td>Routing Area Code (RAC)</td>
<td>OM</td>
<td>RAC at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Location Area Code (LAC)</td>
<td>OM</td>
<td>LAC at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>OM</td>
<td>Cell identity for GSM or Service Area Code (SAC) for UMTS at the time of “Record Opening Time”.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>PDP context identifier used to identify this PDP context in different records created by GSNs.</td>
</tr>
<tr>
<td>GGSN Address Used</td>
<td>M</td>
<td>The control plane IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP context.</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>OM</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
</tr>
<tr>
<td>PDP Type</td>
<td>OM</td>
<td>PDP type, i.e. IP, PPP, IHOSS:OSP.</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>OC</td>
<td>PDP address of the served IMSI, i.e. IPv4 or IPv6. This parameter shall be present except when both the PDP type is PPP and dynamic PDP address assignment is used.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>OM</td>
<td>A list of changes in charging conditions for this PDP context, 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 volumes are also listed.</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Time stamp when PDP context is activated in this SGSN or record opening time on subsequent partial records.</td>
</tr>
<tr>
<td>Duration</td>
<td>M</td>
<td>Duration of this record in the SGSN.</td>
</tr>
<tr>
<td>SGSN Change</td>
<td>C</td>
<td>Present if this is first record after SGSN change.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for closure of the record from this SGSN.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>OM</td>
<td>A more detailed reason for the release of the connection.</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number in this SGSN. Only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>OM</td>
<td>An index indicating how the APN was selected.</td>
</tr>
<tr>
<td>Access Point Name Operator Identifier</td>
<td>OM</td>
<td>The Operator Identifier part of the APN.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics applied to the PDP context.</td>
</tr>
<tr>
<td>RAT Type</td>
<td>OC</td>
<td>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.</td>
</tr>
<tr>
<td>RNC Unsent Downlink Volume</td>
<td>OC</td>
<td>The downlink data volume, which the RNC has not sent to MS. This field is present when the RNC has provided unsent downlink volume count at RAB release.</td>
</tr>
</tbody>
</table>
CDR Fields Supported in S-CDRs

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging Characteristics</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
<tr>
<td>Selection Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>OC</td>
<td>Indicates whether served PDP address is dynamic, which is allocated during</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PDP context activation. This field is missing if address is static.</td>
</tr>
</tbody>
</table>

Notes:
- Support for Direct Tunnel triggers.
- All IP addresses in Binary format.

**custom13 Dictionary**

S-CDR fields in this dictionary are based on 3GPP TS 32.298 v6.4.1 (R6) specification.

**Important:** In custom13 the IP address is encoded in binary format.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record.</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party.</td>
<td>BCD encoded octet string.</td>
<td>3 - 8</td>
<td>83</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>4</td>
<td>O</td>
<td>This field contains the international mobile equipment identity (IMEI) of the equipment served.</td>
<td>BCD encoded octet string. IMEISV will be sent in case if IMEI is not available.</td>
<td>8</td>
<td>84</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>5</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>A5</td>
</tr>
<tr>
<td>SGSN Binary IPv4 Address</td>
<td>5-0</td>
<td>M</td>
<td>This field represents the IPv4 binary address.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>6</td>
<td>O</td>
<td>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.</td>
<td>Octet string</td>
<td>1 - 8</td>
<td>86</td>
</tr>
<tr>
<td>Routing Area</td>
<td>7</td>
<td>O</td>
<td>This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located.</td>
<td>Octet string</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td>Location Area Code</td>
<td>8</td>
<td>O</td>
<td>This field contains the Location Area Code (LAC) of the location area in which the served party is currently located.</td>
<td>Octet string</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>9</td>
<td>O</td>
<td>For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008, and for UMTS it is defined as the Service Area Code in TS 25.413.</td>
<td>Octet string</td>
<td>2</td>
<td>89</td>
</tr>
<tr>
<td>Charging ID</td>
<td>10</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the GGSN address to identify all records produced in the GGSN involved in a single PDP context. The Charging ID is generated by the GGSN at PDP context activation and is transferred to the context requesting SGSN.</td>
<td>Octet string</td>
<td>1 - 5</td>
<td>8a</td>
</tr>
<tr>
<td>GGSN Address</td>
<td>11</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>AB</td>
</tr>
<tr>
<td>GGSN Binary IPV4 Address</td>
<td>11-0</td>
<td>M</td>
<td>This field represents the IPv4 binary address.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>12</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 63</td>
<td>8c</td>
</tr>
<tr>
<td>PDP Type</td>
<td>13</td>
<td>O</td>
<td>This field defines the PDP type, e.g. IP or PPP.</td>
<td>Octet string</td>
<td>2</td>
<td>8d</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>14</td>
<td>O</td>
<td>This field contains the PDP address of the served IMSI, for which the standard 3GPP TS 32.298 allows a choice of either IP Address or ETSI Address.</td>
<td>Choice</td>
<td>11 - 19</td>
<td>ae</td>
</tr>
<tr>
<td>Served PDP IP Address</td>
<td>14-0</td>
<td>M</td>
<td>Only the choice of IP Address is supported by the SGSN for the field described above.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>a0</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Served PDP IPV4 Binary Address</td>
<td>14-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in binary coding.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>82</td>
</tr>
<tr>
<td>List of Traffic Volumes</td>
<td>15</td>
<td>M</td>
<td></td>
<td>Sequence</td>
<td></td>
<td>af</td>
</tr>
<tr>
<td>Change Of Charging Condition</td>
<td>15-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>QoS Requested</td>
<td>15-0-1</td>
<td>O</td>
<td>The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation.</td>
<td>Octet string</td>
<td>4 - 12</td>
<td>81</td>
</tr>
<tr>
<td>QoS Negotiated</td>
<td>15-0-2</td>
<td>O</td>
<td>QoS Negotiated indicates the applied QoS accepted by the network.</td>
<td>Octet string</td>
<td>4 - 12</td>
<td>82</td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>15-0-3</td>
<td>M</td>
<td>It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>83</td>
</tr>
<tr>
<td>Data volume GPRS Downlink</td>
<td>15-0-4</td>
<td>M</td>
<td>It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>84</td>
</tr>
<tr>
<td>Change Condition</td>
<td>15-0-5</td>
<td>M</td>
<td>The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container: Supported values:</td>
<td>Enumerated integer</td>
<td>1</td>
<td>85</td>
</tr>
<tr>
<td>Change time</td>
<td>15-0-6</td>
<td>M</td>
<td>Change Time is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.</td>
<td>BCD encoded</td>
<td>6</td>
<td>86</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>16</td>
<td>M</td>
<td>This field contains the time stamp when a PDP context is activated in SGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms.</td>
<td>BCD encoded</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>17</td>
<td>M</td>
<td>This field is present only in the S-CDR to indicate that this is the first record after an inter-SGSN routing area update.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>91</td>
</tr>
<tr>
<td>SGSN Change</td>
<td>18</td>
<td>O</td>
<td>This field contains a reason for the closure of the CDR.</td>
<td>Boolean</td>
<td>1</td>
<td>92</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>19</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR.</td>
<td>Integer</td>
<td>1</td>
<td>93</td>
</tr>
<tr>
<td>DiagnosticsSM</td>
<td>20</td>
<td>O</td>
<td>This field contains the system internal reasons for the PDP context deactivation at Session Management Level.</td>
<td>Choice</td>
<td>3</td>
<td>B4</td>
</tr>
<tr>
<td>gsm0408Cause</td>
<td>20 - 0</td>
<td>M</td>
<td>This cause is used in the Diagnostics field.</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>21</td>
<td>O</td>
<td>A running sequence number with range 1 - 4294967295 used to link partial records generated by the SGSN for a specific PDP context (characterized with the same Charging ID and GGSN address). This field is not present if the first record is also the final record.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>95</td>
</tr>
<tr>
<td>Node ID</td>
<td>22</td>
<td>O</td>
<td>This field contains an identifier string for the node that had generated the CDR.</td>
<td>IA5 string</td>
<td>5 - 20</td>
<td>96</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>23</td>
<td>O</td>
<td>Set</td>
<td></td>
<td>1 - n</td>
<td>97</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>24</td>
<td>O</td>
<td>For each Node ID, this number with range 1 - 4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. This field is only included when the option gtpp attribute local-record-sequence number is configured. By configuring gtpp single-source centralized-lrsn-creation the local record sequence number will be incremented for S-CDRs.</td>
<td></td>
<td>1 - 5</td>
<td>98</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>25</td>
<td>O</td>
<td>This field indicates how the APN was selected.</td>
<td>Enumerated integer</td>
<td></td>
<td>99</td>
</tr>
<tr>
<td>Access Point Name Operator Identifier</td>
<td>26</td>
<td>M</td>
<td>This field contains the Operator Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 37</td>
<td>9a</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>27</td>
<td>O</td>
<td>The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.</td>
<td>BCD encoded octet string</td>
<td>1 - 9</td>
<td>9b</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>28</td>
<td>M</td>
<td>Lists the charging characteristics applied to the PDP context by the SGSN.</td>
<td>Hex value octet string</td>
<td>2</td>
<td>9c</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>Rat Type</td>
<td>29</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.</td>
<td>Integer</td>
<td>1</td>
<td>9d</td>
</tr>
<tr>
<td>cAMELInformationPDP</td>
<td>30</td>
<td>O</td>
<td>This field is supported if Ge interface is supported. CLI <code>gtpp attribute camel-info</code> needs to be enabled to populate this field.</td>
<td>1 - n Integer</td>
<td>be</td>
<td></td>
</tr>
<tr>
<td>SCF Address</td>
<td>30-0</td>
<td>O</td>
<td>This identifier refers to the network address (E.164 number) of the subscriber related SCP. Address is defined in HLR as part of CAMEL subscription information. The address is BCD encoded.</td>
<td>Address string</td>
<td>1 - 11</td>
<td>81</td>
</tr>
<tr>
<td>Service Key</td>
<td>30-1</td>
<td>O</td>
<td>This parameter describes in case of usage of a CAMEL the service key. Service key is defined in HLR as part of CAMEL subscription information.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>82</td>
</tr>
<tr>
<td>defaultTransactionHandling</td>
<td>30-2</td>
<td>O</td>
<td>This field indicates whether or not a CAMEL encountered a default GPRS-handling or SMS-handling.</td>
<td>Enumerated integer</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>cAMELAccessPointNameNI</td>
<td>30-3</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>cAMELAccessPointNameOI</td>
<td>30-4</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>NumberOfDPEncountered</td>
<td>30-5</td>
<td>O</td>
<td>This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements &quot;Level of CAMEL service&quot; field.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>86</td>
</tr>
<tr>
<td>Level Of Camel Service</td>
<td>30-6</td>
<td>O</td>
<td>This field describes briefly the complexity of CAMEL invocation.</td>
<td>Bit string</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>freeFormatData</td>
<td>30-7</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>fFDAppendIndicator</td>
<td>30-8</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>RNC Unsent Volume</td>
<td>31</td>
<td>O</td>
<td>This field contains the unsent downlink (from RNC to MS) data volume in bytes.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>9f1f</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>32</td>
<td>O</td>
<td>This field specifies how the Charging Characteristics was selected</td>
<td>Enumerated integer</td>
<td>1</td>
<td>9f20</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>33</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>9f21</td>
</tr>
</tbody>
</table>

Notes:
• Context deactivation due to Inter-SGSN RAU results in final CDR with cause “SGSN Change” value:18 (decimal).

ASN.1 Definition for Fields in custom13 Dictionary

The following section provides the complete ASN.1 definition of all S-CDR related fields in this dictionary.

```asn1
GPRS-SGSN-Charging-DataTypes-REL6 DEFINITIONS IMPLICIT TAGS ::= BEGIN

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

--
--GPRS RECORDS
--

GPRSRecord ::= CHOICE
--
{
  sgsnPDPRecord[20] SGSNPDPRecord
}

ManagementExtension ::= SEQUENCE
{
  identifier OBJECT IDENTIFIER,
  significance [1] BOOLEAN DEFAULT FALSE,
  information [2] ANY DEFINED BY identifier
}
```

GTPP Interface Administration and Reference, StarOS Release 18
ManagementExtensions ::= SET OF ManagementExtension

ServiceKey ::= INTEGER (0..2147483647)

DefaultGPRS-Handling ::= ENUMERATED
{
    continueTransaction (0),
    releaseTransaction (1)
}

SGSNPDPRecord ::= SET
{
    recordType [0] RecordType,
    networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL,
    servedIMSI [3] IMSI,
    servedIMEI [4] IMEI OPTIONAL,
    sgsnAddress [5] GSNAddress OPTIONAL,
    msNetworkCapability [6] MSNetworkCapability OPTIONAL,
    routingArea [7] RoutingAreaCode OPTIONAL,
    locationAreaCode [8] LocationAreaCode OPTIONAL,
    cellIdentifier [9] CellId OPTIONAL,
    chargingID [10] ChargingID,
    ggsnAddressUsed [11] GSNAddress,
    accessPointNameNI [12] AccessPointNameNI OPTIONAL,
    pdpType [13] PDPType OPTIONAL,
    servedPDPAddress [14] PDPAddress OPTIONAL,
listOfTrafficVolumes [15] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
recordOpeningTime [16] TimeStamp,
duration [17] CallDuration,
sgsnChange [18] SGSNChange OPTIONAL,
causeForRecClosing [19] CauseForRecClosing,
diagnostics [20] Diagnostics OPTIONAL,
recordSequenceNumber [21] INTEGER OPTIONAL,
nodeID [22] NodeID OPTIONAL,
recordExtensions [23] ManagementExtensions OPTIONAL,
localSequenceNumber [24] LocalSequenceNumber OPTIONAL,
apnSelectionMode [25] APNSelectionMode OPTIONAL,
accessPointNameOI [26] AccessPointNameOI OPTIONAL,
servedMSISDN [27] MSISDN OPTIONAL,
chargingCharacteristics [28] ChargingCharacteristics,
rATType [29] RATType OPTIONAL,
cAMELInformationPDP [30] CAMELInformationPDP OPTIONAL,
rWCUnsentDownlinkVolume [31] DataVolumeGPRS OPTIONAL,
chChSelectionMode [32] ChChSelectionMode OPTIONAL,
dynamicAddressFlag [33] DynamicAddressFlag OPTIONAL
}

-- GPRS DATA TYPES
--
maxAddressLength INTEGER ::= 20
AccessPointNameNI ::= IA5String (SIZE(1..63))

--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.
--

AccessPointNameOI ::= IA5String (SIZE(1..37))

--
-- Operator Identifier part of APN in dot representation.
-- In the 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs' example, the OI portion is
-- 'mnc022.mcc111.gprs'
-- and is presented in this form in the CDR.
--

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

APNSelectionMode ::= ENUMERATED

{ }

--
-- See Information Elements TS 29.060
--

mSOrNetworkProvidedSubscriptionVerified(0),
mSProvidedSubscriptionNotVerified(1),
networkProvidedSubscriptionNotVerified(2)

}

CAMELAccessPointNameNI ::= AccessPointNameNI
CAMELAccessPointNameOI ::= AccessPointNameOI

CAMELInformationPDP ::= SET

{ sCFAddress[1] SCFAddress OPTIONAL,
  serviceKey[2] ServiceKey OPTIONAL,
  defaultTransactionHandling[3] DefaultGPRS-Handling OPTIONAL,
  CAMELAccessPointNameNI[4] CAMELAccessPointNameNI OPTIONAL,
  CAMELAccessPointNameOI[5] CAMELAccessPointNameOI OPTIONAL,
  NumberOfDPEncountered[6] NumberOfDPEncountered OPTIONAL,
  LevelOfCAMELServices[7] LevelOfCAMELServices OPTIONAL,
  freeFormatData[8] FreeFormatData OPTIONAL,
  fFDAppendIndicator[9] FFDAppendIndicator OPTIONAL
}

CauseForRecClosing ::= INTEGER

{ --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- LCS related causes belong to the MAP error causes acc. TS 29.002
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
  --
  normalRelease (0),
  abnormalRelease (4),
  CAMELInitCallRelease (5),
  volumeLimit (16),
}
timeLimit \( (17) \),
sGSNChange \( (18) \),
maxChangeCond \( (19) \),
management Intervention \( (20) \),
intraSGSNIntersystemChange \( (21) \),
rATChange \( (22) \),
mSTimeZoneChange \( (23) \),
unauthorizedRequestingNetwork \( (52) \),
unauthorizedLCSClient \( (53) \),
positionMethodFailure \( (54) \),
unknownOrUnreachableLCSClient \( (58) \),
listOfDownstreamNodeChange \( (59) \)
}

\text{ChangeCondition ::= ENUMERATED}
{
--
-- Failure Handling values used in eGCDR only
--
qoSChange \( (0) \),
tariffTime \( (1) \),
recordClosure \( (2) \),
failureHandlingContinueOngoing \( (3) \),
failureHandlingRetryandTerminateOngoing \( (4) \),
failureHandlingTerminateOngoing \( (5) \)
}

\text{ChangeOfCharCondition ::= SEQUENCE}
{

--

-- Used in PDP context record only

-- failureHandlingContinue field used in eGCDR only

--

qosRequested[1] QoSInformation OPTIONAL,
qosNegotiated[2] QoSInformation OPTIONAL,
dataVolumeGPRSUpLink[3] DataVolumeGPRS,
dataVolumeGPRSDownLink[4] DataVolumeGPRS,
changeCondition[5] ChangeCondition,

}

ChargingCharacteristics::= OCTET STRING (SIZE(2))

--

-- SIZEBit 0-3: Profile Index
-- IndexBit 4-15: For Behavior

--

ChargingID::= INTEGER (0..4294967295)

--

-- Generated in GGSN, part of PDP context, see TS 23.060
-- 0..4294967295 is equivalent to 0..2**32-1

--

ChChSelectionMode::= ENUMERATED
{
sGSSNSupplied(0), -- For GGSN only
subscriptionSpecific(1), -- For SGSN only
aPNSpecific(2), -- For SGSN only
homeDefault(3), -- For SGSN and GGSN
roamingDefault(4), -- For SGSN and GGSN
visitingDefault(5) -- For SGSN and GGSN

DataVolumeGPRS::= INTEGER
--
-- The volume of data transferred in octets.
--
DynamicAddressFlag::= BOOLEAN

GSNAddress::= IPAddress

IA5String ::= [UNIVERSAL 22] IMPLICIT OCTET STRING

IMSI ::= TBCD-STRING (SIZE (3..8))
--
-- from 29.002
-- digits of MCC, MNC, MSIN are concatenated in this order.
--
IMEI ::= TBCD-STRING (SIZE (8))
--
-- Refers to International Mobile Station Equipment Identity
-- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
-- If the SVN is not present the last octet shall contain the
-- digit 0 and a filler.
-- If present the SVN shall be included in the last octet.
--

ISDN-AddressString ::= OCTET STRING

ETSIAddress ::= AddressString
--
-- First octet for nature of address, and numbering plan indicator (3 for X.121)
-- Other octets TBCD
-- See TS 29.002
--

FFDAppendIndicator ::= BOOLEAN

FreeFormatData ::= OCTET STRING (SIZE(1..160))
--
-- Free formatted data as sent in the FurnishChargingInformationGPRS
-- see TS 29.078
--

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
-- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
--
-- Set to true if PDP context was initiated from network side
--
NodeID::= IA5String (SIZE(1..20))

NumberOfDPEncountered ::= INTEGER

PDPAddress::= CHOICE
{
  iPAddress [0] IPAddress,
  eTSIAddress [1] ETSIAddress
}

PDPTypen::= OCTET STRING (SIZE(2))

  --
  -- OCTET 1: PDP Type Organization
  -- OCTET 2: PDP Type Number
  -- See TS 29.060

QoSInformation::= OCTET STRING (SIZE (4..15))

  --
  -- This octet string
  -- is a 1:1 copy of the contents (i.e. starting with octet 4) of the "Quality of
  -- service Profile" information element specified in TS 29.060

RATType::= INTEGER (0..255)

  --
  -- This integer is 1:1 copy of the RAT type value as defined in TS 29.060
ResultCode ::= INTEGER
   
   -- charging protocol return value, range of 4 byte (0...4294967259)
   -- see Result-Code AVP as used in 3GPP 29.210
   --

RoutingAreaCode ::= OCTET STRING (SIZE(1))
   
   --
   -- See TS 24.008
   --

SGSNChange ::= BOOLEAN
   
   -- present if first record after inter SGSN routing area update
   -- in new SGSN
   --

RecordType ::= INTEGER
   {
      sgsnPDPRecord(18)
   }

Diagnostics ::= CHOICE
   {
      gsm0408Cause[0] INTEGER
   }

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

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

IPTextRepresentedAddress ::= CHOICE
{  
  --
  -- IP address in the familiar "dot" notation
  --
  iPTextV4Address[2] IA5String (SIZE(7..15)),
  iPTextV6Address[3] IA5String (SIZE(15..45))
}

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

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

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

LocationAreaCode ::= OCTET STRING (SIZE(2))

--
-- See TS 24.008
--
MSISDN ::= ISDN-AddressString

MSTimeZone ::= OCTET STRING (SIZE (2))

--
-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060

TBCCD-STRING ::= OCTET STRING

TimeStamp ::= OCTET STRING (SIZE(9))

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

CallDuration ::= INTEGER

CellId ::= OCTET STRING (SIZE(2))

--

-- Coded according

custom24 Dictionary

Releases prior to 14.0, the S-CDR fields are based on TS 32.215 v4.5.0 (R4). In 14.0 and later releases, the S-CDR fields are based on TS 32.298 v9.6.0 (R9).

--- Important: ---
In custom24 the IP address is encoded in binary format.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>The field identifies the type of the record.</td>
<td>Integer</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>Network initiated PDP context</td>
<td>1</td>
<td>O</td>
<td>This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of</td>
<td>BCD encoded</td>
<td>3 - 8</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the served party.</td>
<td>octet string.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Served IMEI</td>
<td>4</td>
<td>O</td>
<td>This field contains the international mobile equipment identity (IMEI) of</td>
<td>BCD encoded</td>
<td>8</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the equipment served.</td>
<td>octet string.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IMEISV will be sent in case if IMEI is not available.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGSN Address</td>
<td>5</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>6</td>
<td>A5</td>
</tr>
<tr>
<td>SGSN Binary IPv4 Address</td>
<td>5-0</td>
<td>M</td>
<td>This field represents the IPv4 binary address.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>6</td>
<td>O</td>
<td>MS Network Capability field contains the MS network capability value of the</td>
<td>Octet string</td>
<td>1 - 8</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MS network capability information element of the served MS on PDP context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>activation or on GPRS attachment as defined in 3GPP TS 24.008.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Routing Area</td>
<td>7</td>
<td>O</td>
<td>This field contains the Routing Area Code (RAC) of the routing area in</td>
<td>Octet string</td>
<td>1</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>which the served party is currently located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location Area Code</td>
<td>8</td>
<td>O</td>
<td>This field contains the Location Area Code (LAC) of the location area in</td>
<td>Octet string</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>which the served party is currently located.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>9</td>
<td>O</td>
<td>For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008,</td>
<td>Octet string</td>
<td>2</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and for UMTS it is defined as the Service Area Code in TS 25.413.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charging ID</td>
<td>10</td>
<td>M</td>
<td>This field is a charging identifier, which can be used together with the</td>
<td>Octet string</td>
<td>1 - 5</td>
<td>8a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GGSN address to identify all records produced in the GGSN involved in a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>single PDP context. The Charging ID is generated by the GGSN at PDP context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>activation and is transferred to the context requesting SGSN.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GGSN Address</td>
<td>11</td>
<td>M</td>
<td>This field provides the current SGSN IP Address for the Control Plane.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>AB</td>
</tr>
</tbody>
</table>
## CDR Fields Supported in S-CDRs

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGSN Binary IPV4 Address</td>
<td>11-0</td>
<td>M</td>
<td>This field represents the IPv4 binary address.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>80</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>12</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 63</td>
<td>8c</td>
</tr>
<tr>
<td>PDP Type</td>
<td>13</td>
<td>O</td>
<td>This field defines the PDP type, e.g. IP or PPP.</td>
<td>Octet string</td>
<td>2</td>
<td>8d</td>
</tr>
<tr>
<td>Served PDP Address</td>
<td>14</td>
<td>O</td>
<td>This field contains the PDP address of the served IMSI, for which the standard 3GPP TS 32.298 allows a choice of either IP Address or ETSI Address.</td>
<td>Choice</td>
<td>11 - 19</td>
<td>ae</td>
</tr>
<tr>
<td>Served PDP IP Address</td>
<td>14-0</td>
<td>M</td>
<td>Only the choice of IP Address is supported by the SGSN for the field described above.</td>
<td>Choice</td>
<td>9 - 17</td>
<td>a0</td>
</tr>
<tr>
<td>Served PDP IPV4 Binary Address</td>
<td>14-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in binary coding.</td>
<td>Octet string</td>
<td>7 - 15</td>
<td>80</td>
</tr>
<tr>
<td>List of Traffic Volumes</td>
<td>15</td>
<td>M</td>
<td></td>
<td>Sequence</td>
<td></td>
<td>af</td>
</tr>
<tr>
<td>Change Of Charging Condition</td>
<td>15-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>QoS Requested</td>
<td>15-0-1</td>
<td>O</td>
<td>The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation. In Rel.9, the QoS length is from 4 bytes to 17 bytes.</td>
<td>Octet string</td>
<td>4 - 17</td>
<td>81</td>
</tr>
<tr>
<td>QoS Negotiated</td>
<td>15-0-2</td>
<td>O</td>
<td>QoS Negotiated indicates the applied QoS accepted by the network. In Rel.9, the QoS length is from 4 bytes to 17 bytes.</td>
<td>Octet string</td>
<td>4 - 17</td>
<td>82</td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>15-0-3</td>
<td>M</td>
<td>It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>83</td>
</tr>
<tr>
<td>Data volume GPRS Downlink</td>
<td>15-0-4</td>
<td>M</td>
<td>It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1 - 4</td>
<td>84</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
</tbody>
</table>
| Change Condition           | 15-0-5     | M        | The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container:  
  Supported values:  
  • qoSChange 0  
  • tariffTime 1  
  • recordClosure 2 | Enumerated integer | 1           | 85         |
<p>| Change time                | 15-0-6     | M        | Change Time is a time stamp, which defines the moment when the volume container is closed or the CDR is closed.                                                                                             | BCD encoded     | 6           | 86         |
| Record Opening Time        | 16         | M        | This field contains the time stamp when a PDP context is activated in SGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms.  | BCD encoded     | 6           | 90         |
| Duration                   | 17         | M        |                                                                                                                                                                                                            | Integer         | 1 - 5        | 91         |
| SGSN Change                | 18         | O        | This field is present only in the S-CDR to indicate that this it is the first record after an inter-SGSN routing area update.                                                                               | Boolean         | 1           | 92         |
| Cause for Record Closing   | 19         | M        | This field contains a reason for the closure of the CDR.                                                                                                                                                     | Integer         | 1           | 93         |
| DiagnosticsSM              | 20         | O        | This field contains the system internal reasons for the PDP context deactivation at Session Management Level.                                                                                               | Choice          | 3           | B4         |
| gsm0408Cause               | 20 - 0     | M        | This cause is used in the Diagnostics field.                                                                                                                                                                 | Integer         | 1           | 80         |
| Record Sequence Number     | 21         | O        | A running sequence number with range 1-4294967295 used to link partial records generated by the SGSN for a specific PDP context (characterized with the same Charging ID and GGSN address). This field is not present if the first record is also the final record. | Integer         | 1 - 5        | 95         |
| Node ID                    | 22         | O        | This field contains an identifier string for the node that had generated the CDR.                                                                                                                                 | IA5 string      | 5 - 20       | 96         |
| Record Extensions          | 23         | O        |                                                                                                                                                                                                            | Set             | 1 - n        | 97         |</p>
<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Record Sequence Number</td>
<td>24</td>
<td>O</td>
<td>For each Node ID, this number with range 1 - 4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. This field is only included when the option gtp p attribute local-record-sequence number is configured. By configuring gtp p single-source centralized-lrsn-creation the local record sequence number will be incremented for S-CDRs.</td>
<td>Octet string</td>
<td>1 - 5</td>
<td>98</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>25</td>
<td>O</td>
<td>This field indicates how the APN was selected.</td>
<td>Enumerated integer</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
<td>Access Point Name Operator Identifier</td>
<td>26</td>
<td>M</td>
<td>This field contains the Operator Identifier part of the Access Point Name (APN).</td>
<td>IA5 string</td>
<td>1 - 37</td>
<td>9a</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>27</td>
<td>O</td>
<td>The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.</td>
<td>BCD encoded octet string</td>
<td>1 - 9</td>
<td>9b</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>28</td>
<td>M</td>
<td>Lists the charging characteristics applied to the PDP context by the SGSN.</td>
<td>Hex value octet string</td>
<td>2</td>
<td>9c</td>
</tr>
<tr>
<td>Rat Type</td>
<td>29</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.</td>
<td>Integer</td>
<td>1</td>
<td>9d</td>
</tr>
<tr>
<td>cAMELInformationPDP</td>
<td>30</td>
<td>O</td>
<td>This field is supported if Ge interface is supported. CLI gtp p attribute camel-info needs to be enabled to populate this field.</td>
<td>Address string</td>
<td>1 - n</td>
<td>be</td>
</tr>
<tr>
<td>SCF Address</td>
<td>30-0</td>
<td>O</td>
<td>This identifier refers to the network address (E.164 number) of the subscriber related SCP. Address is defined in HLR as part of CAMEL subscription information. The address is BCD encoded.</td>
<td>Address string</td>
<td>1 - 11</td>
<td>81</td>
</tr>
<tr>
<td>Service Key</td>
<td>30-1</td>
<td>O</td>
<td>This parameter describes in case of usage of a CAMEL the service key. Service key is defined in HLR as part of CAMEL subscription information.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>82</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size in byte</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>defaultTransactionHandling</td>
<td>30-2</td>
<td>O</td>
<td>This field indicates whether or not a CAMEL encountered a default GPRS-handling or SMS-handling. This field will be present only if default call handling has been applied. This parameter is defined in HLR as part of CAMEL subscription information.</td>
<td>Enumerated integer</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>cAMELAccessPointNameNI</td>
<td>30-3</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cAMELAccessPointNameOl</td>
<td>30-4</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NumberOfDPEncountered</td>
<td>30-5</td>
<td>O</td>
<td>This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements &quot;Level of CAMEL service&quot; field.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>86</td>
</tr>
<tr>
<td>Level Of Camel Service</td>
<td>30-6</td>
<td>O</td>
<td>This field describes briefly the complexity of CAMEL invocation.</td>
<td>Bit string</td>
<td>2</td>
<td>87</td>
</tr>
<tr>
<td>freeFormatData</td>
<td>30-7</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>88</td>
</tr>
<tr>
<td>fFDApAppendIndicator</td>
<td>30-8</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td>89</td>
</tr>
<tr>
<td>RNC Unsent Volume</td>
<td>31</td>
<td>O</td>
<td>This field contains the unsent downlink (from RNC to MS) data volume in bytes.</td>
<td>Integer</td>
<td>1 - 5</td>
<td>9f1f</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>32</td>
<td>O</td>
<td>This field specifies how the Charging Characteristics was selected</td>
<td>Enumerated integer</td>
<td>1</td>
<td>9f20</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>33</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context.</td>
<td>Boolean</td>
<td>1</td>
<td>9f21</td>
</tr>
<tr>
<td>iMSIunauthenticatedFlag</td>
<td>34</td>
<td>O</td>
<td></td>
<td>Null</td>
<td>0</td>
<td>9f22</td>
</tr>
<tr>
<td>userCSGInformation</td>
<td>35</td>
<td>O</td>
<td></td>
<td>N/A</td>
<td></td>
<td>9f23</td>
</tr>
<tr>
<td>Served PDP PDN Address Extension</td>
<td>36</td>
<td>O</td>
<td>This field contains the IPv4 address for the PDP connection (PDP context, IP-CAN bearer) when dual-stack IPv4 IPv6 is used, and the IPv6 address is included in Served PDP Address or Served PDP/PDN Address. This field is missing if the PDP/PDN address is IPv4 or IPv6.</td>
<td>Choice</td>
<td>6 (IPV4)</td>
<td>bf24</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>36-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td></td>
<td></td>
<td>0xa0</td>
</tr>
</tbody>
</table>
### CDR Fields Supported in S-CDRs

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size in byte</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDP IPv4 Binary Address</td>
<td>36-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by of the GGSN in binary coding.</td>
<td>Octet string</td>
<td>4 (IPV4)</td>
<td>0x80</td>
</tr>
<tr>
<td>Low Access Priority Indicator</td>
<td>37</td>
<td>O</td>
<td>This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.</td>
<td>Null</td>
<td>0</td>
<td>9f25</td>
</tr>
</tbody>
</table>

**Important:** The inclusion of the field “Served PDP/PDN Address extension” in the S-CDR is enabled on execution of the command `gtpp attribute served-pdp-pdn-address-extension` in the GTPP Server Group Configuration Mode. This field is disabled by default.

**Notes:**
- In custom24 the IP address is encoded in Binary format.
- If the CDR is closed in old SGSN due to Inter SGSN RAU the cause for record closure is “SGSN CHANGE” 18(DECIMAL).
- The fields “Record Extensions”, “cAMELAccessPointNameNI”, “cAMELAccessPointNameOI”, freeFormatData”, “fFDAppendIndentifier”, “iMSIunauthenticatedFlag”, and “userCSGInformation” are not supported.
- Camel fields are supported only if Ge interface is enabled.
- The field “Low Access Priority Indicator” is currently available only in custom24 GTPP dictionary for SGSN-CDRs when the CLI command “`gtpp attribute lapi`” is configured in GTPP Server Group Configuration mode.

### ASN.1 Definition for Fields in custom24 Dictionary

The following section provides the complete ASN.1 definition of all S-CDR related fields in this dictionary.

```asn1
GPRS-SGSN-Charging-DataTypes-REL6 DEFINITIONS IMPLICIT TAGS ::= BEGIN

--ObjectInstance

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

```

---

GTPP Interface Administration and Reference, StarOS Release 18
--- GPRS RECORDS
---

GPRSRecord ::= CHOICE

{
  sgsnPDPRecord[20] SGSNPDPRecord
}

ManagementExtension ::= SEQUENCE

{
  identifier OBJECT IDENTIFIER,
  significance [1] BOOLEAN DEFAULT FALSE,
  information [2] ANY DEFINED BY identifier
}

ManagementExtensions ::= SET OF ManagementExtension

ServiceKey ::= INTEGER (0..2147483647)

DefaultGPRS-Handling ::= ENUMERATED

{
  continueTransaction (0),
  releaseTransaction (1)
}
SGSNPDPRecord ::= SET
{
  recordType [0] RecordType,
  networkInitiation [1] NetworkInitiatedPDPContext OPTIONAL,
  servedIMSI [3] IMSI,
  servedIMEI [4] IMEI OPTIONAL,
  sgsnAddress [5] GSNAddress OPTIONAL,
  msNetworkCapability [6] MSNetworkCapability OPTIONAL,
  routingArea [7] RoutingAreaCode OPTIONAL,
  locationAreaCode [8] LocationAreaCode OPTIONAL,
  cellIdentifier [9] CellId OPTIONAL,
  chargingID [10] ChargingID,
  ggsnAddressUsed [11] GSNAddress,
  accessPointNameNI [12] AccessPointNameNI OPTIONAL,
  pdpType [13] PDPType OPTIONAL,
  servedPDPAddress [14] PDPAddress OPTIONAL,
  listOfTrafficVolumes [15] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
  recordOpeningTime [16] TimeStamp,
  duration [17] CallDuration,
  sgsnChange [18] SGSNChange OPTIONAL,
  causeForRecClosing [19] CauseForRecClosing,
  diagnostics [20] Diagnostics OPTIONAL,
  recordSequenceNumber [21] INTEGER OPTIONAL,
  nodeID [22] NodeID OPTIONAL,
  recordExtensions [23] ManagementExtensions OPTIONAL,
  localSequenceNumber [24] LocalSequenceNumber OPTIONAL,
  apnSelectionMode [25] APNSelectionMode OPTIONAL,
  accessPointNameOI [26] AccessPointNameOI OPTIONAL,
  servedMSISDN [27] MSISDN OPTIONAL,
chargingCharacteristics [28] ChargingCharacteristics,
rAType [29] RATType OPTIONAL,
cAMELInformationPDP [30] CAMELInformationPDP OPTIONAL,
rNCUnsentDownlinkVolume [31] DataVolumeGPRS OPTIONAL,
chChSelectionMode [32] ChChSelectionMode OPTIONAL,
dynamicAddressFlag [33] DynamicAddressFlag OPTIONAL,
servedPDPDNAddressExt [36] PDPAddress OPTIONAL,
lowAccessPriorityIndicator [37] NULL OPTIONAL
}

-- GPRS DATA TYPES
--
maxAddressLength INTEGER ::= 20

AccessPointNameNI::= IA5String (SIZE(1..63))
--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.
--

AccessPointNameOI::= IA5String (SIZE(1..37))
--
-- Operator Identifier part of APN in dot representation.
In the 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs' example, the OI portion is 'mnc022.mcc111.gprs'
and is presented in this form in the CDR.

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

APNSelectionMode::= ENUMERATED
{
  --
  -- See Information Elements TS 29.060
  --
  mSorNetworkProvidedSubscriptionVerified(0),
  mSProvidedSubscriptionNotVerified(1),
  networkProvidedSubscriptionNotVerified(2)
}

CAMELAccessPointNameNI::= AccessPointNameNI

CAMELAccessPointNameOI::= AccessPointNameOI

CAMELInformationPDP::= SET
{
  sCFAddress[1] SCFAddress OPTIONAL,
  serviceKey[2] ServiceKey OPTIONAL,
  defaultTransactionHandling[3] DefaultGPRS-Handling OPTIONAL,
  CAMELAccessPointNameNI[4] CAMELAccessPointNameNI OPTIONAL,
  CAMELAccessPointNameOI[5] CAMELAccessPointNameOI OPTIONAL,
  numberOfDPEncountered[6] NumberOfDPEncountered OPTIONAL,
levelOfCAMELService[7] LevelOfCAMELService OPTIONAL,
freeFormatData[8] FreeFormatData OPTIONAL,
FFDAppendIndicator[9] FFDAppendIndicator OPTIONAL
}

CauseForRecClosing ::= INTEGER
{
  --
  -- In GGSN the value sGSNChange should be used for partial record
  -- generation due to SGSN Address List Overflow
  --
  -- LCS related causes belong to the MAP error causes acc. TS 29.002
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
  --
  normalRelease (0),
  abnormalRelease (4),
  cAMELInitCallRelease (5),
  volumeLimit (16),
  timeLimit (17),
  sGSNChange (18),
  maxChangeCond (19),
  managementIntervention (20),
  intraSGSNIntersystemChange (21),
  rATChange (22),
  mSTimeZoneChange (23),
  unauthorizedRequestingNetwork (52),
  unauthorizedLCSClient (53),
  positionMethodFailure (54),
unknownOrUnreachableLCSClient (58),
listOfDownstreamNodeChange (59)
}

ChangeCondition ::= ENUMERATED
{
--
qoSChange (0),
tariffTime (1),
recordClosure (2),
dT-Establishment (8),
dT-Removal (9),
}

ChangeOfCharCondition ::= SEQUENCE
{
--
-- Used in PDP context record only
-- failureHandlingContinue field used in eGCDR only
--
qosRequested[1] QoSInformation OPTIONAL,
qosNegotiated[2] QoSInformation OPTIONAL,
dataVolumeGPRSUpplink[3] DataVolumeGPRS,
dataVolumeGPRSDownlink[4] DataVolumeGPRS,
changeCondition[5] ChangeCondition,
}
ChargingCharacteristics::= OCTET STRING (SIZE(2))
  --
  -- SIZE Bit 0-3: Profile Index
  -- Index Bit 4-15: For Behavior
  --

ChargingID::= INTEGER (0..4294967295)
  --
  -- Generated in GGSN, part of PDP context, see TS 23.060
  -- 0..4294967295 is equivalent to 0..2**32-1
  --

ChChSelectionMode::= ENUMERATED
  {
    sGSNSupplied(0),            -- For GGSN only
    subscriptionSpecific(1),    -- For SGSN only
    aPNSpecific(2),             -- For SGSN only
    homeDefault(3),             -- For SGSN and GGSN
    roamingDefault(4),          -- For SGSN and GGSN
    visitingDefault(5)          -- For SGSN and GGSN
  }

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

DynamicAddressFlag::= BOOLEAN
GSNAddress ::= IPAddress

IA5String ::= [UNIVERSAL 22] IMPLICIT OCTET STRING

IMSI ::= TBCD-STRING (SIZE (3..8))
  --
  -- from 29.002
  -- digits of MCC, MNC, MSIN are concatenated in this order.
  --

IMEI ::= TBCD-STRING (SIZE (8))
  --
  -- Refers to International Mobile Station Equipment Identity
  -- and Software Version Number (SVN) defined in TS 3GPP TS 23.003
  -- If the SVN is not present the last octet shall contain the
  -- digit 0 and a filler.
  -- If present the SVN shall be included in the last octet.
  --

ISDN-AddressString ::= OCTET STRING

ETSIAddress ::= AddressString
  --
  -- First octet for nature of address, and numbering plan indicator (3 for X.121)
  -- Other octets TBCD
  -- See TS 29.002
  --
FFDAppendIndicator ::= BOOLEAN

FreeFormatData ::= OCTET STRING (SIZE(1..160))
   --
   -- Free formatted data as sent in the FurnishChargingInformationGPRS
   -- see TS 29.078
   --

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
   -- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
   --
   -- Set to true if PDP context was initiated from network side
   --

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

NumberOfDPEncountered ::= INTEGER

PDPAddress ::= CHOICE
   {
      ipAddress[0] IPAddress,
      eTSIAddress [1] ETSIAddress
   }

PDPType ::= OCTET STRING (SIZE(2))
   --
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP Type Number
-- See TS 29.060
--

QoSInformation ::= OCTET STRING (SIZE (4..255))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 4) of the "Quality of
-- service Profile" information element specified in TS 29.060

RATType ::= INTEGER (0..255)
--
-- This integer is 1:1 copy of the RAT type value as defined in TS 29.060
--

ResultCode ::= INTEGER
--
-- charging protocol return value, range of 4 byte (0...4294967259)
-- see Result-Code AVP as used in 3GPP 29.210
--

RoutingAreaCode ::= OCTET STRING (SIZE(1))
--
-- See TS 24.008
--

SGSNChange ::= BOOLEAN
present if first record after inter SGSN routing area update
in new SGSN

RecordType ::= INTEGER

{ sgsnPDPRecord(18) }

Diagnostics ::= CHOICE

{ gsm0408Cause[0] INTEGER }

IPAddress ::= CHOICE

{ iPBinaryAddress iPBinaryAddress,
  iPTextRepresentedAddress iPTextRepresentedAddress }

iPBinaryAddress ::= CHOICE

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

iPTextRepresentedAddress ::= CHOICE

{ }
IP address in the familiar "dot" notation

IPTextV4Address[2] IA5String (SIZE(7..15)),
IPTextV6Address[3] IA5String (SIZE(15..45))

LevelOfCAMELService ::= BIT STRING

{ basic(0),
callDurationSupervision(1),
onlineCharging(2)
}

LocalSequenceNumber ::= INTEGER (0..4294967295)

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

LocationAreaAndCell ::= SEQUENCE

{ locationAreaCode[0] LocationAreaCode, cellId[1] CellId }

LocationAreaCode ::= OCTET STRING (SIZE(2))

-- See TS 24.008
MSISDN ::= ISDN-AddressString

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

TBCD-STRING ::= OCTET STRING

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

CallDuration ::= INTEGER
CellId ::= OCTET STRING (SIZE(2))

--

-- Coded according

SCFAAddress ::= AddressString

--

-- See TS 29.002

--

END
# CDR Fields Supported in S-SMO-CDRs

The tables in this section list the S-SMO-CDR fields present in the available GTPP dictionaries.

## standard, custom1 – custom42 Dictionaries

For TS 32.215 v4.5.0 (R4) / 32.298 v7.4.0 (R7)

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN Mobile Originated SMS.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>The IMSI of the subscriber.</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>OC</td>
<td>The IMEI of the ME, if available.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>OM</td>
<td>The mobile station network capability.</td>
</tr>
<tr>
<td>Service Centre</td>
<td>OM</td>
<td>The address (E.164) of the SMS-service centre.</td>
</tr>
<tr>
<td>Recording Entity</td>
<td>OM</td>
<td>The E.164 number of the SGSN.</td>
</tr>
<tr>
<td>Location Area Code</td>
<td>OM</td>
<td>The Location Area Code from which the message originated.</td>
</tr>
<tr>
<td>Routing Area Code</td>
<td>OM</td>
<td>The Routing Area Code from which the message originated.</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>OM</td>
<td>The Cell Identity for GSM or Service Area Code (SAC) for UMTS from which the message originated.</td>
</tr>
<tr>
<td>Message Reference</td>
<td>M</td>
<td>A reference provided by the MS uniquely identifying this message.</td>
</tr>
<tr>
<td>Event Time Stamp</td>
<td>M</td>
<td>The time at which the message was received by the SGSN from the subscriber.</td>
</tr>
<tr>
<td>SMS Result</td>
<td>C</td>
<td>The result of the attempted delivery if unsuccessful.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics flag set used by the SGSN.</td>
</tr>
<tr>
<td>System Type</td>
<td>OC</td>
<td>Indicates the type of air interface used, e.g. UTRAN. This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface.</td>
</tr>
<tr>
<td>Destination Number</td>
<td>OM</td>
<td>The destination short message subscriber number.</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
</tbody>
</table>
**Important:** Based on TS 32.215 v4.5.0 (R4) or TS 32.298 v7.4.0 (R7). The only difference is that from R6 onwards the “System Type” field is renamed to “RAT Type”.
CDR Fields Supported in S-SMT-CDRs

The tables in this section list the S-SMT-CDR fields present in the available GTPP dictionaries.

standard, custom1 – custom42 Dictionaries

For TS 32.215 v4.5.0 (R4) / TS 32.298 v7.4.0 (R7).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN Mobile Terminated SMS.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>The IMSI of the subscriber.</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>OC</td>
<td>The IMEI of the ME, if available.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>OM</td>
<td>The mobile station network capability.</td>
</tr>
<tr>
<td>Service Centre</td>
<td>OM</td>
<td>The address (E.164) of the SMS-service centre.</td>
</tr>
<tr>
<td>Recording Entity</td>
<td>OM</td>
<td>The E.164 number of the SGSN.</td>
</tr>
<tr>
<td>Location Area Code</td>
<td>OM</td>
<td>The Location Area Code to which the message was delivered.</td>
</tr>
<tr>
<td>Routing Area Code</td>
<td>OM</td>
<td>The Routing Area Code to which the message was delivered.</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>OM</td>
<td>The Cell Identity for GSM or Service Area Code (SAC) for UMTS to which the message was delivered.</td>
</tr>
<tr>
<td>Event Time Stamp</td>
<td>M</td>
<td>Delivery time stamp, time at which message was sent to the MS by the SGSN.</td>
</tr>
<tr>
<td>SMS Result</td>
<td>C</td>
<td>The result of the attempted delivery if unsuccessful.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics flag set used by the SGSN.</td>
</tr>
<tr>
<td>System Type</td>
<td>OC</td>
<td>Indicates the type of air interface used, e.g. UTRAN. This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface.</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
</tbody>
</table>

**Important:** Based on TS 32.215 v4.5.0 (R4) / TS 32.298 v7.4.0 (R7). No change in fields from R4 to R7.
CDR Fields Supported in M-CDR

The tables in this section list the M-CDR fields present in the available GTPP dictionaries.

standard, custom1 – custom42 Dictionaries

For TS 32.215 v 4.5.0 (R4).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN mobility management record.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the MS.</td>
</tr>
<tr>
<td>Served IMEI</td>
<td>OC</td>
<td>The IMEI of the ME, if available.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>OM</td>
<td>The IP address of the current SGSN.</td>
</tr>
<tr>
<td>MS Network Capability</td>
<td>OM</td>
<td>The mobile station network capability.</td>
</tr>
<tr>
<td>Routing Area Code</td>
<td>OM</td>
<td>Routing Area at the time of the Record Opening Time.</td>
</tr>
<tr>
<td>Local Area Code</td>
<td>OM</td>
<td>Location Area Code at the time of Record Opening Time.</td>
</tr>
<tr>
<td>Cell Identifier</td>
<td>OM</td>
<td>The Cell Identity for GSM or Service Area Code (SAC) for UMTS at the time of the Record Opening Time.</td>
</tr>
<tr>
<td>Change of Location</td>
<td>OC</td>
<td>A list of changes in Routing Area Code, each with a time stamp. This field is not required if partial records are generated when the location changes.</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Timestamp when MS is attached to this SGSN or record opening time on following partial record.</td>
</tr>
<tr>
<td>Duration</td>
<td>OM</td>
<td>Duration of this record.</td>
</tr>
<tr>
<td>SGSN Change</td>
<td>C</td>
<td>Present if this is first record after SGSN change.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for the closure of the record in this SGSN.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>OM</td>
<td>A more detailed reason for the release of the connection.</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number in this SGSN; only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics used by the SGSN.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>System Type</td>
<td>OC</td>
<td>Indicates the type of air interface used, e.g. UTRAN. This field is present when either the UTRAN or GERAN air-interface is used. It is omitted when the service is provided by a GSM air interface.</td>
</tr>
<tr>
<td>Charging Characteristics Selection Mode</td>
<td>OM</td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
</tbody>
</table>
CDR Fields Supported in LCS-MT-CDRs

The tables in this section list the LCS-MT-CDR fields present in the available GTPP dictionaries.

**standard, custom1 – custom42 Dictionaries**

For TS 32.298 v8.7.0 (R8) / TS 29.002 v8.7.0 (R8).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN Mobile Terminated LCS.</td>
</tr>
<tr>
<td>Recording Entity</td>
<td>M</td>
<td>The E.164 number of the SGSN.</td>
</tr>
<tr>
<td>LCS Client Type</td>
<td>M</td>
<td>The type of the LCS client that invoked the Location Request (LR).</td>
</tr>
<tr>
<td>LCS Client Identity</td>
<td>M</td>
<td>This field contains additional identification information of the LCS Client.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>The IMSI of the subscriber.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>OM</td>
<td>The IP address of the current SGSN.</td>
</tr>
<tr>
<td>Location Type</td>
<td>M</td>
<td>The type of the estimated location.</td>
</tr>
<tr>
<td>LCS QoS</td>
<td>C</td>
<td>Quality of Service for a location request.</td>
</tr>
<tr>
<td>LCS Priority</td>
<td>C</td>
<td>Priority of the location request.</td>
</tr>
<tr>
<td>MLC Number</td>
<td>M</td>
<td>The ISDN (E.164) number of the requesting GMLC.</td>
</tr>
<tr>
<td>Event Time stamp</td>
<td>M</td>
<td>The time at which the Perform_Location_Request is sent by the SGSN.</td>
</tr>
<tr>
<td>Measurement Duration</td>
<td>OM</td>
<td>The duration of processing the location request.</td>
</tr>
<tr>
<td>Notification To MS User</td>
<td>C</td>
<td>The privacy notification to MS user that was applicable when the LR was invoked.</td>
</tr>
<tr>
<td>Privacy Override</td>
<td>C</td>
<td>This parameter indicates the override MS privacy by the LCS client.</td>
</tr>
<tr>
<td>Location Estimate</td>
<td>OC</td>
<td>An estimate of a geographic location of the subscriber if the subscriber is contained in a geographic position and the location request is successful.</td>
</tr>
<tr>
<td>Positioning Data</td>
<td>C</td>
<td>This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS.</td>
</tr>
<tr>
<td>LCS Cause</td>
<td>OC</td>
<td>This parameter provides the reason for an unsuccessful location request.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for closure of the record from this SGSN.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
</tbody>
</table>
### Field Reference

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics flag set used by the SGSN.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>OM</td>
<td>Selection Mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Holds information about how Charging Characteristics were selected.</td>
</tr>
<tr>
<td>RAT Type</td>
<td>OC</td>
<td>This field indicates the Radio Access Technology (RAT) type, for example, UTRAN or GERAN, currently used by the Mobile Station as defined in TS 29.060.</td>
</tr>
</tbody>
</table>

**Notes:**

- All the dictionaries follow the ASN encoding and decoding. There is no ASCII implementation done for LCS-MT-CDRs.
- The sub-field “ExtensionContainer” in LCS Client external ID is not supported.
- Enabling or Disabling LCS attributes from GTPP group is currently not supported.
- There is no session recovery or recovery CDR generation for MT-LCS accounting.
# CDR Fields Supported in LCS-MO-CDRs

The tables in this section list the LCS-MO-CDR fields present in the available GTPP dictionaries.

## standard, custom1 – custom42 Dictionaries

For TS 32.298 v8.7.0 (R8) / TS 29.002 v8.7.0 (R8).

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>SGSN Mobile Originated LCS.</td>
</tr>
<tr>
<td>Recording Entity</td>
<td>M</td>
<td>The E.164 number of the SGSN.</td>
</tr>
<tr>
<td>LCS Client Type</td>
<td>C</td>
<td>The type of the LCS client that invoked the Location Request (LR).</td>
</tr>
<tr>
<td>LCS Client Identity</td>
<td>C</td>
<td>This field contains additional identification information of the LCS Client.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>The IMSI of the subscriber.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>SGSN Address</td>
<td>OM</td>
<td>The IP address of the current SGSN.</td>
</tr>
<tr>
<td>Location Method</td>
<td>M</td>
<td>The type of the location request.</td>
</tr>
<tr>
<td>LCS QoS</td>
<td>C</td>
<td>Quality of Service for a location request.</td>
</tr>
<tr>
<td>LCS Priority</td>
<td>OC</td>
<td>Priority of the location request.</td>
</tr>
<tr>
<td>MLC Number</td>
<td>M</td>
<td>The ISDN (E.164) number of the requesting GMLC.</td>
</tr>
<tr>
<td>Event Time stamp</td>
<td>M</td>
<td>The time at which the Perform_Location_Request is sent by the SGSN.</td>
</tr>
<tr>
<td>Measurement Duration</td>
<td>OM</td>
<td>The duration of processing the location request.</td>
</tr>
<tr>
<td>Location</td>
<td>OM</td>
<td>The Location Area Code (LAC) and Cell Identity (CI) when the location request is received.</td>
</tr>
<tr>
<td>Routing Area Code</td>
<td>OM</td>
<td>The Routing Area Code to which the LCS originated.</td>
</tr>
<tr>
<td>Location Estimate</td>
<td>OC</td>
<td>An estimate of a geographic location of the subscriber if the subscriber is contained in a geographic position and the location request is successful.</td>
</tr>
<tr>
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<td>C</td>
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</tr>
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<td>LCS Cause</td>
<td>OC</td>
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</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for closure of the record from this SGSN.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
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## CDR Fields Supported in LCS-MO-CDRs

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### Notes:
- All the dictionaries follow the ASN encoding and decoding. There is no ASCII implementation done for LCS-MO-CDRs.
- The sub-field “ExtensionContainer” in LCS Client external ID is not supported.
- Enabling or Disabling LCS attributes from GTPP group is currently not supported.
- There is no session recovery or recovery CDR generation for MO-LCS accounting.
This chapter describes the CDR fields supported by the system for use in SGSN.

Listed below are the types of CDRs supported by SGSN:

- SGSN CDRs (S-CDRs)
- Mobility CDRs (M-CDRs)
- Mobile originated SMS CDRs (S-SMO-CDRs)
- Mobile terminated SMS CDRs (S-SMT-CDRs)
- Mobile terminated location request CDRs (LCS-MT-CDRs)
- Mobile originated location request CDRs (LCS-MO-CDRs)

The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

Based on the following standards:

- 3GPP TS 32.298 V6.5.0 (2006-09): 3rd Generation Partnership Project; Technical Specification Group Service and System Aspects; Telecommunication management; Charging management; Charging Data Record (CDR) parameter description (Release 6)
- 3GPP TS 32.251 V6.10.0 (2007-06): 3rd Generation Partnership Project; Group Services and System Aspects; Telecommunication management; Charging management; Packet Switched (PS) domain charging (Release 6)

Also see the *SGSN CDR Field Reference* chapter for information on CDR fields supported in S-CDRs and M-CDRs.
CDR Fields

Access Point Name Network Identifier

The network identifier (NI) portion of the access point name (APN). The APN typically corresponds to a registered Internet domain name and represents the external packet data network (PDN). It is sent to the SGSN by the MS (or determined locally by the HLR or configuration) and is relayed to the GGSN in the Create PDP Context Request message.

The APN string may consist of 1 to 63 characters composed of alphanumerics (upper- and/or lowercase letters and digits 0-9), periods and dashes.

Format
IA5 String

Length
1–63 Bytes

Access Point Name Operator Identifier

The operator identifier (OI) part of the APN. The OI is composed of three parts (<operator’s MNC>.<operator’s MCC>.gprs) and the first two combined uniquely identify the network operator’s PLMN.

Format
IA5 String

Length
1–37 Bytes

APN Selection Mode

An index indicating how the APN was selected.

The following APN selection mode indexes are possible:

- 0: MS or network provided APN, subscribed verified
- 1: MS provided APN, subscription not verified
- 2: Network provided APN, subscription not verified

Format
Unsigned Integer

Enumerated for custom11 and custom33

Enumerated integer for custom41

Length
1 Byte
**CAMEL Information**

Set of CAMEL information related to PDP context. This field is present if CAMEL Charging Information is received by the HLR in ISD message.

This field is supported if Ge interface is supported. The CLI command “gtpp attribute camel-info” needs to be enabled to populate this field.

**Format**

Octet String

**Length**

1-n

**Cause for Record Closing**

The reason the record is closed and released from the SGSN.

Some of the possible reasons are:

- normalRelease (0): The PDP context was terminated normally through a PDP context release (end of context or SGSN change) or a GPRS detach.
- abnormalRelease (4): The PDP context was abnormally terminated.
- volumeLimit (16): The CDR is released due to exceeding volume limit.
- timeLimit (17): The CDR is released due to exceeding time limit.
- sGSNChange (18):
- maxChangeCond (19): The CDR is released due to exceeding the changed condition limit.
- managementIntervention (20): The record was closed due to an O&M request.
- intraSGSNIntersystemChange (21): The CDR is released when MS moves from 3G<->2G and vice versa within the same SGSN.
- Partial Record Generation: A partial CDR was generated for reasons such as the reaching of data volume or time (duration) limits, or reaching the maximum number of charging condition changes, or intraSGSNIntersystemChange change.

**Format**

Integer

**Length**

1 Byte

**Cell Identifier**

For GSM, the Cell Identifier is defined as the Cell Id, reference 24.008. For UMTS, it is defined as the Service Area Code in TS 25.413. This field contains the CI (GSM) or the SAC (WCDMA) where the MS is located when the S-CDR is opened. The first partial or single S-CDR reports the value at PDP context activation. For any subsequent partial S-CDRs, the accuracy of the reported value is limited to the value at the last RA update reported by the MSCell identity for GSM or Service Area Code (SAC) for UMTS at “Record Opening Time”.

**Format**

Octet String
Length
2 Bytes

**Change Condition**

The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Data Volumes. Change Condition defines the reason for closing the container; supported values include:

- qosChange
- tariffTime
- recordClosure

Format
Enumerated
Length
1 Byte

**Change of Charging Characteristics**

Lists the charging characteristics applied to the PDP context.

The SGSN can accept charging characteristics from the HLR or use its own. SGSN-configured charging characteristics are specified as part of the operator policy and are applied to subscriber PDP contexts through SGSN-Operator-Policy templates.

Format
Hex Value Octet String
Length
2 Bytes

**Change of Charging Condition**

Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.

Format
Sequence
Length
Variable

**Change Time**

The Change Time field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. Change Time identifies the local time when a change condition occurred and the container was closed. The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead, for example: e.g. YYMMDDhhmmssShhmm.
**Charging Characteristics**

Lists the charging characteristics (CC) applied to the PDP context by the SGSN. The SGSN can accept charging characteristics from the HLR, default values, or use its own configured values.

**Format**
Octet string

**Length**
2 Bytes

**Charging Characteristics Selection Mode**

The charging characteristic (CC) type that the SGSN applied to the CDR. The following values for this field are supplied:

- **homeDefault**: SGSN configured charging characteristics for home subscribers are used. Home subscribers are those that belong to the same PLMN as the one on which the GGSN is located.
- **visitingDefault**: SGSN configured charging characteristics for visiting subscribers are used. Visiting subscribers are those that belong to a different PLMN than the one on which the GGSN is located.
- **roamingDefault**: SGSN configured charging characteristics for roaming subscribers are used. Roaming subscribers are those that are serviced by an SGSN belonging to a different PLMN than the one on which the GGSN is located.
- **subscriptionSpecific**: This CC will be applied to S-CDR only if aPNSpecific CC is absent.
- **aPNSpecific**: For S-CDR priority will be given to aPNSpecific Charging Characteristics Selection mode. The aPNSpecific mode is from HLR (ISD Message).

**Format**
Enumerated Integer

**Length**
1 Byte

**Charging ID**

This field specifies the charging identifier, which can be used together with the GGSN address to identify all records involved in a single PDP context. The charging ID is generated by the GGSN at PDP context activation and is transferred to the SGSN requesting the context. At an inter-SGSN routing area update (ISRAU) the charging ID is transferred to the new SGSN as part of each active PDP context. Each GGSN allocates the charging ID independently and may allocate the same number prefix, so the charging ID must always be combined with the GGSN address to form a unique identifier for the PDP context.

**Format**
Integer (0..4294967295)

Octet string for custom11 and custom41
Length
1–4 Bytes / 1-5 Bytes (custom33 only)

Data Volume GPRS Downlink

The Data Volume GPRS Downlink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate. The data volume tabulated by the SGSN covers the amount of user data transferred in the SNDCP PDUs (GSM) and GTP-U T-PDUs (WCDMA). Data volumes retransmitted by RLC or LLC, due to poor radio link conditions, are not tabulated. The data counted includes the IP PDP bearer protocols, i.e. IP or PPP.

**Important:** In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

Format
Integer

Length
1–5 Bytes
1–4 Bytes for custom11

Data Volume GPRS Uplink

The Data Volume GPRS Uplink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate. The data volume tabulated by the SGSN covers the amount of user data transferred in the SNDCP PDUs (GSM) and GTP-U T-PDUs (WCDMA). Data volumes retransmitted by RLC or LLC, due to poor radio link conditions, are not tabulated. The data counted includes the IP PDP bearer protocols, i.e. IP or PPP.

**Important:** In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

Format
Integer

Length
1–5 Bytes
1–4 Bytes for custom11

Default Transaction/SMS Handling

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

This field is included in the CDR when the PDP context is released and when the option "**gtpp attribute diagnostics**" is configured. This field is supported in G-CDRs but not for eG-CDRs.

It will contain one of the following values:

- 36: If the SGSN sends Delete PDP Context request
- 38: If the SGSN sends Delete PDP Context request due to GTP-C/U echo timeout with SGSN
- 26: If the SGSN sends Delete PDP Context request for any other reason

Duration

This field contains the duration for the record in seconds. For partial records, only the interval described by the recordOpeningTime and the last ChangeTime in the ListOfTrafficVolumes is counted. The Duration value is reset for each new partial CDR. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured.

Dynamic Address Flag

The presence of this field indicates that the PDP Address was dynamically allocated for that particular PDP context during context activation. This field is missing if the address is static (part of the PDP context subscription).

Event Time Stamp

These fields contain the event time stamps relevant for each of the individual record types. For LCS-MT-CDRs and LCS-MO-CDRs, this field indicates the time at which the Perform_Location_Request is sent by the SGSN.
All time-stamps include a minimum of date, hour, minute and second.

---

**GGSN Address**

This field provides the IP address for the control plane of the current serving GGSN, which is equivalent to the configured ggsn-service address on the GGSN. The standard 3GPP 32.298 offers a choice for the encoding of the address to be either in binary or text format. The SGSN encodes the address in binary format and includes the Octet String.

**Format**
- Hex Value Octet String

**Length**
- 4-6 Bytes

---

**IP Address**

The IP address format is used by multiple fields in the CDR, such as the GGSN address or the Served PDP address. This entry is included here to avoid duplication. For the IP address, both the binary and text format and both IPv4 and IPv6 are specified in 3GPP 32.298.

For custom33 only, served PDP IP address will be in IPV4 or IPV6. The SGSN and GGSN transport interfaces should be IPV4 encoded.

- iPBinV4Address -- [0] -- OCTET STRING -- (SIZE(4))
- iPBinV6Address -- [1] -- OCTET STRING -- (SIZE(16))
- iPTextV4Address -- [2] -- IA5String -- (SIZE(7..15))
- iPTextV6Address -- [3] -- IA5String -- (SIZE(15..45))

**Format**
- Hex Value Octet String

**Length**
- 4-6 Bytes

---

**IPv4 Binary Address**

This field contains an IPv4 address in hexadecimal format. Depending on where the field is used in the sequence of the CDR, it may contain either an SGSN or GGSN address or the PDP IP address of the mobile subscriber. Note the difference between how the GSN address and the PDP address are encoded. Currently, only IPv4 support is provided.

**Format**
- Hex Value Octet String

**Length**
- Varies for GSN address or PDP address
IPv6 Binary Address

This field contains an IPv6 address in hexadecimal format. Depending on where the field is used in the sequence of the CDR, it may contain either an SGSN or GGSN address or the PDP IP address of the mobile subscriber. Note: Note the difference between how the GSN address and the PDP address are encoded. Currently, only IPv4 support is provided.

Format
Hex Value Octet String

Length
Varies for GSN address or PDP address

LCS Cause

This provides the reason for an unsuccessful location request.

Format
Octet String

Length
1 Byte

LCS Client Identity

This field contains additional information on the LCS Client Identity.

The additional information of the LCS client identity include:

- Client External ID
- Client Dialed by MS ID
- Client Internal ID

Important: ExtensionContainer sub-field in LCS Client external ID is not supported.

Format
Sequence

Length
Variable

LCS Client Type

This field contains the type of the LCS Client.

Format
Enumerated

Length
1 Byte
LCS Priority

This field defines the priority of the location request.

**Format**
- Octet String

**Length**
- 1 Byte

LCS QoS

This field defines the Quality of Service for a location request.

**Format**
- Octet String

**Length**
- 4 Bytes

Level of CAMEL services

This field describes 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: The CAMEL feature is invoked only during the PDP context activation phase. (For example, to modify APN_NI/APN_OI).
- Call duration supervision: The PDP context duration or volume supervision is applied in the gprsSSF of the VPLMN (Apply Charging message is received from the gsmSCF).

**Format**
- Octet String

List of Traffic Data Volumes

A list of the changes that occurred in the charging conditions for this PDP context. The list will include one or more containers each including the following fields:

- QoS negotiated: Quality of service (QoS) has been negotiated. The initial and final corresponding data values are listed. This is only added for the first container and the container after a QoS change.
- Uplink volume: The number of octets (uncompressed) received from the MS. The initial and final corresponding data values are listed.
- Downlink volume: The number of octets (uncompressed) transmitted to the MS. The initial and final corresponding data values are listed.
- Change Condition: Identifies the reason that the container was closed such as tariff time change, QoS change, or closing of the CDR.
- Change Time: A timestamp identifying the time at which the volume container or the CDR closed.

For GPRS, data volumes are in octets above the GTP layer and are separated for uplink and downlink traffic. In UMTS, data volumes are in octets above the GTP-U layer and are separated for uplink and downlink traffic.
Format
- QoS negotiated: Octet String
- Uplink volume: Integer
- Downlink volume: Integer
- Change Condition: Integer
- Change Time: BCD Encoded Octet String

Length
- QoS negotiated: 12 Bytes
- Uplink volume: 4 Bytes
- Downlink volume: 4 Bytes
- Change Condition: 1 Byte
- Change Time: 9 Bytes

List of Traffic Volumes
This list includes one or more Traffic Volume containers related to a “Change of Charging Condition”. The maximum number of containers is configurable.

This list includes containers that include the following fields:
- QoS requested (optional)
- QoS negotiated (optional)
- data volume uplink
- data volume downlink
- change condition
- change time

Format
Sequence
Length
Variable

Local Record Sequence Number
This field contains a unique sequence number associated with the NodeId field and independent of the PDP context. Unless the LRSN rewrite feature is used on the HDD, the SGSN will generate multiple NodeIds (one for each internal process generating CDRs), each with its own sequence number. The number, allocated sequentially and including all CDR types, is unique within one physical node, which is identified either by field Node ID or by record-dependent node address (SGSN address, GGSN address, Record Entity). The local sequence number will be restarted at 0 when, for example, the node is reloaded.

Note: Since node-id is unique centralized LRSN feature must be enabled.

Format
Unsigned Integer (0..4294967295)
Octet string for custom11
Length
1–4 Bytes / 1-5 Bytes (custom33)
4 Bytes for custom11

Location
The location field contains a combination of the Location Area Code (LAC), Cell Identity (CI) and MCC+MNC of the cell in which the served party is currently located.

Format
Sequence
Length
Variable

Location Area Code (LAC)
This field contains the location area code (LAC) identifying the location area in which the served party is currently located. The LAC is coded according to 3GPP TS 24.008.

Format
Octet String
Length
2 Bytes

Location Estimate
The geographic location estimate of the subscriber, if the subscriber is contained in a geographic position and the location request was successful.

Format
Octet String
Length
1-20 Bytes

Location Type
This field contains the type of the estimated location.

Format
Sequence
Length
Variable

Low Access Priority Indicator
This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.
**Important:** This attribute field is currently available only in custom24 GTPP dictionary for SGSN-CDRs when the CLI command “gtpp attribute lapi” is configured in GTPP Server Group Configuration mode.

### 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.

**Format**
- Null

**Length**
- 0 Byte

### MLC Number

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

**Format**
- Address

**Length**
- ISDN (E.164) number

### MS Network Capability

This field identifies the mobile station network capability value or information element for the served MS at PDP Context Activation or at GPRS Attach as defined in 3GPP TS 24.008.

**Format**
- Octet String

**Length**
- 1–8 Bytes

### Network Initiated PDP Context

The presence of this field indicates that the PDP context was initiated by the network.

**Format**
- Boolean

**Length**
- 1 Byte
**Node ID**

The identifier string for the SGSN that had generated the CDR. Node ID, along with local record sequence number, uniquely identifies a CDR.

On the ASR5K SGSN, this NodeID field is a printable string of the ndddSTRING format:

- **n**: The first digit is the Sessmgr restart counter having a value between 0 and 7.
- **ddd**: The number of the sessmgr instance generating the CDR
- **STRING**: This is a configured Node-ID-Suffix having any string between 1 to 16 characters, defined using the gtpp attribute node-id command.

If this node-id-suffix is not configured, the SGSN uses the GTPP context name as the Node-id-suffix (truncated to 16 characters).

This field is only included when the option “gtpp attribute local-record-sequence-number” is configured.

**Format**

IA5string

**Length**

5-20 Bytes

---

**Notification To MS User**

This field contains the privacy notification to MS user that was applicable when the Location Request was invoked.

**Format**

Enumerated

**Length**

1 Byte

---

**Number of DPs encountered**

The number of armed CAMEL detection points (TDP and EDP) encountered and complements the "Level of CAMEL service" field.

Note: Bits 5-8 of octet 2 contain third MNC digit, or 1111 used as filler when MNC has only two digits.

**Format**

Integer

---

**PDP Type**

The PDP context type. The PDP types supported by the SGSN are IP or PPP (including IHOSS:OSP).

**Format**

Hex Value Octet String

**Length**

2 Bytes
For custom41 dictionary:

- Value “0”: PDP type IPv4
- Value “1”: PDP type IPv6
- Value “2”: PDP type IPv4v6

**pLMNIdentifier**

This field defines the PLMN identity (MCC and MNC) as part of the location information. It is present only if the option to include PLMN identity has been set by the operator.

Note: Bits 5-8 of octet 2 contain third MNC digit, or 1111 used as filler when MNC has only two digits.

**Format**

Octet String

**Length**

3 Bytes

**Positioning Data**

This information element provides positioning data associated with a successful or unsuccessful location attempt for a target MS.

**Format**

Octet String

**Length**

1 - 33 Bytes

**Privacy Override**

This parameter indicates if the LCS client overrides MS privacy when the GMLC and SGSN for an MT-LR are in the same country.

**Format**

Null attribute

**QoS Negotiated**

QoS Negotiated indicates the applied QoS accepted by the network.

**Note:**

- If a pre-release ‘99-capable terminal is served, only octets 1 to 4 are included.
- The field is defined with a maximum size of 12 bytes.
- This field is present in first container of all CDRs.
- In next container this field is present if there is QOS change.
- The mediation system should be capable of handling QoS values up to 255 bytes. In Rel. 9, the maximum QoS length is 17 bytes and the minimum length is 4 bytes. To support the QoS length of 17 bytes, the CLI command "gtpp attribute qos max-length" should be enabled. Otherwise, the QoS length will be restricted to 15 bytes.

**QoS Requested**

The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation.

**Note:**
- If a pre-release '99-capable terminal is served, only octets 1 to 4 are included.
- The field is defined with a maximum size of 12 bytes.
- This field is present in first container of all CDRs.
- In next container this field is present if there is QoS change. QoS Requested field may be absent if QoS change is initiated by network (GGSN/HLR).
- The mediation system should be capable of handling QoS values up to 255 bytes. In Rel. 9, the maximum QoS length is 17 bytes and the minimum length is 4 bytes. To support the QoS length of 17 bytes, the CLI command "gtpp attribute qos max-length" should be enabled. Otherwise, the QoS length will be restricted to 15 bytes.

**Format**
- Octet String

**Length**
- 4-17 Bytes

**Radio Access Technology (RAT) Type**

The SGSN may include the RAT Type IE along with User Location Information IE, and MS Time Zone IE if they are available. The RAT Type IE is not included for the MS-initiated PDP Context Modification procedure.

**Format**
- Integer (1-255).

**Length**
- 1 Byte

**Record Extensions**

A set of network operator or manufacturer specific extensions that may be added to the record if provided. It is used for reporting flows and volumes consumed, and also for passing key information about the session into the downstream charging systems.
SGSN CDR Field Descriptions

Record Opening Time

The timestamp at which the PDP context was activated on the SGSN or when a subsequent record is opened after a partial record. The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds. In the case of custom11 dictionary, this field does not support the offset to the UTC in the string and is limited to 6 bytes.

Format
BCD Encoded Octet String
Length
9 Bytes
6 Bytes for custom11

Record Sequence Number

A running sequence number used to link partial records generated by the SGSN for a specific PDP context (characterized with the same Charging ID and SGSN address pair). This field is only present in case of partial records or if the first record is also the final record.

Format
Unsigned Integer
Length
1–5 Bytes
1–3 Bytes for custom11

Record Type

Indicates type of the record: S-CDR(sgsnPDPRecord) >>> 18 (0x12).

Format
Integer
Length
1 Byte

Recording Entity

This field contains the ITU-T E.164 number assigned to the SGSN.

Format
ITU-T E.164 number
RNC Unsent Downlink Volume

This field contains the unsent downlink (from RNC to MS) data volume in bytes. The value is measured within the RNC and a correction of the already counted downlink volume within the 3G-SGSN. The value is sent from the RNC to the 3G-SGSN on request during the PDP context or at RAB release. This field is absent in case of 2G SGSN.

Format
Integer

Length
For custom10 and custom11 dictionaries: 1–4 Bytes
For other custom dictionaries: 1–5 Bytes

Routing Area Code (RAC)

This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located when the (partial) record is opened. The RAC is coded according to 3GPP TS 24.008.

Format
Octet String

Length
1 Byte

SCF Address

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

Format
Address

Served IMEI

This field contains the international mobile equipment identity (IMEI) of the equipment served. If IMEISV (IMEI software version) is available, then IMEISV shall be sent in the CDR. The structure of the IMEI is defined in TS 23.003.

The IMEI is composed of the following elements:
- Type Allocation Code (TAC) with a length of 8 digits
- Serial Number (SNR) is an individual serial number uniquely identifying each equipment within each TAC. Its length is 6 digits
- Spare digit: this digit shall be zero, when transmitted by the MS
  A filler digit "f" is added after the spare digit to fill up the last byte.

**Important:** In the case of custom31 GTPP dictionary, if IMEISV or IMEI is present, then IMEI will be sent.

Format
BCD Encoded Octet String
SGSN CDR Field Descriptions

CDR Fields

Length
8 Bytes

Served IMSI

The International Mobile Subscriber Identity (IMSI) of the MS. The IMSI is formatted in accordance with 3GPP TS 23.003. This will be present if the Anonymous Access Indicator is FALSE or not supplied.

Format
BCD Encoded Octet String

Length
3–8 Bytes

Served PDP Address

The binary-represented IP address associated with the PDP context of the served IMSI for the CDR. This address could be either static or dynamically assigned. The standard 3GPP TS32.298 allows a choice of either IPAddress or ETSIAddress - a binary IPv4 address (iPBinV4Address) or IPv6 address (iPBinV6Address).

Format
Choice

Length
4 bytes for IPv4 address
16 bytes for IPv6 address

Served PDP PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4v6 is used, and the IPv6 address is included in Served PDP Address or Served PDP PDN Address.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the \texttt{gtpp attribute served-pdp-pdn-address-extension} CLI command.

\textbf{Important:} Note that this field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Rel.9 attribute and it can be present in Rel.7 or Rel.8 dictionary if enabled through the \texttt{gtpp attribute served-pdp-pdn-address-extension} CLI command.

Format
Octet string

Length
8 bytes

PDP IP Address

This field contains the IP address for the PDP context.
Format
IP address

Length
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

---

**PDP IPv4 Binary Address**

The octet string included in the field described above includes the IPv4 address of the P-GW in binary coding.

**Format**
Octet string

**Length**
4 bytes

---

**Served MSISDN**

The primary Mobile Station (MS) ISDN number (MSISDN) of the subscriber.

**Format**
BCD Encoded Octet String

**Length**
1–9 Bytes

---

**Service Key**

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

**Format**
Integer

---

**SGSN Address**

The SGSN IPv4 addresses (binary-represented) used over the duration of the CDR. The address(es) can be either user or control-plane addresses.

**Format**
Hex Value Octet String

**Length**
4 Bytes per address, field max is 30 Bytes

---

**SGSN Change**

Present if this is first record after SGSN change. Note that this attribute will not be present in S-CDRs for PDPs activated after the SGSN change. Only PDPs that were present in the older SGSN when the SGSN change happened should have this attribute when S-CDR is generated.
SGSN 2G Downlink Dropped Bytes

This is an optional field, present only in the S-CDR to indicate the number of downlink 2G bytes dropped by the SGSN. This is not a CLI controlled feature. This field is provided also for partial CDRs generated with gtpp interim, volume trigger, time tariff, etc.

**Important:** This field is introduced only in custom33 GTPP dictionary to address the SGSN and GGSN CDR packet count mismatch issue occurred due to paging failure and queue full in 2G scenario.

<table>
<thead>
<tr>
<th>Format</th>
<th>Boolean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1 Byte</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format</th>
<th>Integer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>1-5 Bytes</td>
</tr>
</tbody>
</table>
Chapter 11
S-GW CDR Field Reference

This chapter provides a reference for CDR fields supported by the system for use in SGW-CDRs. A complete list and descriptions of supported CDR fields is provided in the S-GW CDR Field Descriptions chapter of this reference.

Important: This reference document contains information only on standard GTPP dictionaries. For information on custom dictionaries, contact your Cisco account representative.

The category column in all tables use keys described in the following table.

Table 31. Dictionary Table Key

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be present in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable: Mandatory</td>
<td>A field that an operator has provisioned and must be included in the CDR for all conditions.</td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable: Conditional</td>
<td>A field that an operator has provisioned and must be included in the CDR if certain conditions are met.</td>
</tr>
</tbody>
</table>
CDR Fields Supported in SGW-CDRs

The tables in this section list the SGW-CDR fields present in the available GTPP dictionaries.

custom6 Dictionary

CDR fields are based on 3GPP TS 32.298 v8.7.0, 3GPP TS 32.251 v8.8.0, and 3GPP TS 32.298 v9.6.0.

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>S-GW IP CAN bearer record</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied)</td>
</tr>
<tr>
<td>Served IMEISV</td>
<td>OC</td>
<td>IMEISV of the ME, if available</td>
</tr>
<tr>
<td>S-GW Address used</td>
<td>M</td>
<td>The control plane IP address of the S-GW used.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs</td>
</tr>
<tr>
<td>PDN Connection Id</td>
<td>OM</td>
<td>The PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.</td>
</tr>
<tr>
<td>Serving Node Address</td>
<td>M</td>
<td>List of serving node control plane IP addresses (e.g. SGSN, MME, etc.) used during this record.</td>
</tr>
<tr>
<td>Serving Node Type</td>
<td>M</td>
<td>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.</td>
</tr>
<tr>
<td>S-GW Change</td>
<td>OC</td>
<td>Present if this is the first record after S-GW change.</td>
</tr>
<tr>
<td>PGW PLMN Identifier</td>
<td>OM</td>
<td>PLMN identifier (MCC MNC) of the P-GW used.</td>
</tr>
<tr>
<td>Access Point Name</td>
<td>OM</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
</tr>
<tr>
<td>Network Identifier</td>
<td>OM</td>
<td>Indicates PDN type (i.e IPv4, IPv6 or IPv4v6).</td>
</tr>
<tr>
<td>Served PDP/PDN Address</td>
<td>OC</td>
<td>IP address allocated for the PDP context / PDN connection, i.e. IPv4 or IPv6, if available.</td>
</tr>
<tr>
<td>Served PDP/PDN Address Extension</td>
<td>OC</td>
<td>This field holds IPv4 address of the served IMSI, if available, when PDN Type is IPv4v6.</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>OC</td>
<td>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.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>OM</td>
<td>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. Refer to the List of Data Traffic Volumes table in this chapter.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>M</td>
<td>Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.</td>
</tr>
<tr>
<td>MS Time Zone</td>
<td>OC</td>
<td>Contains the MS Time Zone the MS is currently located as defined in TS 29.060, if available.</td>
</tr>
<tr>
<td>Duration</td>
<td>M</td>
<td>Duration of this record in the S-GW.</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>M</td>
<td>The reason for the release of record from this S-GW.</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>OM</td>
<td>A more detailed reason for the release of the connection.</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>C</td>
<td>Partial record sequence number, only present in case of partial records.</td>
</tr>
<tr>
<td>Node ID</td>
<td>OM</td>
<td>Name of the recording entity.</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>OC</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>OM</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>OM</td>
<td>An index indicating how the APN was selected.</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>OM</td>
<td>The primary MSISDN of the subscriber.</td>
</tr>
<tr>
<td>User Location Information</td>
<td>OC</td>
<td>Contains the User Location Information of the MS as defined in TS 29.060 for GPRS case, and in TS 29.274 for EPC case, if available.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>M</td>
<td>The Charging Characteristics applied to the IP CAN bearer.</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>OM</td>
<td>Information about how Charging Characteristics were selected.</td>
</tr>
<tr>
<td>Selection Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMS Signalling Context</td>
<td>OC</td>
<td>Included if the IM-CN Subsystem Signalling Flag is set. IP CAN bearer is used for IMS signalling.</td>
</tr>
<tr>
<td>P-GW Address used</td>
<td>OC</td>
<td>The P-GW IP Address for the Control Plane.</td>
</tr>
<tr>
<td>Serving Node PLMN Identifier</td>
<td>OC</td>
<td>Serving node PLMN Identifier (MCC and MNC) used during this record, if available.</td>
</tr>
<tr>
<td>RAT Type</td>
<td>OC</td>
<td>Indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available. This RAT type is defined in TS 29.060 for GTP case, in TS 29.274 for eGTP case and in TS 29.275 for PMIP case.</td>
</tr>
<tr>
<td>Start Time</td>
<td>OC</td>
<td>The time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.</td>
</tr>
<tr>
<td>Stop Time</td>
<td>OC</td>
<td>The time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.</td>
</tr>
<tr>
<td>User CSG Information</td>
<td>OC</td>
<td>Contains the User CSG Information (UCI) status of the user accessing a CSG cell. It includes 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 for GPRS case, and in TS 29.274 for EPC case.</td>
</tr>
</tbody>
</table>
Notes:
- All IP addresses are in ASCII format.

**List of Traffic Data Volumes**

<table>
<thead>
<tr>
<th>Traffic Data Volume</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Of Charging Condition</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.</td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>M</td>
<td>The Data Volume GPRS Uplink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.</td>
</tr>
<tr>
<td>Data Volume GPRS Downlink</td>
<td>M</td>
<td>The Data Volume GPRS Downlink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate. The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.</td>
</tr>
<tr>
<td>Change Condition</td>
<td>M</td>
<td>The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container.</td>
</tr>
<tr>
<td>Change time</td>
<td>M</td>
<td>The Change Time field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It provides the local time when a change condition (e.g. record closure) occurred and the container was closed.</td>
</tr>
<tr>
<td>User Location Information</td>
<td>OC</td>
<td>This field contains the User Location Information as described in TS 29.274 for eGTP case (e.g. CGI, SAI, RAI TAI and ECGI). The field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification. 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 CDR was opened.</td>
</tr>
<tr>
<td>EPC Qos Requested</td>
<td>OC</td>
<td>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.</td>
</tr>
</tbody>
</table>

**ASN.1 Definition for Fields in custom6**

The following section provides the complete ASN.1 definition of all SGW-CDR related fields in this dictionary.
GPRS-SGW-Charging-DataTypes-REL8 DEFINITIONS IMPLICIT TAGS ::= BEGIN

-----BEGIN---------------------

GPRS RECORDS

-----BEGIN---------------------

GPRSRecord ::= CHOICE

--
-- Record values 20, 22..27 are specific
-- Record values 76..77 are MBMS specific
-- Record values 78..79 are EPC specific
{
  sGWRecord[78] SGWRecord
}

SGWRecord ::= SET
{
  recordType [0] RecordType,
  servedIMSI [3] IMSI,
  s-GWAddress [4] GSNAddress,
  chargingID [5] ChargingID,
  servingNodeAddress [6] SEQUENCE OF GSNAddress,
  accessPointNameNI [7] AccessPointNameNI OPTIONAL,
  pdpPDNType [8] PDPType OPTIONAL,
  servedPDPDNAddress [9] PDPAddress OPTIONAL,
  dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL,

-----END---------------------
listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
recordOpeningTime [13] TimeStamp,
duration [14] CallDuration,
causeForRecClosing [15] CauseForRecClosing,
diagnostics [16] Diagnostics OPTIONAL,
recordSequenceNumber [17] INTEGER OPTIONAL,
nodeID [18] NodeID OPTIONAL,
recordExtensions [19] ManagementExtensions OPTIONAL,
localSequenceNumber [20] LocalSequenceNumber OPTIONAL,
apnSelectionMode [21] APNSelectionMode OPTIONAL,
servedMSISDN [22] MSISDN OPTIONAL,
chargingCharacteristics [23] ChargingCharacteristics,
chChSelectionMode [24] ChChSelectionMode OPTIONAL,
iMSsignalingContext [25] NULL OPTIONAL,
servingNodePLMNIentifier [27] PLMN-Id OPTIONAL,
servedIMEISV [29] IMEI OPTIONAL,
rATType [30] RATType OPTIONAL,
mSTimeZone [31] MSTimeZone OPTIONAL,
userLocationInformation [32] OCTET STRING OPTIONAL,
sGWchange [34] SGWChange OPTIONAL,
servingNodeType [35] SEQUENCE OF ServingNodeType,
p-GWAddressUsed [36] GSNAddress OPTIONAL,
p-GWPLMNIentifier [37] PLMN-Id OPTIONAL,
startTime [38] TimeStamp OPTIONAL,
stopTime [39] TimeStamp OPTIONAL,
pDNConnectionID [40] ChargingID OPTIONAL,
servedPDPDNAddressExt [43] PDPAddress OPTIONAL
AccessPointNameNI::= IA5String (SIZE(1..63))
--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apnla.apnlb.apnlc.mnc022.mcc111.gprs'
-- NI is 'apnla.apnlb.apnlc' and is presented in this form in the CDR.

APNSelectionMode::= ENUMERATED
{
--
-- See Information Elements TS 29.060, TS 29.274 or TS 29.275
--
  mSorNetworkProvidedSubscriptionVerified  (0),
  mSProvidedSubscriptionNotVerified       (1),
  networkProvidedSubscriptionNotVerified (2)
}

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

CauseForRecClosing ::= INTEGER
{
--
-- In PGW-CDR and SGW-CDR the value servingNodeChange is used for partial record
-- generation due to Serving Node Address list Overflow
-- In SGSN servingNodeChange indicates the SGSN change
--
-- LCS related causes belong to the MAP error causes acc. TS 29.002
--
-- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
-- All cause values are not relevent to SGW. Refer the spec to find out the
-- cause values for SGW.

  normalRelease 0,
  abnormalRelease 4,
  cAMELInitCallRelease 5,
  volumeLimit 16,
  timeLimit 17,
  servingNodeChange 18,
  maxChangeCond 19,
  managementIntervention 20,
  intraSGSNIntersystemChange 21,
  rATChange 22,
  mSTimeZoneChange 23,
  sGSNPLMNIDChange 24,
  unauthorizedRequestingNetwork 52,
  unauthorizedLCSClient 53,
  positionMethodFailure 54,
  unknownOrUnreachableLCSClient 58,
  listofDownstreamNodeChange 59

ChangeCondition ::= ENUMERATED
{ 
  qosChange (0),
tariffTime (1),
recordClosure (2),
cGI-SAICHange (6),  -- bearer modification. CGI-SAI Change
rAIChange (7),  -- bearer modification. RAI Change
dT-Establishment (8),
dT-Removal (9),
eCGIChange (10),  -- bearer modification. ECGI Change
tAIChange (11),  -- bearer modification. TAI Change
userLocationChange (12)  -- bearer modification. User Location Change
apnAmbrChange (50)  -- apn-ambr change.
}

ChangeOfCharCondition ::= SEQUENCE
{
  --
  -- qosRequested and qosNegotiated are used in S-CDR only
  -- ePCQoSInformation used in SGW-CDR only
  --
  qosRequested  [1] QoSInformation OPTIONAL,
  qosNegotiated  [2] QoSInformation OPTIONAL,
dataVolumeGPRSUplink  [3] DataVolumeGPRS OPTIONAL,
dataVolumeGPRSDownlink  [4] DataVolumeGPRS OPTIONAL,
changeCondition  [5] ChangeCondition,
changeTime  [6] TimeStamp,
userLocationInformation  [8] OCTET STRING OPTIONAL,
}
ePCQoSInformation [9] EPCQoSInformation OPTIONAL

ChargingCharacteristics ::= OCTET STRING (SIZE(2))

ChargingID ::= INTEGER (0..4294967295)

--
-- Generated in P-GW, part of IP CAN bearer
-- 0..4294967295 is equivalent to 0..2**32-1
--

ChChSelectionMode ::= ENUMERATED
{
    servingNodeSupplied (0), -- For S-GW/P-GW
    subscriptionSpecific (1), -- For SGSN only
    aPNSpecific (2), -- For SGSN only
    homeDefault (3), -- For SGSN, S-GW and P-GW
    roamingDefault (4), -- For SGSN, S-GW and P-GW
    visitingDefault (5) -- For SGSN, S-GW and P-GW
}

DataVolumeGPRS ::= INTEGER

--
-- The volume of data transferred in octets.
--

DynamicAddressFlag ::= BOOLEAN
EPCQoSInformation ::= SEQUENCE

{
  --
  -- See TS 29.212 for more information
  --
  qCI [1] INTEGER,
  maxRequestedBandwithUL [2] INTEGER OPTIONAL,
  maxRequestedBandwithDL [3] INTEGER OPTIONAL,
  guaranteedBitrateUL [4] INTEGER OPTIONAL,
  guaranteedBitrateDL [5] INTEGER OPTIONAL,
  aRP [6] INTEGER OPTIONAL
}

ETSIAddress ::= IPAddress

--
-- First octet for nature of address, and numbering plan indicator (3 for X.121)
-- Other octets TBCD
-- See TS 29.002
--

GSNAddress ::= IPAddress

IA5String ::= OCTET STRING

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))

-- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
--
-- Set to true if PDP context was initiated from network side
--

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

NumberOfDPEncountered ::= INTEGER

PDPAddress ::= CHOICE
{
iPAddress [0] IPAddress,
eTSIAddress [1] ETSIAddress
}

PDPType ::= OCTET STRING (SIZE(2))
--
-- OCTET 1: PDP Type Organization
-- OCTET 2: PDP Type Number
-- See TS 29.060 for GTP, TS 29.274 for eGTP and TS 29.275 for PMIP
--

PLMN-Id ::= OCTET STRING (SIZE (3))
--
-- This is a 1:1 copy from the Routing Area Identity (RAI) IE specified in TS 29.060
-- as follows:
-- OCTET 1 of PLMN-Id = OCTET 2 of RAI
-- OCTET 2 of PLMN-Id = OCTET 3 of RAI
-- OCTET 3 of PLMN-Id = OCTET 4 of RAI

QoSInformation ::= OCTET STRING (SIZE (4..255))

--

-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Bearer
-- Quality of
-- Service" information element specified in TS 29.274

--

RAType ::= INTEGER (0..255)

--

-- This integer is 1:1 copy of the RAT type value as defined in TS 29.060 for GTP,
-- TS 29.274 for eGTP and TS 29.275 for PMIP.

--

RecordType ::= INTEGER

{
  -- Record values 0..17 are CS specific.
  -- The contents are defined in TS 32.250

  sGWRecord     (84)
}

ResultCode ::= INTEGER

-- charging protocol return value, range of 4 byte (0...4294967259)
-- see Result-Code AVP as used in 3GPP 32.299

--
ServingNodeType ::= ENUMERATED
{
    sGSN    (0),
pMIPSGW  (1),
gTPSGW   (2),
ePDG     (3),
hSGW     (4),
mME      (5)
}

SGWChange ::= BOOLEAN
--
-- present if first record after inter S-GW change
--

Diagnostics ::= CHOICE
{
    gsm0408Cause [0] INTEGER,
    -- See TS 24.008
    gsm0902MapErrorValue [1] INTEGER,
    -- Note: The value to be stored here corresponds to
    -- the local values defined in the MAP-Errors and
    -- MAP-DialogueInformation modules, for full details
    -- see TS 29.002
    itu-tQ767Cause [2] INTEGER,
    -- See ITU-T Q.767
    networkSpecificCause [3] ManagementExtension,

-- To be defined by network operator
manufacturerSpecificCause [4] ManagementExtension,

-- To be defined by manufacturer
positionMethodFailureCause [5] PositionMethodFailure-Diagnostic,

-- see TS 29.002
unauthorizedLCSClientCause [6] UnauthorizedLCSClient-Diagnostic

-- see TS 29.002

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

IPBinaryAddress::= CHOICE
{
ipBinV4Address [0] OCTET STRING (SIZE(4)),
ipBinV6Address [1] OCTET STRING (SIZE(16))
}

IPTextRepresentedAddress::= CHOICE
{
--
-- IP address in the familiar "dot" notation
--
iPTextV4Address [2] IA5String (SIZE(7..15)),
iPTextV6Address [3] IA5String (SIZE(15..45))
}
PositionMethodFailure-Diagnostic ::= ENUMERATED

{
    congestion (0),
    insufficientResources (1),
    insufficientMeasurementData (2),
    inconsistentMeasurementData (3),
    locationProcedureNotCompleted (4),
    locationProcedureNotSupportedByTargetMS (5),
    qosNotAttainable (6),
    positionMethodNotAvailableInNetwork (7),
    positionMethodNotAvailableInLocationArea (8)
}

LocalSequenceNumber ::= INTEGER (0..4294967295)

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

ManagementExtension ::= SEQUENCE

{
    identifier OBJECT IDENTIFIER,
    significance [1] BOOLEAN DEFAULT FALSE,
    information [2] ANY DEFINED BY identifier
}

ManagementExtensions ::= SET OF ManagementExtension
MSISDN::= ISDN-AddressString

--

-- See TS 23.003

MSTimeZone::= OCTET STRING (SIZE (2))

--

-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060

TimeStamp::= OCTET STRING (SIZE(9))

--

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

UnauthorizedLCSClient-Diagnostic ::= ENUMERATED
custom24 Dictionary

In releases prior to 16, CDR fields in this dictionary are compliant to 3GPP TS 32.298 v8.7.0 and 3GPP TS 32.251 v8.8.0, and also partially compliant to 3GPP TS 32.298 v10.11.0. In release 16 and later, the CDR fields are fully compliant to 3GPP spec 32.298 v10.11.0.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Tag Number</th>
<th>Category</th>
<th>Description</th>
<th>Format</th>
<th>Size (in bytes)</th>
<th>ASN1 code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>0</td>
<td>M</td>
<td>S-GW IP CAN bearer record.</td>
<td>Integer</td>
<td>1</td>
<td>0x80</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>3</td>
<td>M</td>
<td>IMSI of the served party.</td>
<td>BCD encoded octet string</td>
<td>3-8</td>
<td>0x83</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
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<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>S-GW Address</td>
<td>4</td>
<td>M</td>
<td>The control plane IP address of the S-GW used.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>0xa4</td>
</tr>
<tr>
<td>S-GW BINARY IPV4 ADDRESS</td>
<td>4-0</td>
<td>M</td>
<td>The octet string includes the Gx address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>S-GW BINARY IPV6 ADDRESS</td>
<td>4-0</td>
<td>M</td>
<td>The octet string included in the field described includes the Gx address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>Charging ID</td>
<td>5</td>
<td>M</td>
<td>IP CAN bearer identifier used to identify IP CAN bearer in different records created by PCNs.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x85</td>
</tr>
<tr>
<td>List of Serving Node Address</td>
<td>6</td>
<td>M</td>
<td>List of serving node control plane IP addresses (e.g. SGSN, MME ) used during this record.</td>
<td>Sequence</td>
<td>6 to 90</td>
<td>0xa6</td>
</tr>
<tr>
<td>Serving Node BINARY IPV4 ADDRESS</td>
<td>6-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address of the MME.</td>
<td>Octet string</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>Serving Node BINARY IPV6 ADDRESS</td>
<td>6-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPV6 address of the MME.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>7</td>
<td>M</td>
<td>The logical name of the connected access point to the external packet data network (network identifier part of APN).</td>
<td>IA5 string</td>
<td>1-63</td>
<td>0x87</td>
</tr>
<tr>
<td>PDP/PDN Type</td>
<td>8</td>
<td>M</td>
<td>This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).</td>
<td>Octet string (SIZE(2))</td>
<td>2</td>
<td>0x88</td>
</tr>
<tr>
<td>Served PDP/PDN Address</td>
<td>9</td>
<td>M</td>
<td>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.</td>
<td>Choice</td>
<td>8 (IPv4) or 20 (IPv6)</td>
<td>0xa9</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>9-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>0xa0</td>
</tr>
<tr>
<td>PDP IPV4 Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the S-GW in binary coding.</td>
<td>Octet string</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>PDP IPV6 Address</td>
<td>9-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv6 address assigned to the subscriber by the S-GW in binary coding.</td>
<td>Octet string</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
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</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>11</td>
<td>O</td>
<td>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.</td>
<td>Boolean</td>
<td>1</td>
<td>0x8b</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>12</td>
<td>M</td>
<td>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.</td>
<td>Sequence</td>
<td>0xac</td>
<td></td>
</tr>
<tr>
<td>Change of charging condition</td>
<td>12-0</td>
<td>M</td>
<td>Each traffic volume container contains details related to a charging condition. A new container is usually created for a QoS change and for tariff changes.</td>
<td>Sequence</td>
<td>0x30</td>
<td></td>
</tr>
<tr>
<td>Data Volume GPRS Uplink</td>
<td>12-0-3</td>
<td>M</td>
<td>The Data Volume GPRS Uplink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x83</td>
</tr>
<tr>
<td>Data Volume GPRS Downlink</td>
<td>12-0-4</td>
<td>M</td>
<td>The Data Volume GPRS Downlink field is a part of the ChangeOfCharCondition element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x84</td>
</tr>
<tr>
<td>Change Condition</td>
<td>12-0-5</td>
<td>M</td>
<td>The Change Condition field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It defines the reason for closing the container.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x85</td>
</tr>
<tr>
<td>Change Time</td>
<td>12-0-6</td>
<td>M</td>
<td>The Change Time field is part of the ChangeOfCharCondition element in the List of Traffic Volumes. It provides the local time when a change condition (e.g. record closure) occurred and the container was closed.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>0x86</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
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</tr>
<tr>
<td>User Location Information</td>
<td>12-0-8</td>
<td>O</td>
<td>This field contains the User Location Information.</td>
<td>Octet string</td>
<td>8-33</td>
<td>0x88</td>
</tr>
<tr>
<td>EPC QoS Information</td>
<td>12-0-9</td>
<td>O</td>
<td>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 the following containers this field is present if previous change condition is &quot;QoS change&quot;. This field is applicable only in SGW-CDR.</td>
<td>Octet string</td>
<td>18-42</td>
<td>0xa9</td>
</tr>
<tr>
<td>qci</td>
<td>12-9-1</td>
<td>M</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x81</td>
</tr>
<tr>
<td>Uplink MBR</td>
<td>12-9-2</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x82</td>
</tr>
<tr>
<td>Downlink MBR</td>
<td>12-9-3</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x83</td>
</tr>
<tr>
<td>Uplink GBR</td>
<td>12-9-4</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x84</td>
</tr>
<tr>
<td>Downlink GBR</td>
<td>12-9-5</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x85</td>
</tr>
<tr>
<td>arp</td>
<td>12-9-6</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x86</td>
</tr>
<tr>
<td>apnAmbrUplink</td>
<td>12-9-7</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x87</td>
</tr>
<tr>
<td>apnAmbrDownlink</td>
<td>12-9-8</td>
<td>O</td>
<td></td>
<td>Integer</td>
<td>1-5</td>
<td>0x88</td>
</tr>
<tr>
<td>Record Opening Time</td>
<td>13</td>
<td>M</td>
<td>Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>0x8d</td>
</tr>
<tr>
<td>Duration</td>
<td>14</td>
<td>M</td>
<td>This field contains the duration in seconds for the record.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x8e</td>
</tr>
<tr>
<td>Cause for Record Closing</td>
<td>15</td>
<td>M</td>
<td>This field contains a reason for the closure of the CDR.</td>
<td>Integer</td>
<td>1</td>
<td>0x8f</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>16</td>
<td>O</td>
<td>This field is included in the CDR when the bearer context is released and when the option <em>gtpp attribute diagnostics</em> is configured.</td>
<td>Choice</td>
<td>3</td>
<td>0xb0</td>
</tr>
<tr>
<td>gsm408cause</td>
<td>16-0</td>
<td>M</td>
<td></td>
<td>Integer</td>
<td>1</td>
<td>0x80</td>
</tr>
<tr>
<td>Record Sequence Number</td>
<td>17</td>
<td>O</td>
<td>Partial record sequence number, only present in case of partial records.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x91</td>
</tr>
<tr>
<td>Node ID</td>
<td>18</td>
<td>O</td>
<td>Name of the recording entity.</td>
<td>IA5 string</td>
<td>5-20</td>
<td>0x92</td>
</tr>
<tr>
<td>Record Extensions</td>
<td>19</td>
<td>O</td>
<td>A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.</td>
<td>Sequence</td>
<td>N/A</td>
<td>0xb3</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
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</tr>
<tr>
<td>Local Record Sequence Number</td>
<td>20</td>
<td>O</td>
<td>Consecutive record number created by this node. The number is allocated sequentially including all CDR types.</td>
<td>Integer</td>
<td>1-5</td>
<td>0x94</td>
</tr>
<tr>
<td>APN Selection Mode</td>
<td>21</td>
<td>M</td>
<td>An index indicating how the APN was selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x95</td>
</tr>
<tr>
<td>Served MSISDN</td>
<td>22</td>
<td>M</td>
<td>The primary MSISDN of the subscriber.</td>
<td>Integer</td>
<td>1-9</td>
<td>0x96</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>23</td>
<td>M</td>
<td>The Charging Characteristics applied to the IP CAN bearer.</td>
<td>Hex Value</td>
<td>2</td>
<td>0x97</td>
</tr>
<tr>
<td>Charging Characteristics</td>
<td>24</td>
<td>O</td>
<td>Holds information about how Charging Characteristics were selected.</td>
<td>Enumerated</td>
<td>1</td>
<td>0x98</td>
</tr>
<tr>
<td>IMS Signaling Context</td>
<td>25</td>
<td>O</td>
<td>Included if the IM-CN Subsystem Signalling Flag is set, see [201] IP CAN bearer is used for IMS signalling.</td>
<td>Null</td>
<td>0</td>
<td>0x99</td>
</tr>
<tr>
<td>Serving Node PLMN Identifier</td>
<td>27</td>
<td>O</td>
<td>Serving node PLMN Identifier (MCC and MNC) used during this record, if available.</td>
<td>Octet string</td>
<td>3</td>
<td>0x9b</td>
</tr>
<tr>
<td>Served IMEISV</td>
<td>29</td>
<td>O</td>
<td>IMEISV of the ME, if available.</td>
<td>BCD encoded</td>
<td>8</td>
<td>0x9d</td>
</tr>
<tr>
<td>RAT Type</td>
<td>30</td>
<td>O</td>
<td>This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.</td>
<td>Integer</td>
<td>1</td>
<td>9e</td>
</tr>
<tr>
<td>MS Time Zone</td>
<td>31</td>
<td>O</td>
<td>The &quot;Time Zone&quot; IE that the MME may provide to the S-GW during the PDN context activation/modification procedure.</td>
<td>Octet string (SIZE (2))</td>
<td>2</td>
<td>9f1f</td>
</tr>
<tr>
<td>User Location Information</td>
<td>32</td>
<td>O</td>
<td>This field contains the User Location Information as described in TS 29.274 for eGTP case (e.g. CGI, SAI, RAI TAI and ECGI). This field is provided by the SGSN/MME and transferred to the S-GW/P-GW during the IP-CAN bearer activation/modification.</td>
<td>Octet string</td>
<td>8-33</td>
<td>9f20</td>
</tr>
<tr>
<td>S-GW Change</td>
<td>34</td>
<td>O</td>
<td>This field is present only in the SGW-CDR to indicate that this is the first record after an S-GW change. In this case, it is set to TRUE (&quot;FF&quot;).</td>
<td>Boolean</td>
<td>1</td>
<td>9f22</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
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<td>Size (in bytes)</td>
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</tr>
<tr>
<td>Serving Node Type</td>
<td>35</td>
<td>M</td>
<td>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 &quot;Serving node Address&quot; in sequence.</td>
<td>Sequence</td>
<td></td>
<td>bf23</td>
</tr>
<tr>
<td>Serving Node Type enum</td>
<td>35-1</td>
<td>M</td>
<td></td>
<td>Sequence: Enumerated</td>
<td>0x0a</td>
<td></td>
</tr>
<tr>
<td>P-GW Address Used</td>
<td>36</td>
<td>M</td>
<td>This field is the P-GW IP Address for the Control Plane.</td>
<td>Choice</td>
<td>6 (IPv4) or 18 (IPv6)</td>
<td>bf24</td>
</tr>
<tr>
<td>P-GW Binary IPV4 Address</td>
<td>36-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet String</td>
<td>4</td>
<td>0x80</td>
</tr>
<tr>
<td>P-GW Binary IPV6 Address</td>
<td>36-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv6 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet String</td>
<td>16</td>
<td>0x81</td>
</tr>
<tr>
<td>P-GW PLMN Identifier</td>
<td>37</td>
<td>O</td>
<td>This field holds the time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.</td>
<td>Octet string</td>
<td>3</td>
<td>9f25</td>
</tr>
<tr>
<td>Start Time</td>
<td>38</td>
<td>O</td>
<td>This field holds the time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>9f26</td>
</tr>
<tr>
<td>Stop Time</td>
<td>39</td>
<td>O</td>
<td>This field holds the time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.</td>
<td>BCD encoded octet string</td>
<td>9</td>
<td>9f27</td>
</tr>
<tr>
<td>PDN Connection ID</td>
<td>40</td>
<td>O</td>
<td>This field holds the PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.</td>
<td>Integer</td>
<td>1-5</td>
<td>9f28</td>
</tr>
<tr>
<td>iMSIunauthenticatedFlag</td>
<td>41</td>
<td>O</td>
<td>This field indicates the provided served IMSI is not authenticated (emergency bearer service situation).</td>
<td>Null</td>
<td>0</td>
<td>9f29</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
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<td>------------</td>
</tr>
<tr>
<td>userCSGInformation</td>
<td>42</td>
<td>O</td>
<td>This field contains the &quot;User CSG Information&quot; 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 for GPRS case, and in TS 29.274 for EPC case.</td>
<td>Sequence</td>
<td></td>
<td>bf2a</td>
</tr>
<tr>
<td>cSGId</td>
<td>42-0</td>
<td>O</td>
<td>A CSG ID is a unique identifier within the scope of PLMN which identifies a Closed Subscriber Group (CSG) in the PLMN associated with a CSG cell or group of CSG cells.</td>
<td>Octet string</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>cSGAccessMode</td>
<td>42-1</td>
<td>O</td>
<td>cSGAccessMode will be either CLOSED or HYBRID.</td>
<td>Enumerated</td>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>cSGMembershipIndication</td>
<td>42-2</td>
<td>O</td>
<td>This field provides an indication on CSG membership for the user.</td>
<td>Null</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td>Served PDP PDN Address Extension</td>
<td>43</td>
<td>O</td>
<td>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 address is included in Served PDP Address or Served PDP/PDN Address.</td>
<td>Choice</td>
<td>8 (IPv4)</td>
<td>bf2b</td>
</tr>
<tr>
<td>PDP IP Address</td>
<td>43-0</td>
<td>M</td>
<td>This field contains the IP address for the PDP context.</td>
<td>Choice</td>
<td>6 (IPv4)</td>
<td>0xa0</td>
</tr>
<tr>
<td>PDP IPV4 Address</td>
<td>43-0-0</td>
<td>M</td>
<td>The octet string included in the field described above includes the IPv4 address assigned to the subscriber by S-GW in binary coding.</td>
<td>Octet String</td>
<td>4 (IPv4)</td>
<td>0x80</td>
</tr>
<tr>
<td>lowAccessPriorityIndicator</td>
<td>44</td>
<td>O</td>
<td>This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.</td>
<td>Null</td>
<td>0</td>
<td>9f2c</td>
</tr>
<tr>
<td>dynamicAddressFlagExt</td>
<td>47</td>
<td>O</td>
<td>This field 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.</td>
<td>Boolean</td>
<td>1</td>
<td>9f2f</td>
</tr>
<tr>
<td>s-GWIPv6Address</td>
<td>48</td>
<td>O</td>
<td>The control plane IPv6 address, in case of IPv4v6 dual stack, of the S-GW.</td>
<td>Choice</td>
<td>18(IPv6)</td>
<td>bf30</td>
</tr>
<tr>
<td>Field Name</td>
<td>Tag Number</td>
<td>Category</td>
<td>Description</td>
<td>Format</td>
<td>Size (in bytes)</td>
<td>ASN1 code</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>SGW BINARY IPV6 ADDRESS</td>
<td>48-0</td>
<td>O</td>
<td>The octet string in this field includes the Gn address of the GGSN service in binary coding.</td>
<td>Octet string</td>
<td>16(IPv6)</td>
<td>0x81</td>
</tr>
<tr>
<td>List of Serving Node IPv6Address</td>
<td>49</td>
<td>O</td>
<td>List of serving node control plane IPv6 addresses, in case of IPv4v6 dual stack, (e.g. S4-SGSN, MME) used during this record.</td>
<td>Sequence</td>
<td>18 to 270</td>
<td>bf31</td>
</tr>
<tr>
<td>Serving Node BINARY IPV6 ADDRESS</td>
<td>49-0</td>
<td>M</td>
<td>The octet string in this field includes the IPV6 address of the MME.</td>
<td>Octet string</td>
<td>16(ipv6)</td>
<td>0x81</td>
</tr>
<tr>
<td>p-GWIPv6AddressUsed</td>
<td>50</td>
<td>O</td>
<td>This field is the P-GW IPv6 Address, in case of IPv4v6 dual stack, for the Control Plane.</td>
<td>Choice</td>
<td>18(IPv6)</td>
<td>bf32</td>
</tr>
<tr>
<td>PGW BINARY IPV6 ADDRESS</td>
<td>50-0</td>
<td>O</td>
<td>The octet string in this field includes the IPV6 address assigned to the subscriber by of the P-GW in binary coding.</td>
<td>Octet string</td>
<td>16(IPv6)</td>
<td>0x81</td>
</tr>
</tbody>
</table>

Notes:
- All IP addresses are encoded in binary format.

**ASN.1 Definition for Fields in custom24**

The following section provides the complete ASN.1 definition of all SGW-CDR related fields in this dictionary.

```asn1
GPRS-SGW-Charging-DataTypes-REL8 DEFINITIONS IMPLICIT TAGS ::= BEGIN

GPRSRecord ::= CHOICE
```

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---
-- Record values 20, 22..27 are specific
-- Record values 76..77 are MBMS specific
-- Record values 78..79 are EPC specific

{  
sGWRecord[78]  SGWRecord
}

SGWRecord ::= SET
{
  recordType [0] RecordType,
  servedIMSI [3] IMSI,
  s-GWAddress [4] GSNAddress,
  chargingID [5] ChargingID,
  servingNodeAddress [6] SEQUENCE OF GSNAddress,
  accessPointNameNI [7] AccessPointNameNI OPTIONAL,
  pdpPDNType [8] PDPType OPTIONAL,
  servedPDPDNAddress [9] PDPAddress OPTIONAL,
  dynamicAddressFlag [11] DynamicAddressFlag OPTIONAL,
  listOfTrafficVolumes [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,
  recordOpeningTime [13] TimeStamp,
  duration [14] CallDuration,
  causeForRecClosing [15] CauseForRecClosing,
  diagnostics [16] Diagnostics OPTIONAL,
  recordSequenceNumber [17] INTEGER OPTIONAL,
  nodeID [18] NodeID OPTIONAL,
  recordExtensions [19] ManagementExtensions OPTIONAL,
  localSequenceNumber [20] LocalSequenceNumber OPTIONAL,
  apnSelectionMode [21] APNSelectionMode OPTIONAL,
  servedMSISDN [22] MSISDN OPTIONAL,
AccessPointNameNI::= IA5String (SIZE(1..63))
--
-- Network Identifier part of APN in dot representation.
-- For example, if the complete APN is 'apn1a.apn1b.apn1c.mnc022.mcc111.gprs'
-- NI is 'apn1a.apn1b.apn1c' and is presented in this form in the CDR.
APNSelectionMode::= ENUMERATED
{
  --
  -- See Information Elements TS 29.060, TS 29.274 or TS 29.275
  --
  mSorNetworkProvidedSubscriptionVerified (0),
  mSProvidedSubscriptionNotVerified (1),
  networkProvidedSubscriptionNotVerified (2)
}

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

CauseForRecClosing ::= INTEGER
{
  --
  -- In PGW-CDR and SGW-CDR the value servingNodeChange is used for partial record
  -- generation due to Serving Node Address list Overflow
  -- In SGSN servingNodeChange indicates the SGSN change
  --
  -- LCS related causes belong to the MAP error causes acc. TS 29.002
  --
  -- cause codes 0 to 15 are defined 'CauseForTerm' (cause for termination)
-- All cause values are not relevant to SGW. Refer the spec to find out the -- cause values for SGW.

normalRelease (0),
abnormalRelease (4),
cAMELInitCallRelease (5),
volumeLimit (16),
timeLimit (17),
servingNodeChange (18),
maxChangeCond (19),
managementIntervention (20),
intraSGSNIntersystemChange (21),
rATChange (22),
mSTimeZoneChange (23),
sGSNPLMNIDChange (24),
unauthorizedRequestingNetwork (52),
unauthorizedLCSClient (53),
positionMethodFailure (54),
unknownOrUnreachableLCSClient (58),
listofDownstreamNodeChange (59)
}

ChangeCondition ::= ENUMERATED
{
qoSChange (0),
tariffTime (1),
recordClosure (2),
cGI-SAICChange (6), -- bearer modification. CGI-SAI Change
rAIChange (7), -- bearer modification. RAI Change
dT-Establishment (8),
dT-Removal (9),
eCGIChange (10), -- bearer modification. ECGI Change
tAIChange (11), -- bearer modification. TAI Change
userLocationChange (12) -- bearer modification. User Location Change
apnAmbrChange (50) -- apn-ambr change.

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

ChChSelectionMode ::= ENUMERATED
{
  servingNodeSupplied     (0), -- For S-GW/P-GW
  subscriptionSpecific    (1), -- For SGSN only
  aPNSpecific            (2), -- For SGSN only
  homeDefault             (3), -- For SGSN, S-GW and P-GW
  roamingDefault          (4), -- For SGSN, S-GW and P-GW
  visitingDefault         (5) -- For SGSN, S-GW and P-GW
}

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

DynamicAddressFlag ::= BOOLEAN

EPCQoSInformation ::= SEQUENCE
{
  --
  -- See TS 29.212 for more information
  --
CDR Fields Supported in SGW-CDRs

qCI [1] INTEGER,
maxRequestedBandwithUL [2] INTEGER OPTIONAL,
maxRequestedBandwithDL [3] INTEGER OPTIONAL,
guaranteedBitrateUL [4] INTEGER OPTIONAL,
guaranteedBitrateDL [5] INTEGER OPTIONAL,
aRP [6] INTEGER OPTIONAL,
apnAmbrUplink [7] INTEGER OPTIONAL,
apnAmbrDownlink [8] INTEGER OPTIONAL
}

ETSIAddress ::= AddressString
--
-- First octet for nature of address, and numbering plan indicator (3 for X.121)
-- Other octets TBCD
-- See TS 29.002
--

GSNAddress ::= IPAddress

IA5String ::= OCTET STRING

MSNetworkCapability ::= OCTET STRING (SIZE(1..8))
-- see TS 24.008

NetworkInitiatedPDPContext ::= BOOLEAN
--
-- Set to true if PDP context was initiated from network side
--
NodeID ::= IA5String (SIZE(1..20))

NumberOfDPsEncountered ::= INTEGER

PDPAddress ::= CHOICE
{
  IPAddress   [0] IPAddress,
  ETSIAddress [1] ETSIAddress
}

PDPType ::= OCTET STRING (SIZE(2))
  --
  -- OCTET 1: PDP Type Organization
  -- OCTET 2: PDP Type Number
  -- See TS 29.060 for GTP, TS 29.274 for eGTP and TS 29.275 for PMIP
  --

PLMN-Id ::= OCTET STRING (SIZE(3))
  --
  -- This is a 1:1 copy from the Routing Area Identity (RAI) IE specified in TS 29.060
  --    as follows:
  -- OCTET 1 of PLMN-Id = OCTET 2 of RAI
  -- OCTET 2 of PLMN-Id = OCTET 3 of RAI
  -- OCTET 3 of PLMN-Id = OCTET 4 of RAI
  --

QoSInformation ::= OCTET STRING (SIZE(4..255))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Bearer
Quality of
-- Service" information element specified in TS 29.274
--

RATType ::= INTEGER (0..255)
--
-- This integer is 1:1 copy of the RAT type value as defined in TS 29.060 for
GTP,
-- TS 29.274 for eGTP and TS 29.275 for PMIP.
--

RecordType ::= INTEGER
{
  -- Record values 0..17 are CS specific.
  -- The contents are defined in TS 32.250

  sGWRecord    (84)
}

ResultCode ::= INTEGER
-- charging protocol return value, range of 4 byte (0...4294967259)
-- see Result-Code AVP as used in 3GPP 32.299
--

ServingNodeType ::= ENUMERATED
{
SGWChange ::= BOOLEAN

--
-- present if first record after inter S-GW change
--

Diagnostics ::= CHOICE

{  
gsm0408Cause [0] INTEGER,
   -- See TS 24.008

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

IPAddress ::= CHOICE
{
ipBinaryAddress      IPBinaryAddress,
ipTextRepresentedAddress  IPTextRepresentedAddress
}

IPBinaryAddress ::= CHOICE
{
ipBinV4Address     [0] OCTET STRING (SIZE(4)),
ipBinV6Address     [1] OCTET STRING (SIZE(16))
}

IPTextRepresentedAddress ::= CHOICE
{
  --
  -- IP address in the familiar "dot" notation
  --
  iPTextV4Address    [2] IA5String (SIZE(7..15)),
ipTextV6Address     [3] IA5String (SIZE(15..45))
}

PositionMethodFailure-Diagnostic ::= ENUMERATED
{
  congestion            (0),
insufficientResources (1),
insufficientMeasurementData (2),
inconsistentMeasurementData (3),
locationProcedureNotCompleted (4),
locationProcedureNotSupportedByTargetMS (5),
qoSNotAttainable (6),
positionMethodNotAvailableInNetwork (7),
positionMethodNotAvailableInLocationArea (8)

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

ManagementExtension ::= SEQUENCE
{
    identifier OBJECT IDENTIFIER,
    significance [1] BOOLEAN DEFAULT FALSE,
    information [2] ANY DEFINED BY identifier
}

ManagementExtensions ::= SET OF ManagementExtension

MSISDN ::= ISDN-AddressString
--
-- See TS 23.003
MSTimeZone ::= OCTET STRING (SIZE (2))

--

-- 1.Octet: Time Zone and 2. Octet: Daylight saving time, see TS 29.060

TimeStamp ::= OCTET STRING (SIZE(9))

--

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

UnauthorizedLCSClient-Diagnostic ::= ENUMERATED
{
  noAdditionalInformation (0),
  clientNotInMSPrivacyExceptionList (1),
  callToClientNotSetup (2),
privacyOverrideNotApplicable   (3),
disallowedByLocalRegulatoryRequirements (4),
unauthorizedPrivacyClass   (5),
unauthorizedCallSessionUnrelatedExternalClient (6),
unauthorizedCallSessionRelatedExternalClient  (7)

CSGAccessMode ::= ENUMERATED
{
closedMode (0),
hybridMode (1)
}

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

--
-- Defined in 23.003. Coded according to TS 29.060 for GTP, and in TS 29.274
-- for eGTP.
-- 24.008
--

UserCSGInformation ::= SEQUENCE
{
cSGId   [0] CSGId,
cSGAccessMode   [1] CSGAccessMode,
cSGMembershipIndication   [2] NULL OPTIONAL
}

TBCDSTRING ::= OCTET STRING

ISDN-AddressString ::= OCTET STRING

IMEI ::= TBCDSTRING (SIZE(8))

IMSI ::= TBCDSTRING (SIZE(3..8))
maxAddressLength INTEGER ::= 20

AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))

END
Chapter 12
S-GW CDR Field Descriptions

This chapter describes the CDR fields supported by the system for use in SGW-CDRs.

The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

All SGW-CDRs are encoded using the ASN.1 format and are sent to the charging gateway function (CGF) using the GPRS Tunneling Protocol Prime (GTPP) as defined in the following standards:

- 3GPP TS 29.060
- 3GPP TS 32.015
- 3GPP TS 32.215
- 3GPP TS 32.251 (v 8.5.0, v 8.6.0, v 8.8.0)
- 3GPP TS 32.298 (v 8.4.0, v 8.5.0, v 8.7.0) (SGW-CDRs)

Also see the *S-GW CDR Field Reference* chapter for information on CDR fields supported in SGW-CDRs.

**Important**: The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the `gtpp attributes` command in the *Command Line Interface Reference*. 
CDR Fields

Access Point Name Network Identifier

This field contains the Network Identifier part of the Access Point Name (APN). This APN is sent to the S-GW by the MME and is relayed to the P-GW in the Create PDP Context Request message. The APN string consists of alphabetic characters (“A..Z”, “a..z”), digits (“0..9”) and the dash “-”.

Format
IA5string

Length
1-63 bytes

APN Selection Mode

An index indicating how the APN was selected.

The following APN selection mode indexes are possible:

0: MS or network provided APN, subscribed verified
1: MS provided APN, subscription not verified
2: Network provided APN, subscription not verified

Format
Enumerated

Length
1 byte

Cause for Record Closing

This field contains a reason for the closure of the CDR.

Supported values:

- normalRelease (0)
- abnormalRelease (4)
- volumeLimit (16)
- timeLimit (17)
- servingNodeChange (18)
- maxChangeCond (19)
- managementIntervention (20)
- rATChange (22)
- mSTimeZoneChange (23)
• LTE Serving Node Change (25)

**Format**
Integer

**Length**
1 byte

### Charging Characteristics

Lists the charging characteristics applied to the PDP context by the S-GW. The S-GW accepts the charging characteristics from the MME or use its own configured values.

**Format**
Octet string

**Length**
2 bytes

### Charging Characteristics Selection Mode

This field specifies how the Charging Characteristics was selected.

Supported values:
• servingNodeSupplied (0)
• homeDefault (3)
• roamingDefault (4)
• visitingDefault (5)

**Format**
Enumerated

**Length**
1 byte

### Charging ID

This field is a charging identifier, which can be used together with the P-GW address to identify all records involved in a single bearer context. The Charging ID is generated by the P-GW during bearer context activation and is transferred to the context requesting S-GW.

**Format**
Integer

**Length**
1-5 bytes
Diagnostics

This field is included in the CDR when the bearer context is released and when the option "gtpp attribute diagnostics" is configured. Only the choice of "gsm0408Value" is used.

**Format**

- Choice (gsm0408 only)
- Choice (networkSpecificCause only for GTPP custom34 dictionary)

**Length**

3 bytes

---

**gsm0408Cause**

This field is always present when the optional Diagnostics field is included. For more information, refer to the 3GPP TS 24.008 specification.

Some examples:

- 36: If the MME sends Delete Session Request
- 38: If S-GW deletes the PDN context request due to echo timeout with P-GW
- 26: If the S-GW deletes the PDN context request for any other reason

**Format**

Integer

**Length**

1 byte

---

**networkSpecificCause (GTPP custom34 Dictionary)**

This field is used to report the NAS cause code in the Delete Session message request sent to the S-GW. A maximum of three network operator-defined cause codes are reported.

**Important:** In 18.0 and later releases, a new field “abnormalTerminationCause” is added as part of “NAS management extension” in the Diagnostics field of SGW-CDR for custom34 and custom35 GTPP dictionaries. This field is populated in the CDR when the cause for record closing is “Abnormal Release”. Also, note that the inclusion of this field is controlled through the CLI command “gtpp attribute diagnostics abnormal-release-cause” in GTPP group configuration. By default, this trigger is disabled. This trigger is added to indicate the reasons for abnormal termination of VoLTE bearers.

**Format**

Set of Management Extensions

**Length**

N/A
Duration

This field contains the duration in seconds for the record. For partial records, only the interval described by the “recordOpeningTime” and the “last ChangeTime” in the “ListOfTrafficVolumes” is counted. The value is reset for each new partial CDR. This value is converted from the internal representation in milliseconds to an integer value representing only seconds. The mechanism for this conversion (ceiling, floor, round-off) can be configured.

- **Format**: Integer
- **Length**: 1-5 bytes

Dynamic Address Flag

This field indicates that PDN address has been dynamically allocated for that particular IP CAN bearer (PDN connection). This field is missing if address is static. Dynamic address allocation might be relevant for charging e.g. as one resource offered and possibly owned by network operator. The presence of this field indicates that the **Served PDP Address** was dynamically assigned during context activation.

- **Format**: Boolean
- **Length**: 1 byte

List of Traffic Data Volumes

This list includes one or more Traffic Volume containers related to a “Change of Charging Condition”. The maximum number of containers is configurable.

- **Format**: Sequence
- **Length**: Variable

Change Of Charging Condition

Each traffic volume container contains details related to a charging condition as described in the following subsections. A new container is usually created for a QoS change and for tariff changes.

- **Format**: Sequence
- **Length**: Variable
GPRS Uplink data volume

The Data Volume GPRS Uplink field is a part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It includes the number of octets received in the uplink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.

The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.

Important: In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

Format
Integer
Length
1-5 bytes

GPRS Downlink data volume

The Data Volume GPRS Downlink field is a part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It includes the number of octets transmitted in the downlink direction during the timeframe specified by the container. For each new container, the counter is reset and does not accumulate.

The data counted already includes the IP PDP bearer protocols i.e. IP or PPP.

Important: In the CDRs, the data volume usage field is defined with a maximum size of 4 bytes. If the volume triggers are disabled and the volume usage goes beyond 4GB, then the CDRs will not be generated and the data stats will be reset to zero after the max usage.

Format
Integer
Length
1-5 bytes

Change Condition

The Change Condition field is part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It defines the reason for closing the container.

Supported values:

ChangeCondition ::= ENUMERATED

(
   qoSChange  (0),
   tariffTime   (1),
   recordClosure  (2),
)
cGI-SAICHange (6), -- bearer modification. "CHI SAI Change"

rAIChange (7), -- bearer modification. "RAI Change"

eCGIChange (10), -- bearer modification. "ECGI Change"

tAIChange (11), -- bearer modification. "TAI Change"

userLocationChange (12), -- bearer modification. "User Location Change"

apnAmbrChange (50), -- apn-ambr change

1. The change condition is based on the current ULI type and not on new ULI. i.e if the ULI type is ECGI during CSRequest and while changing the ULI, whatever be the ULI type in MBRequest, the “changeCondition” should be ECGI change.

2. If the initial ULI has one or more ULI Types (i.e. ECGI, TAI, RAI, CGI), then the change condition the priority will be as follows:
   • CGI-SAI Change
   • RAI Change
   • TAI Change
   • ECGI Change

3. If the current ULI type is not present (optional) in CSRequest the change condition is based on the new ULI contents. That is, if new ULI has ECGI, then it will be considered as ECGI change.

4. The ULI in main CDR part indicates the ULI at the time of record opening time. i.e. If CSReq comes with ULI U1 and then the ULI is changed to U2, U3 and if a CDR is generated the main ULI in CDR contains ULI as U1, but the next CDR generated contains the ULI as U3 and so on.

5. In container the ULI is present in next container if the previous change condition is either RAI Change, CGI-SAI Change, TAI Change, ECGI Change.

**Important:** apnAmbrChange (50) -- This value is not defined in any 3GPP spec as of yet and therefore a non-standard value is used.

**Format**
Enumerated

**Length**
1 byte

**Change time**

The Change Time field is part of the “ChangeOfCharCondition” element in the List of Traffic Volumes. It provides the local time when a change condition (e.g. record closure) occurred and the container was closed.

The format is shown below.

TimeStamp ::= OCTET STRING (SIZE(6))
The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

-- e.g. YYMMDDhhmmsgsShmm
-- where
-- YY = Year 00 to 99 BCD encoded
-- MM = Month 01 to 12 BCD encoded
-- DD = Day 01 to 31 BCD encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S = Sign 0 = “+”, “-” ASCII encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded

Format
BCD encoded octet string

Length
9 bytes

User Location Information

This field contains the User Location Information as described in TS 29.274 for eGTP cases (e.g. CGI, SAI, RAI, TAI and ECGI).

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

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 CDR was opened.

In the below example there are five containers. In the third container the CGI/SAI is changed. So as per the definition above since the CGI/SAI is changed, the next container should have ULI information. The fourth container has the ULI information.

<table>
<thead>
<tr>
<th>QoS Negotiated</th>
<th>Data Volume Uplink</th>
<th>Data Volume Downlink</th>
<th>Change Condition</th>
<th>Time Stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>QoS1</td>
<td>1</td>
<td>2</td>
<td>QoS change</td>
<td>TIME1</td>
</tr>
<tr>
<td>QoS2</td>
<td>5</td>
<td>6</td>
<td>Tariff change</td>
<td>TIME2</td>
</tr>
<tr>
<td>QoS3</td>
<td>10</td>
<td>3</td>
<td>CGI/SAI Change</td>
<td>TIME3</td>
</tr>
<tr>
<td>QoS4</td>
<td>3</td>
<td>4</td>
<td>CGI2</td>
<td>TIME4</td>
</tr>
<tr>
<td>QoS5</td>
<td>3</td>
<td>4</td>
<td>Record closed</td>
<td>TIME5</td>
</tr>
</tbody>
</table>
In the above example, assume that when CDR is opened the subscriber is in CGI1. The first container is closed because of QOS change and second container is closed because of Tariff Time. Now the ULI is changed to CGI2. Third container includes the indication of location change (ULI change to CGI2) and corresponding volume counts before the location change and after the tariff time change. Now these three containers does not have the “User Location Info” because none of the containers are closed with CGI/SAI change or RAI change. Now if the fourth container is closed it should have a User Location Info as CGI2. This is because the previous change condition was CGI/SAI change and hence the next container should have new ULIs (CGI2).

Format
Octet string
Length
6-34 bytes
Note that the length varies depending on the type of identity.

QoS Negotiated (GTPP custom34 Dictionary)

QoS Information: For an IP-CAN bearer-specific container, this contains the authorized QoS for the IP-CAN bearer. This field is null-terminated.

Format
Structure of the following type:
QoSNegotiated ::= qoSInformation
Length
23 bytes

EPC QoS Requested

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 the following containers, this field is present if previous change condition is “QoS change”. This field is applicable only in SGW-CDR.

Format

EPCQoSInformation ::= SEQUENCE

aRP [6] INTEGER OPTIONAL
apNAggregateMaxBitrateUL [7] INTEGER OPTIONAL
apNAggregateMaxBitrateDL [8] INTEGER OPTIONAL

Length
Variable length format (Will vary based on the values).

**iMSsignalingContext**

Indicates if the IP-CAN bearer is used for IMS signaling. It is only present if the IP-CAN bearer is an IMS signaling bearer. A IP-CAN bearer for IMS signaling is determined via the “IM CN Subsystem Signaling Flag” conveyed via the “Activate PDP context request” message from the MS to the network (refer to TS 24.008).

**Format**
Null

**Length**
Zero

**List of Served Node Addresses**

This field contains 1-16 Serving Node control plane IP used during this record (max of 15 Serving Node Changes). This is a list of IP addresses. If the PLMN-ID of the MME is same after Handover to new MME, one more IP address is added to the list. If the list is overflowed, with configured number of IP addresses, a CDR with “serving node Change” as cause for record closure will be generated. The serving node addresses, listed here map to the serving node types listed in the field “Serving node Types” in sequence.

**Format**
Octet String containing list of IPv4 or IPv6 addresses

**Length**
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

**Served Node IPv4 Binary Address**

The octet string included in the field “List of Served Node Addresses” includes the IPv4 address of the MME.

**Format**
Octet String

**Length**
4 bytes

**Served Node IPv6 Binary Address**

The octet string included in the field “List of Served Node Addresses” includes the IPv6 address of the MME.
Local Record Sequence Number

This field contains a unique sequence number associated with the NodeId field and independent of the bearer context. For each Node ID, this number with range 1..4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR. For SGW-CDRs, this field is included only when the command `gtpp attribute local-record-sequence-number` is configured.

Format
Octet String
Length
16 bytes

Low Access Priority Indicator

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

**Important:** This attribute field is currently available only in custom24 and custom35 GTPP dictionaries for SGW-CDRs when the CLI command “`gtpp attribute lapi`” is configured in GTPP Server Group Configuration mode.

Format
Null
Length
0 Byte

MS Time Zone

The “Time Zone” IE that the MME may provide to the S-GW during the PDN context activation/modification procedure.

Format
Octet String
Length
2 bytes

Node ID

This field contains an identifier string for the node that had generated the CDR.

The NodeID field is a printable string of the ndddSTRING format:

n: The first digit is the Sessmgr restart counter having a value between 0 and 7.
S-GW CDR Field Descriptions

CDR Fields

GTPP Interface Administration and Reference, StarOS Release 18

---

**ddd**: The number of the sessmgr instance generating the CDR.

**STRING**: This is a configured Node-ID-Suffix having any string from 1 to 16 characters, defined using the `gtpp attribute node-id` command.

If this node-id-suffix is not configured, the S-GW uses the GTPP context name as the Node-id-suffix (truncated to 16 characters).

This field is included only when the command `gtpp attribute local-record-sequence-number` is configured.

**Format**

IA5string

**Length**

5-20 bytes

---

**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.

**Format**

Integer

**Length**

1-5 bytes

---

**PDP PDN Type**

---

**OCTET 1: PDP Type Organization**

<table>
<thead>
<tr>
<th>Spare '1111'</th>
<th>PDP Type Organization Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI</td>
<td>0</td>
</tr>
<tr>
<td>IETF</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTE: In LTE, only IETF is supported.

**OCTET 2: PDP/PDN Type Number**

<table>
<thead>
<tr>
<th>Bits</th>
<th>IPv4</th>
<th>IPv6</th>
<th>IPv4/IPv6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3   2 1</td>
<td>0 0 1</td>
<td>0 1 0</td>
<td>0 1 1</td>
</tr>
</tbody>
</table>

---
Bits 8-4 of octet are spare and are coded as zero.

**Format**
Octet string

**Length**
2 bytes

---

**PGW Address used**

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 includes the IPv4 address in the CDR. This is a choice attribute and the CDR can contain the binary format or the ASCII format in the CDR.

**Format**
Octet string

**Length**
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

---

**PGW IPv4 Binary Address**

The octet string included in the field “PGW Address used” includes the IPv4 address of the P-GW in binary coding.

**Format**
Octet string

**Length**
4 bytes

---

**PGW IPv6 Binary Address**

The octet string included in the field “PGW Address used” includes the IPv6 address of the P-GW in binary coding.

**Format**
Octet string

**Length**
16 bytes

---

**RAT Type**

Holds the value of RAT Type, as provided to S-GW and P-GW, described in TS 29.274 for eGTP case.

<table>
<thead>
<tr>
<th>RAT Types</th>
<th>Values (Decimal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;reserved&gt;</td>
<td>0</td>
</tr>
<tr>
<td>UTRAN</td>
<td>1</td>
</tr>
<tr>
<td>GERAN</td>
<td>2</td>
</tr>
</tbody>
</table>
### RAT Types

<table>
<thead>
<tr>
<th>RAT Types</th>
<th>Values (Decimal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLAN</td>
<td>3</td>
</tr>
<tr>
<td>GAN</td>
<td>4</td>
</tr>
<tr>
<td>HSPA Evolution</td>
<td>5</td>
</tr>
<tr>
<td>EUTRAN</td>
<td>6</td>
</tr>
<tr>
<td>&lt;spare&gt;</td>
<td>7-255</td>
</tr>
</tbody>
</table>

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

**Format**

Integer

**Length**

1 byte

---

### Record Extensions

A set of network operator/manufacturer specific extensions to the record.

This field is used to report a maximum of three RAN cause codes and packet counts.

**Important:** This field is operator-defined and is not encoded in any S-GW CDR dictionary until release v14.0.

**Format**

Sequence

**Length**

Variable Length Format

---

### Record Opening Time

This field contains the time stamp when a PDP context is activated in SGSN or when a subsequent record is opened after a partial record.

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off), this is translated into the timestamp which only shows the full seconds.

The format is shown below.

-TimeStamp ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

- e.g. YYMMDDhhmmsShhmm
- where
-- YY = Year 00 to 99  BCD encoded
-- MM = Month 01 to 12  BCD encoded
-- DD = Day 01 to 31  BCD encoded
-- hh = hour 00 to 23  BCD encoded
-- mm = minute 00 to 59  BCD encoded
-- ss = second 00 to 59  BCD encoded
-- S = Sign 0 = “+”, “-”  ASCII encoded
-- hh = hour 00 to 23  BCD encoded
-- mm = minute 00 to 59  BCD encoded

Format
BCD encoded octet string

Length
9 bytes

Record Sequence Number

A running sequence number with range 1.. 4294967296 used to link partial records generated by the S-GW for a specific IP-CAN bearer context (characterized with the same Charging ID and P-GW address). This field is not present if the first record is also the final record.

Format
Integer

Length
1-5 bytes

Record Type

This field identifies the type of the record.

SGW-CDR (sgwPDPRecord)  84 (0x54)

Format
Integer

Length
1 byte

Served IMEISV

This fields contains the International Mobile Equipment Identity (IMEISV) of the equipment served, if available.

The structure of the IMEI is defined in TS 23.003.

The IMEI is composed of the following elements:

- Type Allocation Code (TAC). Its length is 8 digits;
Serial Number (SNR) is an individual serial number uniquely identifying each equipment within each TAC. Its length is 6 digits;

Software Version Number (SVN) identifies the software version number of the mobile equipment. Its length is 2 digits.

If SVN is not available, a filler digit “f” is added after the spare digit to fill up the last byte. Spare digit: this digit is zero, when transmitted by the MS.

Format
BCD encoded octet string

Length
8 bytes

Served IMSI

This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.

Example for Coding: (Set by SGSN)

3GPP TS 23.003 (CCITT Rec. E 212) ServedIMSI ::= OCTET STRING (SIZE(1..8)) -- subscriber identification IMSI-- octet 1..8: <= 15 digits TBCD-String (twisted)-- substructure (without spares or fillers):-- 3 digits - mobile country code (MCC)-- 2 digits - mobile network code (MNC)-- <= 10 digits - mobile subscriber identification number (MSIN)-- first and intermediate octet = 2 digits-- last octet = 2 digits or 1 digit + 1 fill digit H'F--

-- example:-- IMSI: '262025600010020'-- filled: '262025600010020F'-- encoded: H'62 02 52 06 00 01 20 F0

Format
BCD encoded octet string

Length
3-8 bytes

Served MSISDN

This field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create Session Request message.

The MSISDN is TBCD encoded as shown in the example below:

3GPP TS 23.003 (CCITT Rec. E 213)

ServedMSISDN ::= OCTET STRING (SIZE(1..9))

MSISDN in CDR is 1:1 copy of the MSISDN sent in GTP-V2 message. MSISDN value contains only the actual MSISDN number (does not contain the “nature of address indicator” octet, which indicates “international number” as in 3GPP TS 29.002) and is encoded as TBCD digits (i.e. digits from 0 through 9 are encoded “0000” to “1001”). When there is an odd number of digits, bits 8 to 5 of the last octet are encoded with the filler “1111”.

Example:
encoded: H' 94 71 02 04 30 50

Format
BCD encoded octet string

Length
1-9 bytes

Served PDP PDN Address

This field contains the IP address for the PDN connection (PDP context, IP-CAN bearer) if available. This is a network layer address of type IP version 4 (PDN Type is IPv4) or IP version 6 (PDN Type is IPv6 or IPv4v6). The address for each bearer type is allocated either temporarily or permanently (see “Dynamic Address Flag”). This parameter is present except when both the bearer type is PPP and dynamic address assignment is used.

NOTE: 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.

Format
Octet string

Length
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

PDP IP Address

This field contains the IP address for the PDP context.

Format
IP address

Length
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

PDP IPv4 Binary Address

The octet string included in the field “PDP IP Address” includes the IPv4 address of the P-GW in binary coding.

Format
Octet string

Length
4 bytes

PDP IPv6 Binary Address

The octet string included in the field “PDP IP Address” includes the IPv6 address of the P-GW in binary coding.

Format
Octet string

Length
Served PDP PDN Address Extension

This field contains the IPv4 address for the PDN connection (PDP context, IP-CAN bearer) when dual-stack IPv4v6 is used, and the IPv6 address is included in Served PDP Address or Served PDP PDN Address.

This field is not included if the PDP/PDN address is IPv4 or IPv6. By default, this field is not sent, even if the PDP Type is IPv4v6; this field must be enabled using the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**Important:** Note that this field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Rel.9 attribute and it can be present in Rel.7 or Rel.8 dictionary if enabled through the `gtpp attribute served-pdp-pdn-address-extension` CLI command.

**Format**
- Octet string

**Length**
- 8 bytes

PDP IP Address

This field contains the IP address for the PDP context.

**Format**
- IP address

**Length**
- The length can vary based on whether the encoded IP address is IPv4 or IPv6.

**PDP IPv4 Binary Address**

The octet string included in the field described above includes the IPv4 address of the P-GW in binary coding.

**Format**
- Octet string

**Length**
- 4 bytes

Serving Node PLMN Identifier

This field denotes the PLMN identifier (MCC and MNC) of the P-GW used. This field is present in CDRs if the P-GW PLMN-ID is available in the CSR message from Serving Node (MME).

The MCC and MNC are coded as described for “Routing Area Identity” in TS 29.060.

**Format**
- Octet string
Serving Node Type

This field contains 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.

The possible values are:

```plaintext
ServingNodeType ::= ENUMERATED
{
  sGSN       (0),
  pMIPSGW    (1),
  gTPSGW     (2),
  ePDG       (3),
  hSGW       (4),
  mME        (5)
}
```

NOTE: In the SGW-CDR, the possible values are SGSN(0) and MME(5).

Format
Sequence of serving Node Type

Length
Variable length format (Based on number of nodes connected during this period).

SGW Address Used

This 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 includes the IPv4 address in the CDR. This is a choice attribute and the CDR can contain the binary format or the ASCII format in the CDR.

Format
Octet string

Length
The length can vary based on whether the encoded IP address is IPv4 or IPv6.

SGW IPv4 Binary Address

This field is the serving control plane S-GW IPv4 address on the S5 interface.

Format
Octet string

Length
4 bytes
SGW IPv6 Binary Address

This field is the serving control plane S-GW IPv6 address on the S5 interface.

**Format**
- Octet string

**Length**
- 16 bytes

SGW Change

This field is present only in the SGW-CDR to indicate that this is the first record after an S-GW change. In this case, it is set to TRUE ("FF")

**Format**
- Boolean

**Length**
- 1 byte

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.

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism this is translated into the timestamp which only shows the full seconds.

The format is shown below.

TimeStamp ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

- e.g. YYMMDDhhmmssShhmm
- where
  - YY = Year 00 to 99  BCD encoded
  - MM = Month 01 to 12  BCD encoded
  - DD = Day 01 to 31  BCD encoded
  - hh = hour 00 to 23  BCD encoded
  - mm = minute 00 to 59  BCD encoded
  - ss = second 00 to 59  BCD encoded
  - S = Sign 0 = “+”, “-”  ASCII encoded
  - hh = hour 00 to 23  BCD encoded
  - mm = minute 00 to 59  BCD encoded

**Format**
- BCD encoded octet string
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.

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, round-off) this is translated into the timestamp which only shows the full seconds.

The format is shown below.

Time Stamp ::= OCTET STRING (SIZE(6))

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

-- e.g. YYMMDDhhmmssShhmm
-- where
-- YY = Year 00 to 99 BCD encoded
-- MM = Month 01 to 12 BCD encoded
-- DD = Day 01 to 31 BCD encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded
-- ss = second 00 to 59 BCD encoded
-- S = Sign 0 = “+”, “−” ASCII encoded
-- hh = hour 00 to 23 BCD encoded
-- mm = minute 00 to 59 BCD encoded

Format
BCD encoded octet string

Length
9 bytes

User CSG Information

This field contains the User CSG Information (UCI) status of the user accessing a CSG cell. Closed Subscriber Group identifies a group of subscribers who are permitted to access one or more CSG cells of the PLMN as a member of the CSG.

Length
Varies
**CSG ID**

This field is a unique identifier within the scope of PLMN which identifies a Closed Subscriber Group (CSG) in the PLMN associated with a CSG cell or group of CSG cells. The value of CSG ID will be printed as the hexadecimal value received in AAA.

- **Format**: Octet string
- **Length**: 4 bytes

**CSG Access Mode**

This field is the CGI access mode of the user accessing a CSG cell.

Possible access modes are:

- Closed
- Hybrid

- **Format**: Enumerated integer
- **Length**: 1 byte

**CSG Membership Indication**

This field indicates CSG membership for the user when hybrid access applies, as defined in TS 29.060 for GPRS case, and in TS 29.274 for EPC case.

- **Format**: Null
- **Length**: Zero

**User Location Information**

This field contains the User Location Information as described in TS 29.274 for eGTP case (e.g. CGI, SAI, RAI, TAI and ECGI).

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

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.

The flags ECGI, TAI, RAI, SAI and CGI in octet 1 indicate if the corresponding fields are present in the IE or not. If one of these flags is set to “0”, the corresponding field is not present at all. The respective identities are defined in 3GPP TS 23.003.
The following subclauses specify the coding of the different identities. For each identity, if an Administration decides to include only two digits in the MNC, then bits 5 to 8 of octet 7 are coded as “1111”.

**CGI field:**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation is used.

The Cell Identity (CI) consists of 2 octets. Bit 8 of Octet 11 is the most significant bit and bit 1 of Octet 12 the least significant bit. The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation is used.

**SAI field:**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation is used.

The Service Area Code (SAC) consists of 2 octets. Bit 8 of Octet 11 is the most significant bit and bit 1 of Octet 12 the least significant bit. The SAC is defined by the operator.

**RAI field:**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the location area code is the responsibility of each administration. Coding using full hexadecimal representation is used.

The Routing Area Code (RAC) consists of 2 octets. Only Octet 11 contains the RAC. Octet 12 is coded as all 1's (11111111). The RAC is defined by the operator.

**TAI field:**

The Tracking Area Code (TAC) consists of 2 octets. Bit 8 of Octet 9 is the most significant bit and bit 1 of Octet 10 the least significant bit. The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation is used.

**ECGI field:**

The E-UTRAN Cell Identifier (ECI) consists of 28 bits. Bit 4 of octet 10 is the most significant bit and bit 1 of Octet 11 the least significant bit. The coding of the E-UTRAN cell identifier is the responsibility of each administration. Coding using full hexadecimal representation is used.

<table>
<thead>
<tr>
<th>Format</th>
<th>Octet string</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>6 -34 bytes</td>
</tr>
</tbody>
</table>

Note that the length varies depending on the type of identity.
Chapter 13
WLAN CDR Field Reference

This chapter provides a reference for WLAN-CDR fields supported by PDG and TTG.

The PDG/TTG provides CDRs that are compliant with the definitions in 3GPP TS32.298. When modifications are required, changes to the standard behavior can be implemented in different dictionaries which can be selected in the configuration file. This provides the flexibility to adapt to a customer’s needs, and therefore, to a legacy post-processing billing interface, while retaining the standard behavior.

A complete list and descriptions of supported CDR fields is provided in the WLAN CDR Field Descriptions chapter of this reference.

**Important:** This reference document contains information only on standard GTPP dictionaries. For information on custom dictionaries, contact your Cisco account representative.

The Category column in all tables use key described in the following table.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Mandatory</td>
<td>A field that must be present in the CDR.</td>
</tr>
<tr>
<td>C</td>
<td>Conditional</td>
<td>A field that must be in a CDR if certain conditions are met.</td>
</tr>
<tr>
<td>OM</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR</td>
</tr>
<tr>
<td></td>
<td>Mandatory</td>
<td>for all conditions.</td>
</tr>
<tr>
<td>OC</td>
<td>Operator Provisionable:</td>
<td>A field that an operator has provisioned and must be included in the CDR</td>
</tr>
<tr>
<td></td>
<td>Conditional</td>
<td>if certain conditions are met.</td>
</tr>
</tbody>
</table>

The Category column in all tables use key described in the following table.
CDR Fields Supported in WLAN-CDRs

The table in this section lists the WLAN fields present in GTPP dictionaries.

standard, custom1 – custom6 Dictionaries

WLAN-CDR fields for TS 32.252

<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Type</td>
<td>M</td>
<td>This field identifies the type of record. The 3GPP 32298 does not define any values for record type.</td>
</tr>
<tr>
<td>Network Initiated PDP Context</td>
<td>O</td>
<td>This field indicates that the PDP context was network-initiated. This field is missing in case of UE-activated PDP context.</td>
</tr>
<tr>
<td>Served IMSI</td>
<td>M</td>
<td>This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.</td>
</tr>
<tr>
<td>PDG Address</td>
<td>M</td>
<td>This field provides the current service PDG IP address for the control plane.</td>
</tr>
<tr>
<td>PDG IPv4 Binary Address</td>
<td>M</td>
<td>The octet string in this field includes the IPv4 address of the PDG service in binary coding.</td>
</tr>
<tr>
<td>PDG IPv6 Binary Address</td>
<td>M</td>
<td>The octet string in this field includes the IPv6 address of the PDG service in binary coding.</td>
</tr>
<tr>
<td>Charging ID</td>
<td>M</td>
<td>This field contains a charging identifier, which can be used with the PDG address to identify all records produced in the PDG involved in a single PDP context. The charging ID is generated by the PDG at PDP context activation.</td>
</tr>
<tr>
<td>Access Point Name Network Identifier</td>
<td>M</td>
<td>This field contains the Network Identifier part of the Access Point Name (APN). It is provided by WMN during the IPSec or SSL establishment procedure.</td>
</tr>
<tr>
<td>PDP Type</td>
<td>O</td>
<td>This field defines the PDG type, IP or PPP.</td>
</tr>
<tr>
<td>Served WLAN PDP Address</td>
<td>M</td>
<td>This field contains the PDP address of the served IMSI. The standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAAddress.</td>
</tr>
<tr>
<td>WLAN UE Remote Address</td>
<td>M</td>
<td>This field contains the PDP address of the served IMSI, which is supported only in IPAddress by the PDG.</td>
</tr>
<tr>
<td>WLAN UE Remote IPv4 Binary Address</td>
<td>M</td>
<td>The octet string in this field contains the IPv4 address assigned to the subscriber by the PDG/TTG in binary coding.</td>
</tr>
<tr>
<td>WLAN UE Remote IPv6 Binary Address</td>
<td>M</td>
<td>The octet string in this field contains the IPv6 address assigned to the subscriber by the PDG/TTG in binary coding.</td>
</tr>
<tr>
<td>Dynamic Address Flag</td>
<td>O</td>
<td>This field indicates that the PDP address has been dynamically allocated for that particular PDP context. This field is missing if the address is static, that is, part of the PDP context subscription.</td>
</tr>
<tr>
<td>List of Traffic Data Volumes</td>
<td>M</td>
<td>This list includes one or more Traffic Data Volume containers. The number of containers is configurable with a maximum of 4 for WLAN-CDRs.</td>
</tr>
<tr>
<td>Field</td>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------</td>
<td>-------------</td>
</tr>
</tbody>
</table>
| Change of Charging Condition | M        | One traffic data volume container contains a list of change of charging conditions:  
  - Data Volume Uplink  
  - Data Volume Downlink  
  - Change Condition  
  - Change Time  
  - Failure Handling Continue  
  The QoS values may only be included in the first container. In later containers, the presence depends on what was changed. |
| QoS Negotiated        | O        | This field indicates that the applied QoS is accepted by the network. This field is compliant with 3GPP standards. |
| GPRS Uplink Data Volume | M        | This field includes the number of octets transmitted during the use of the packet data services in the uplink direction.  
  Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined for this value to avoid an overflow, if not already done for a smaller amount of traffic. |
| GPRS Downlink Data Volume | M        | This field includes the number of octets transmitted during the use of the packet data services in the downlink direction.  
  Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined for this value to avoid an overflow, if not already done for a smaller amount of traffic. |
| Change Condition      | M        | This field defines the reason for closing the container, such as tariff time change, QoS change, or closing of the CDR. Values according to 3GPP TS 32.298 are:  
  - qosChange = 0  
  - tariffTime = 1  
  - recordClosure = 2 |
| Change Time           | M        | A time stamp that defines the moment when the volume container or the CDR is closed. |
| Record Opening Time   | M        | This field contains the time stamp of when the PDP context is activated in the PDG or when a subsequent record is opened after a partial record.  
  The timestamp is determined based on the internal timer which has an accuracy of 10ms.  
  Depending on the configured mechanism (ceiling, floor, or round-off) this field is translated to only show full seconds. |
| Duration              | M        | This field contains the duration in seconds of the PDP contexts with the range of 0 to $4294967295$ ($2^{32}$-1). 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. |
| Cause for Record Closing | M       | This field shows the reason for the release of the CDR. The values are:  
  - normalRelease = 0  
  - abnormalRelease = 4  
  - volumeLimit = 16  
  - timeLimit = 17  
  - maxChangeCond = 19  
  - managementIntervention = 20 |
<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics</td>
<td>O</td>
<td>This field is included in the CDR when the PDP context is released and when the option gtpp-attribute diagnostics is configured.</td>
</tr>
</tbody>
</table>
| gsm0408Cause               | M        | This cause is used in the Diagnostics field and contains one of the following values:  
  - 36: If the PDP context is terminated gracefully  
  - 40: AAA Server disconnect  
  - 26: If the PDG sends delete PDP context request for any other reason |
| Record Sequence Number     | O        | A running sequence number with range 1 to 4294967295 that links partial records generated by the PDG for a specific PDP context (characterized with the same Charging ID and PDG address pair). This field is not present if the first record is also the final record. |
| Node ID                    | O        | This field contains an identifier string for the node that generated the CDR. The NodeID field is a printable string of the ndddSTRING format:  
  - n: the first digit is the sesmsgmgr restart counter having a value between 0 and 7.  
  - ddd: The number of the sesmsgmgr instance generating the CDR.  
  - STRING: A configured Node-ID-Suffix string of 1 to 16 characters. Defined with the gtpp attribute node-id command. |
| recordExtensions           | O        |                                                                                |
| Local Record Sequence Number | O        | For each Node ID, this number with range 1 to 4294967295, is allocated sequentially for each CDR. With the Node ID, it uniquely identifies a CDR. For WLAN-CDRs, this field is only included when the option gtpp attribute local-record-sequence number is configured. |
| APN Selection Mode         | O        | An index that shows how the APN is selected:  
  - 0 = MS or network provided APN, subscribed verified  
  - 1 = MS provided APN, subscription not verified  
  - 2 = Network provided APN, subscription not verified |
<p>| Served MSISDN              | O        | This field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber, which is sent by the AAA server. |
| Charging Characteristics   | M        | Lists the charging characteristics applied to the PDP context. The PDG can accept charging characteristics from the AAA server or use its own configured value. PDG-configured charging characteristics are specified as part of the PDG Service and are applied for WLAN-CDRs to subscriber PDP contexts through APN templates. |</p>
<table>
<thead>
<tr>
<th>Field</th>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| Charging Characteristics Selection Mode | O        | Lists the charging characteristic type that the PDG applied to the CDR. The values for this field are defined in 3GPP TS 32.298:  
  - AAASupplied (0): The PDG is using the charging characteristics supplied by the AAA Server.  
  - homeDefault (3): PDG configured charging characteristics for home subscribers are used.  
  - roamingDefault (4): PDG configured charging characteristics for roaming subscribers are used.  
  - visitingDefault (5): PDG configured charging characteristics for visiting subscribers are used. |
| Rat Type                     | O        | This field shows the Radio Access Technology (RAT) type currently used by the Mobile Station. This field is present in the CDR if provided by WLAN. RAT Type values:  
  - 0 = Reserved  
  - 1 = UTRAN  
  - 2 = GERAN  
  - 3 = WLAN  
  - 4-255 = Spare |
Chapter 14
WLAN CDR Field Descriptions

This chapter describes the WLAN-CDR fields supported by PDG/TTG.

The following information is provided for each field:

- **Description**: The field’s description.
- **Format**: The field’s data format.
- **Length**: The field’s size, in bytes.

All WLAN-CDRs are encoded using the ASN.1 format and are sent to the charging gateway function (CGF) using the GPRS Tunneling Protocol Prime (GTPP) as defined in the following standards:

- 3GPP TS 32.015
- 3GPP TS 32.215
- 3GPP TS 32.251 (v8.5.0, v8.6.0)
- 3GPP TS 32.252 (WLAN-CDRs)

Also see the *WLAN CDR Field Reference* chapter for information on CDR fields supported in WLAN-CDRs.

---

**Important**: The behavior for several of the fields supported in CDRs can be modified. For more information, refer to the `gtpp attributes` command in the *Command Line Interface Reference*. 
CDR Fields

Access Point Name Network Identifier

This field contains the Network Identifier part of the Access Point Name (APN). It is provided by WMN during IPSEC or SSL establishment procedure.

**Format**
IA5 string

**Length**
1-63 bytes

APN Selection Mode

An index indicating how the APN is selected.

The following APN selection mode indexes are possible:

- 0: MS or network provided APN, subscribed verified
- 1: MS provided APN, subscription not verified
- 2: Network provided APN, subscription not verified

**Format**
Enumerated

**Length**
1 byte

Cause for Record Closing

This field contains a reason for the release of the CDR.

Supported values:

- normalRelease 0
- abnormalRelease 4
- volumeLimit 16
- timeLimit 17
- maxChangeCond 19
- managementIntervention 20

**Format**
Integer

**Length**
1 byte
Charging Characteristics

This field lists the charging characteristics applied to the PDP context.

The PDG can accept charging characteristics from the AAA Server or use its own configured value. PDG configured charging characteristics are specified as part of the PDG Service and are applied for WLAN-CDRs to subscriber PDP contexts through APN templates.

**Format**
- Octet string

**Length**
- 2 bytes

Charging Characteristics Selection Mode

The charging characteristic type that the PDG applied to the CDR.

The following values for this field are defined in 3GPP TS 32.298:

- AAASupplied (0): The PDG is using the charging characteristics supplied by the AAA Server.
- homeDefault (3): PDG configured charging characteristics for home subscribers are used.
- roamingDefault (4): PDG configured charging characteristics for roaming subscribers are used.
- visitingDefault (5): PDG configured charging characteristics for visiting subscribers are used.

**Format**
- Enumerated (Integer)

**Length**
- 1 byte

Charging ID

This field contains a charging identifier, which can be used together with the PDG address to identify all records produced in the PDG involved in a single PDP context. The Charging ID is generated by the PDG at PDP context activation.

The possible values for the charging ID, which are defined in TS 29.060 are 1 - 4,294,967,295 and those values are encapsulated in the following scheme in the CDR field:

- 1 - 127 850101-85017F
- 128 - 32,767 85020080-85027FFF
- 32,768 - 8,388,607 8503008000-85037FFFFFF
- 8,388,608 - 2,147,483,647 850400800000-85047FFFFFF
- 2,147,483,648 - 4,294,967,295 85050080000000 - 850500FFFFFFFF

**Format**
- Integer

**Length**
- 1–5 bytes
Diagnostics

This field is included in the CDR when the PDP context is released and when the option gtp attribute diagnostics is configured. Only the choice of "gsm0408Value" is used.

Format
Choice
Length
3 bytes

**gsm0408Cause**

This cause is used in the Diagnostics field and contains one of the following values:

- 36: If the PDP context is terminated gracefully
- 40: AAA Server disconnect
- 26: If the PDG sends delete PDP context request for any other reason

Format
Integer
Length
1 byte

Dynamic Address Flag

This field indicates that the 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.

Format
Boolean
Length
1 byte

Duration

This field contains the relevant duration in seconds for PDP contexts with the range of 0 through 4294967295 (2^32-1). 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.

Format
Integer
Length
1–5 bytes
Local Record Sequence Number

For each Node ID, this number with the range of 1 through 4294967295 is allocated sequentially for each CDR. This along with a Node ID uniquely identifies a CDR.

For WLAN-CDRs, this field is only included when the option `gtpp attribute local-record-sequence number` is configured.

**Format**
- Integer

**Length**
- 1-5 bytes

List of Traffic Data Volumes

This list includes one or more traffic data volume containers. The number of containers is configurable with a maximum of 4 for WLAN-CDRs.

**Format**
- Sequence

**Length**
- Variable

Change Of Charging Condition

One traffic data volume container contains a list of change of charging conditions:

- Data Volume Uplink
- Data Volume Downlink
- Change Condition
- Change Time
- Failurehandling Continue

The QoS values may only be included in the first container, in later containers the presence depends upon what was changed.

**Format**
- Sequence

**Length**
- Variable

QoS Negotiated

This field indicates the applied QoS is accepted by the network. It is compliant to 3GPP standards.

**Format**
- Octet string

**Length**
- 4–15 bytes
**GPRS Uplink data volume**

This field includes the number of octets transmitted during the use of the packet data services in the uplink direction.

Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.

Format  
Integer

Length  
1–5 bytes

**GPRS Downlink data volume**

This field includes the number of octets transmitted during the use of the packet data services in the downlink direction.

Note that a maximum of $2^{32}$ bytes can be counted in this field. A volume trigger should be defined at least for this value to avoid an overflow, if not done already for a smaller amount of traffic.

Format  
Integer

Length  
1–5 bytes

**Change Condition**

This field defines the reason for closing the container, such as tariff time change, QoS change or closing of the CDR.

The following values are defined according to 3GPP TS 32.298:

- qoSChange 0
- tariffTime 1
- recordClosure 2

Format  
Enumerated (Integer)

Length  
1 byte

**Change time**

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

3GPP Format definition:

```
TimeStamp ::= OCTET STRING (SIZE(9))
```

-- UTC time (compact form: local time + offset to GMT)
-- YYMMDDhhssShhmm
-- octet 1..6: local time
-- octet 1: YY .. decade (2 digits BCD non-twisted, readable)
-- octet 2: MM ... month (2 digits BCD non-twisted, readable)
-- octet 3: DD ... day (2 digits BCD non-twisted, readable)
-- octet 4: hh ... hour (2 digits BCD non-twisted, readable)
-- octet 5: mm ... minute (2 digits BCD non-twisted, readable)
-- octet 6: ss ... second (2 digits BCD non-twisted, readable)
-- octet 7..9: .. offset to GMT (universal time)
-- octet 7: S ... H'2B: "+" H'2D: "-" (ASCII)
-- octet 8: hh ... hour (2 digits BCD non-twisted, readable)
-- octet 9: mm ... minute (2 digits BCD non-twisted, readable)

**Format**
BCD encoded octet string

**Length**
9 bytes

### Node ID

This field contains an identifier string for the node that generated the CDR.

On the PDG, this NodeID field is a printable string of the ndddSTRING format:

n: The first digit is the sessmgr restart counter having a value between 0 and 7.
ddd: The number of the sessmgr instance generating the CDR.
STRING: This is a configured node-id-suffix having any string from 1 to 16 characters, defined using the `gtpp attribute node-id` command.

If this node-id-suffix is not configured, the PDG uses the GTPP context name as the node-id-suffix (truncated to 16 characters).

For WLAN-CDRs, this field is only included when the option `gtpp attribute local-record-sequence number` is configured.

**Format**
IA5string

**Length**
5-20 bytes

### PDG Address

This field provides the current serving PDG IP address for the Control Plane. The standard 32.298 offers a choice for the encoding of the address to be either in binary or text format.

The PDG encodes the address in binary format and includes the octet string.

**Format**
CDR Fields

PDG IPv4 Binary Address

The octet string in this field includes the IPv4 address of the PDG service in binary coding.

Format
Octet string

Length
4 bytes

PDG IPv6 Binary Address

The octet string in this field includes the IPv6 address of the PDG service in binary coding.

Format
Octet string

Length
16 bytes

PDP Type

This field defines the PDP type, e.g. IP or PPP.

Supported values:
- IP = f121
- PPP = f001

Format
Octet string

Length
2 bytes

RAT Type

This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station. This field is present in the CDR if provided by WLAN.

RAT Type values:
- Reserved 0
- UTRAN 1
- GERAN 2
- WLAN 3
- Spare 4-255
Record Opening Time

This field contains the time stamp when PDP context is activated in PDG or when a subsequent record is opened after a partial record.

The timestamp is determined based on the internal timer which has an accuracy of 10ms. Depending on the configured mechanism (ceiling, floor, or round-off) this field is translated to only show full seconds.

The contents of this field are a compact form of the UTC Time format containing local time plus an offset to universal time. Binary coded decimal encoding is employed for the digits to reduce the storage and transmission overhead.

Record Sequence Number

A running sequence number with the range of 1 through 4294967295 used to link partial records generated by the PDG for a specific PDP context (characterized with the same Charging ID and PDG address pair). This field is not present if the first record is also the final record.

Record Type

This field identifies the type of the record:

- WLAN-CDR(WLANPDGRecord) 95 (0x5F)
- WLAN-CDR(WLANTTGRecord) 96 (0x60)

The 3GPP 32.298 does not define any values for record type. This value is selected as this is not yet reserved by any CDRs.
**Served IMSI**

This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.

Example for Coding: (Set by PDG)

```plaintext
3GPP TS 23.003 (CCITT Rec. E 212)
ServedIMSI ::= OCTET STRING (SIZE(1..8))
  -- subscriber identification IMSI
  -- octet 1..8: <= 15 digits TBCD-String (twisted)
  -- substructure (without spares or fillers):
  -- 3 digits - mobile country code (MCC)
  -- 2 digits - mobile network code (MNC)
  -- <= 10 digits - mobile subscriber identification number (MSIN)
  -- first and intermediate octet = 2 digits
  -- last octet = 2 digits or 1 digit + 1 fill digit H'F
  --
  -- example:
  -- IMSI: '262025600010020'
  -- filled: '262025600010020F'
  -- encoded: H'62 02 52 06 00 01 20 F0
```

**Format**

BCD encoded octet string

**Length**

3–8 bytes

---

**Served MSISDN**

The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber, which is sent by AAA server. The MSISDN is TBCD encoded as shown in the example below:

```plaintext
3GPP TS 23.003 (CCITT Rec. E 213)
ServedMSISDN ::= OCTET STRING (SIZE(1..9))
subscriber identification MSISDN
```
octet 1 : bit 8 (msb): extension bit
= 1 : no extension
other : not relevant

bit 7..5 : type of number
= 000 : unknown
= 001 : international number
= 010 : national significant number
= 011 : network specific number
= 100 : subscriber number
= 101 : reserved
= 110 : abbreviated number
= 111 : reserved for extension

bit 4..1 : numbering plan indicator
= 0001: ISDN/Telephony Numbering Plan (Rec CCITT E.164)
other : not relevant

octet 2..9: <= 16 digits TBCD-String (twisted)
substructure (without spares or fillers):
1..3 digits - country code (CC)
(only international number)
3 digits - national destination code (NDC)
<= 10 digits - subscriber number (SN)
first and intermediate octet = 2 digits
last octet = 2 digits or 1 digit + 1 fill digit H'F

example:
MSISDN: '<internat #><E.164>491720400305'
encoded: H'91 94 71 02 04 30 50

Format
BCD encoded octet string

Length
1–9 bytes

Served WLAN PDP Address

This field contains the PDP address of the served IMSI, for which the standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAddress.

Format
Choice

Length
8 bytes

WLAN UE Remote Address

This field contains the PDP address of the served IMSI, which is supported only in IPAddress by the PDG.

Format
Choice

Length
6 bytes

WLAN UE REMOTE IPV4 Binary Address

The octet string in this field contains the IPv4 address assigned to the subscriber by the PDG/TTG in binary coding.

Format
Octet string

Length
4 bytes

WLAN UE REMOTE IPV6 Binary Address

The octet string in this field contains the IPv6 address assigned to the subscriber by the PDG/TTG in binary coding.

Format
Octet string

Length
16 bytes
Chapter 15
HDD Storage

This chapter describes the mechanism implemented in the ASR 5x00 platform for short term storage of charging records (CDRs) in the event of loss of communication with an external Charging Gateway Function (CGF).
Overview

The hard disk was introduced in the ASR 5x00 platform to add storage capability. The first application is used in CDMA environments to increase buffering for I/O between the gateway and L-ESS to alleviate tight linkage required to avoid record loss due to overrun on the ASR 5x00 PSC buffers.

The External Storage System (ESS) is a high availability, fault tolerant, redundant solution for short-term storage of files containing detail records (UDRs/EDRs/FDRs/xDRs). To avoid loss of xDRs on the chassis due to overwriting, deletion, or unforeseen events such as power or network failure or unplanned chassis switchover, xDRs are off-loaded to ESS for storage and analysis to avoid loss of charging and network analysis information contained in the xDRs. The xDR files can be pulled by the L-ESS from the chassis, or the chassis can push the xDR files to the L-ESS using SFTP protocol. In the Push mode, the L-ESS URL to which the xDR files need to be transferred to is specified. The configuration allows a primary and a secondary server to be configured. Configuring the secondary server is optional. Whenever a file transfer to the primary server fails for four consecutive times, the files will be transferred to the secondary server. The system running with ECS stores xDRs on an L-ESS, and the billing system collects the xDRs form the L-ESS and correlates them with the AAA accounting messages using 3GPP2-Correlation-IDs (for PDSN) or Charging IDs (for GGSN).

This release now supports purging/deleting xDR records based on time or volume limit to restrict hard-disk space usage for charging records. When configured, old records can be deleted based on specified storage or time limits.

The second application is intended for UMTS environment. Records generated on ASR 5x00 are sent through UDP to an external storage application running on possibly clustered SUN servers utilizing shared storage. In parallel, records are sent over GTPP to a CGF. In addition to (e)GCDRs, the hard disk supports SCDRs and MCDRs generated by SGSN.

**Important:** The hard disk is not designed to support all features supported by the external storage application and not intended to replace this application in all situations.

The hard disk is useful for other applications:

- Store the Content Filtering static ratings database instead of using FLASH; valuable for other users including recovery scenarios.
- IPMS
- Large volume firewall and other DPI information such as applications/particular user, and users/bay station heretofore not store-able embedded.

The hard drive serves a number of uses in providing storage for various records generated by the mobile gateway that formerly require buffering or treatment outside of the gateway, necessitating purchase and operation of auxiliary servers. For 3GPP accounts the hard disk is an enhancement to service, and not a replacement. The hard drive is required to provide non-volatile storage in the ASR 5x00. For 3GPP accounts the hard disk can be used instead of external storage in networks where storage and record formatting needs can be met by the hard disk. The communication link between the ASR 5x00 and external storage is removed. GTPP continues to be supported. Files can be accessed by either GTPP (streaming) or sFTP (file I/O), but not both. At the same time, different files can be accessed by GTPP or sFTP.

Benefits

The HDD functionality provides an additional level of protection to the wireless operator by ensuring the charging records are preserved in case the Charging Gateway (CGF) goes down or loses connectivity with the ASR 5x00.
gateway. At the same time, this was implemented in a way that does not require any addition or modification to the existing mediation/billing systems.

Supported Records on HDD

This section describes the various records supported on the HDD:

- Accounting Request Records (ACR)
- Charging Data Records (CDR)
- Event Data Records (EDR)
- Event Records
- Reporting Event Data Records (REDR)
- Usage Data Records (UDR)

Accounting Request Records (ACR)

The Accounting Request Records are types of CDRs that contain offline charging information generated by the Diameter Rf interface. If all the Diameter servers configured in a group are down, ACRs are written to files in formats supported by the external node and stored on the HDD. These files are created when the chassis does not have connection with the CDF. From the HDD, ACR files can be pushed/pulled using FTP/SFTP protocols.

**Important:** ACRs are supported in 10.0 and later releases.

In StarOS releases prior to 12.3, in the standby chassis if HDD is configured and if the HDD profile status is unavailable, the pending Diameter accounting requests will be removed. Release 12.3 onwards, when HDD is configured in the standby chassis, irrespective of HDD profile status, the Diameter accounting requests will be retried to HDD until it successfully writes in to HDD. Any misconfiguration of HDD can result in Diameter accounting requests being piled up in to accounting archive list in the standby chassis. The only way to clean up the list can be either unconfigure the HDD or configure active HDD properly.

**Directory Structure:** By default, the ACR records are placed in the following directory paths:

- RAM-disk: `/records/acr/<policy_name>/`
- HDD: `/hd-raid/data/records/acr/<policy_name>/`

**File Formats:** Currently, file format1 to format10 are supported.

**Supported Products:** HSGW, P-GW, S-GW

Charging Data Records (CDR)

A Charging Data Record is a formatted collection of information about a chargeable event. The CDRs generated by GGSN/SGSN are sent to an external node for storage. CDRs are written to files in formats supported by the external node and stored on the HDD. From the HDD, CDR files can be pushed/pulled using FTP/SFTP protocols.

For information on how to configure push functionality, refer to the Configuring CDR Push section in this chapter.

**Directory Structure:** In releases prior to 16.0, by default, the CDRs are placed in the following directory paths for local mode:
**HDD Storage**

- RAM-disk: `/records/cdr/<gtpp_group_name><vpn_id>/`
- HDD: `/hd-raid/data/records/cdr/<gtpp_group_name><vpn_id>/`

In releases prior to 16.0, the CDRs are defaulted to be stored in the following directory paths for GTPP Streaming mode:
- RAM-disk: `/records/cdr/hdd_sec_stor_<gtpp-group-name><vpn-id>/`
- HDD: `/hd-raid/data/records/cdr/hdd_sec_stor_<gtpp-group-name><vpn-id>/`

In 16.0 and later releases, by default, the CDRs are placed in the following directory paths for local mode:
- RAM-disk: `/records/cdr/<gtpp-group-name>_context-name>/`
- HDD: `/hd-raid/records/cdr/<gtpp-group-name>_context-name>/`

In 16.0 and later releases, the CDRs are defaulted to be stored in the following directory paths for GTPP Streaming mode:
- RAM-disk: `/records/cdr/hdd_sec_stor_<gtpp-group-name>_context-name>/`
- HDD: `/hd-raid/records/cdr/hdd_sec_stor_<gtpp-group-name>_context-name>/`

**File Formats:** The GSS file formats, Custom1 to Custom8 are supported.

**Supported Products:** ePDG, GGSN, SGSN, P-GW, S-GW

---

**Event Data Records (EDR)**

The Event Data Records are responsible for definition, generation, and offloading of EDRs generated in the system (as a result of occurrence of an event) to the external billing system. EDRs are basically used for content billing purposes, wherein it is required that a different charging unit be employed for different types of content e.g. HTTP, SMTP, MMS, etc. EDRs are a type of usage records that are configurable by the operator. EDRs are generated per flow subject to available configuration.

**Directory Structure:** By default, the EDRs are placed in the following directory paths:
- RAM-disk: `/records/edr/`
- HDD: `/hd-raid/data/records/edr/`

**File Formats:** In this release, EDRs are supported in the Comma Separated Values (CSV) format.

**Supported Products:** ECS and other products/features using ECS

---

**Event Records**

The Event reporting is a mechanism using which subscriber activities like session creation/deletion, bearer creation/modification/update/deletion are reported to the external server (RTT server). The event report logs assist network operators in maintaining and troubleshooting the network. The event records are stored as files in the HDD and these files are later SFTPd to the external RTT server. To store the event records in the form of files, compress the event record file using the Call Detail Records Module (CDRMOD) which provides support for collecting, storing, and compressing the event records.

**Important:** Event Records are supported in 12.2 and later releases.

**Directory Structure:** By default, the Event records are placed in the following directory paths:
- RAM-disk: `/records/event/`
• HDD: `/hd-raid/data/records/event/`

File Formats: In this release, Event Records are supported in the Comma Separated Values (CSV) format.

Supported Products: SGSN, S-GW

Reporting Event Data Records (REDR)

Reporting Event Data Records are a type of CDRs that contain EDRs generated on flow end conditions, that is reporting flow end EDRs and HTTP transaction EDRs. REDR records are written to files in formats supported by the external node and stored in the HDD. From the HDD, REDR records can be pushed/pulled using FTP/SFTP protocols.

Important: REDRs are supported in 12.2 and later releases.

Directory Structure: By default, the REDRs are placed in the following directory paths:

- RAM-disk: `/records/redr/`
- HDD: `/hd-raid/data/records/redr/`

File Formats: In this release, REDRs are supported in the Comma Separated Values (CSV) format.

Supported Products: ECS and other products/features using ECS

Usage Data Records (UDR)

The Usage Data Records contain accounting information related to a specific mobile subscriber. UDRs are generated and stored on the system as records in CSV format (comma separated values). The CDR subsystem in conjunction with the External Storage Server (ESS) are responsible for offloading of UDRs. UDRs are generated per content type. The fields required as part of usage data records are configurable and stored in the System Configuration Task (SCT). UDRs are generated at the end of a call, i.e. call termination, time threshold, volume threshold, and handoffs.

Directory Structure: By default, the UDRs are placed in the following directory paths:

- RAM-disk: `/records/udr/`
- HDD: `/hd-raid/data/records/udr/`

File Formats: In this release, UDRs are supported in the Comma Separated Values (CSV) format.

Supported Products: GGSN, HA, PDSN
Hardware Overview

This section provides information on the hardware components that comprise the HDD feature in the ASR 5x00. The HDD functionality takes advantage of the Hard Disk available in the System Management Card (SMC) of the ASR 5x00. The System Management Card (SMC) serves as the primary controller and is responsible for initializing the entire system, and loading the software’s configuration image into other cards in the chassis as applicable. SMCs are installed in the chassis slots 8 and 9. During normal operation, the SMC in slot 8 serves as the primary (Active), while the SMC in slot 9 serves as the secondary (Standby).

Each SMC contains an enterprise-class Serial Attached SCSI (SAS) hard disk to load and store configuration data, software updates, buffer accounting information, and store diagnostic or troubleshooting information. Space for CDR storage in the internal Hard Disk is 100 Gigabytes (GB). Redundant control mechanisms allow for data to be written to the hard disks on both the active and standby SMCs.

*Important:* No hardware changes (PSC, SMC, chassis, etc.) are required to enable the CDR Storage and Retransmission. However, an appropriate software version has to be loaded in the ASR 5x00.
How HDD Works

This section describes the working of the HDD functionality.

The functionality for CDR Storage and Retransmission works without requiring an external storage. In normal operating mode, when CGF is up and reachable, the ASR 5x00 streams CDRs to the CGF. If the CGF becomes unreachable, the ASR 5x00 starts temporarily storing CDRs into the internal hard disk. Once the CGF is up again, the ASR 5x00 streams those records stored in its hard disk to the external CGF via GTP protocol. This is called the streaming mode of operation.

When CDR Internal Storage and Retransmission is configured, the ASR 5x00 continuously checks for reachability of configured CGFs. When there is no reply to Echo Requests or responses to signaling messages from the CGF, the ASR 5x00 assumes that the CGF is down and starts storing the CDRs into its internal hard disk.

**Important:** Only one CGF server per GTPP group is supported.

This function in the ASR 5x00 incorporates partial external storage functionality inside the ASR 5x00 gateway. The following diagram depicts the mechanism using external storage (no hard disk configured in the ASR 5x00) and using the hard disk.

![Diagram of HDD Mechanism](image)

The following example shows the amount of time that CDRs can be stored in the internal hard disk and the coverage in case CGF is down. Assuming a CDR size of 350 bytes, approximately 285 million CDRs can be stored in 100 GB of hard disk. Based on information from deployed systems, a peak rate of 4M (million) records/hour provides 2.9 days of storage. This means that assuming 2M sessions per gateway (say GGSN) at peak busy hour, and each session generates approximately 2 GCDRs per hour, 4 million CDRs/hour represents the worst case scenario for the Busy Hour. Assuming an average 75% of that busy hour, 0.75 x 96M CDR = 72M CDR per day; for 350 bytes per CDR, it yields approximately 4 days of storage.
CDR Streaming via GTPP

HDD is used to store CDRs when CGF fails and then CDRs are streamed to the CGF when CGF is up. Streaming can be done in a First-In-First-Out (FIFO) or parallel mode. The parallel mode of operation is newly introduced in release 16.0. In FIFO mode, newly generated CDRs are routed to CGF via HDD. In parallel mode, newly generated CDRs from AAA Managers are sent directly to CGF server along with the streamed CDRs from hard disk.

With streaming mode enabled, CDRs are written to HDD when the OCG connectivity is down. Once the OCG connectivity is up, the HDD contents are sent in a FIFO order. New records should be written to disk as long as all contents from disk are not fully flushed. If the disk is completely flushed, the records can be sent to OCG directly.

In the FIFO implementation, CDR streaming works fine but the process of sending the newly generated CDRs to HDD and then to CGF is inefficient. Also, if the CDR generation rate is high and streaming rate is slow, the files in HDD will keep increasing and eventually there will be no space left in hard disk, leading to CDR purging. This can be avoided by sending the newly generated CDRs directly to CGF when streaming from HDD is in progress.

With parallel mode, this behavior is changed to send new CDRs directly to CGF when streaming from HDD is in progress.

The existing CLI command “gtpp storage-server mode streaming” used to set the streaming mode, is extended. The “parallel” keyword used with this command enables the new parallel streaming mode.

In the current implementation, during streaming, GTPP requests are read from HDD and sent to CGF server, till configured max outstanding is reached.

In PARALLEL mode, rate of streaming from HDD will be slow. It is assumed that the billing domain should be capable of handling Out-Of-Order CDRs in parallel streaming mode.

CDR Streaming Workflow

This section describes the streaming behavior in Streaming (FIFO) and Parallel mode.

- **CGF is reachable, No files in HDD:**
  
  **FIFO:** newly generated CDRs will be sent to CGF server.
  
  **Parallel:** newly generated CDRs will be sent to CGF server.

- **CGF server is not reachable:**
  
  **FIFO:** newly generated CDRs will be stored to HDD.
  
  **Parallel:** newly generated CDRs will be stored to HDD

- **CGF is not reachable, HDD has less than 3 files, Now CGF becomes active:**
  
  **FIFO:** AAAMgr is blocked from sending new CDRs. GTPP requests in HDD are first streamed out to CGF server. After all requests in HDD are flushed, start sending new CDRs to CGF.
  
  **Parallel:** Same behavior as in FIFO mode.

- **CGF is not reachable, HDD has 3 or more CDR files, Now CGF becomes active:**
  
  **FIFO:** GTPP requests in HDD are streamed to CGF server. Newly generated CDRs will be stored in HDD and then sent to CGF.
  
  **Parallel:** GTPP requests in HDD are streamed to CGF server at a slower pace. Newly generated CDRs will be sent directly to CGF server.
Assumptions / Limitations

- The rate of streaming from HDD would be slower in parallel mode.
- Billing domain should be capable of handling Out-Of-Order CDRs in parallel streaming mode.
Deployment Scenarios

The HDD functionality is enabled in the ASR 5x00 gateway in the following deployment scenarios:

- **CGF configured but not reachable**: The ASR 5x00 attempts to stream the CDRs to the configured CGF. If the CGF does not respond to queries from ASR 5x00 or GTP messages, CDRs are stored in the internal HDD for future retransmission when CGF becomes reachable again.

- **CGF configured and active, then goes down**: The ASR 5x00 was sending CDRs to CGF (via GTPP) normally. Upon loss of reachability of the CGF, the ASR 5x00 determines that CGF is down and starts storing CDRs in its internal HDD.

- **CGF configured, goes down and later becomes available**: CDRs were sent (streamed) to CGF until it becomes unreachable. After ASR 5x00 determines CGF is down/unreachable, it starts storing CDRs in internal HDD. When CGF becomes available again, CDRs are streamed to CGF, starting from the older CDR first.
HDD Configuration

This section describes how to configure the HDD.

This section covers the following topics:

- Configuring HDD
- Configuring EDR/UDR Parameters
- Configuring CDR Push

Configuring HDD

This section describes how to configure the HDD feature.

Important: This feature is disabled by default in the ASR 5x00.

In GTPP group mode, an option is added to enable this functionality with local-fallback option to existing `gtpp storage-server mode` in the ASR 5x00:

```
default gtpp storage-server mode { local | remote | streaming }
```

Notes:

- **default**: Returns the GTPP group configuration to the default ‘remote’ value (the ASR 5x00 streams CDRs to the configured external CGF) for the GTPP.
- If `remote` is configured, the ASR 5x00 sends CDRs to the external CGF. In case CGF is down or unreachable, CDRs will be lost.
- If `local` is configured, records are stored in the ASR 5x00’s internal hard disk. Mediation / billing system can retrieve the records through Secure FTP (SFTP).
- If `streaming` is configured, then the CDRs are sent to CGF by default. If the CGF is down or unreachable, CDRs are temporarily stored in the internal hard disk and streamed to CGF once it becomes available.

Configuring EDR/UDR Parameters

This section provides an example configuration to configure EDR/UDR file transfer and file properties parameters, including configuring hard disk support on SMC card on ASR 5x00, transfer modes, transfer interval, etc.

To configure EDR/UDR file parameters:

```
configure

  context <context_name>

  edr-module active-charging-service

  cdr { purge { storage-limit storage_limit | time-limit time_limit } [ max-files max_records_to_purge ] | push-interval push_interval | push-trigger space-usage-percent
```
trigger_percentage | remove-file-after-transfer | transfer-mode { pull [ module-only ] | push primary { encrypted-url encrypted_url | url url } [ [ max-files max_records ] [ module-only ] [ secondary { encrypted-secondary-url encrypted_secondary_url | secondary-url secondary_url } ] [ via local-context ] + | ] use-harddisk }

    file [ charging-service-name { include | omit } | compression { gzip | none } ] [ current-prefix string ] [ delete-timeout seconds ] [ directory directory_name ] [ edr-format-name ] [ exclude-checksum-record ] [ field-separator { hyphen | omit | underscore } ] [ file-sequence-number rulebase-seq-num ] [ headers ] [ name file_name ] [ reset-indicator ] [ rotation num-records number | time seconds | volume bytes ] [ sequence-number { length length | omit | padded | padded-six-length | unpadded } ] [ storage-limit limit ] [ single-edr-format ] [ time-stamp { expanded-format | rotated-format | unix-format } ] [ trailing-text string ] [ trap-on-file-delete ] [ xor-final-record ] +

    exit

udr-module active-charging-service

cdr { purge { storage-limit storage_limit | time-limit time_limit } [ max-files max_records_to_purge ] | push-interval push_interval | push-trigger space-usage-percent trigger_percentage | remove-file-after-transfer | transfer-mode { pull [ module-only ] | push primary { encrypted-url encrypted_url | url url } [ [ max-files max_records ] [ module-only ] [ secondary { encrypted-secondary-url encrypted_secondary_url | secondary-url secondary_url } ] [ via local-context ] + | ] use-harddisk }  

    file [ charging-service-name { include | omit } | compression { gzip | none } ] [ current-prefix string ] [ delete-timeout seconds ] [ directory directory_name ] [ exclude-checksum-record ] [ field-separator { hyphen | omit | underscore } ] [ file-sequence-number rulebase-seq-num ] [ headers ] [ name file_name ] [ reset-indicator ] [ rotation num-records number | time seconds | volume bytes ] [ sequence-number { length length | omit | padded | padded-six-length | unpadded } ] [ storage-limit limit ] [ time-stamp { expanded-format | rotated-format | unix-format } ] [ trailing-text string ] [ trap-on-file-delete ] [ udr-seq-num ] [ xor-final-record ] +

end

Notes:

- The cdr command can be configured either in the EDR or the UDR Configuration Mode. Configuring in one mode prevents the configurations from being applied in the other mode.

- The use-harddisk keyword is only available on the ASR 5x00.

- The push keyword is used to send the EDR/UDR files to the configured L-ESS or any other external server.

- The purge keyword is used to purge or delete the EDR/UDR records based on time or volume limit. By default, no purge operation is performed by VPNMGR module.

  When the configured threshold limit is reached on the hard disk drive, the records that are created dynamically in the /mnt/hd-raid/data/records/ directory are automatically deleted. Files that are manually created should be deleted manually.

- The max-files keyword allows the operator to configure the maximum number of files sent per iteration based on configured file-size.

For more information on this command, refer to the Command Line Interface Reference.
Viewing Statistics

To view EDR-UDR file statistics, in the Exec Mode, enter the following command:

```
show cdr statistics
```

Pushing EDR/UDR Files Manually

To manually push EDR/UDR files to the configured L-ESS, in the Exec mode, use the following command:

```
cdr-push { all | local-filename file_name }
```

Notes:

- Before you can use this command, the EDR/UDR transfer mode and file locations must be set to push in the EDR/UDR Module Configuration Mode.
- The `cdr-push` command is available in the Exec Mode.
- `file_name` must be absolute path of the local file to push.

Retrieving EDR and UDR Files

To retrieve UDR or EDR files you must SFTP into the context that was configured for EDR or UDR file generation. This was done with the FTP-enabled account that you configured in the Enabling Charging Record Retrieval section. The following commands use SFTP to log on to a context named ECP as a user named ecpadmin, through an interface configured in the ECS context that has the IP address `192.168.1.10` and retrieve all EDR or UDR files from the default locations:

```
sftp -oUser=ecpadmin@ECP 192.168.1.10:/records/edr/*
sftp -oUser=ecpadmin@ECP 192.168.1.10:/records/udr/*
```

Configuring CDR Push

This section provides an example configuration to configure CDR file transfer and file properties parameters, including configuring hard disk support on SMC card on ASR 5x00, transfer modes, transfer interval, etc.

```
Important: This CDR push feature is applicable to all types of CDRs, for example, GCDRs, eGCDRs, PGW/SGW CDRs, SGSN CDRs, etc.
```

To configure CDR push feature:

```
configure
context <context_name>
gtpp group <group_name>
gtpp storage-server local file { compression { gzip | none } | format { custom1 | custom2 | custom3 | custom4 | custom5 | custom6 | custom7 | custom8 } | name { format string [ max-file-seq-num seq_number ] | prefix prefix } | purge-processed-files [ file-
```

exit
end

Notes:

- The `gtpp storage-server local file push` command enables the push mode. This configuration will allow a primary and a secondary server to be configured. When a file transfer to primary fails four times, the transfer of CDR files will automatically be failed over to the secondary server. The transfer will switch back to the original primary after 30 minutes, or if there are four transfer failures to the secondary server.

- The keyword `[via-local-context]` is used to specify whether to use the gtpp group's context or use local context to push/reach remote server.

---

**Important:** If the push is done through GTPP group context then the push rate is lesser compared to via local context, as the HDD is attached to the local context.

For more information on this command, refer to the *Command Line Interface Reference*.

### Viewing Statistics

To view CDR file statistics, in the Exec Mode, enter the following command:

```
show cdr statistics
```

### Pushing CDR Files Manually

To manually push CDR files to the configured remote server, in the Exec mode, use the following command:

```
cdr-push { all | local-filename file_name }
```

Notes:

- Before you can use this command, the CDR transfer mode and file locations must be set to push in the GTPP Group Configuration Mode.

- The `cdr-push` command is available in the Exec Mode.

- `file_name` must be absolute path of the local file to push.

### Retrieving CDR Files

To retrieve CDR files you must SFTP into the context that was configured for CDR file generation.

This was done with the FTP-enabled account that you configured in the *Enabling Charging Record Retrieval* section.

The following commands use SFTP to log on to a context named `ECP` as a user named `ecpadmin`, through an interface configured in the ECS context that has the IP address `192.168.1.10` and retrieve all CDR files from the default locations:

```bash
sftp -oUser=ecpadmin@ECP 192.168.1.10:/records/cdr/<gtpp-group>-<vpnid>/*
```
Appendix A
Switching CDRs

This appendix describes the following procedures:

- Switching CDRs from HDD to GSS
- Switching CDRs from GSS to HDD
Switching CDRs from HDD to GSS

This section describes how to switch CDRs from HDD to GSS with:

- **LRSN Enabled**
- **LRSN Disabled**

**LRSN Enabled**

To switch CDRs from HDD to GSS with LRSN enabled:

```bsh
Important: This configuration change must be undertaken in a maintenance window, when the load is minimum.
```

**Step 1**

Configure the GSS server, and ensure that GSS and GGSN have no connectivity issues.

- If configuring to the *default* GTPP group:

  ```bsh
  configure
  gtppp single-source centralized-lrsn-creation
  context <billing>
  gtppp charging-agent address <address>
  gtppp storage-server <address> port <port>
  gtppp max-cdrs 255 wait-time 300
  end
  ```

  ```bsh
  show configuration | grep gtppp
  ```

  - If configuring to a specific GTPP group:

    ```bsh
    configure
    gtppp single-source centralized-lrsn-creation
    context <billing>
    gtppp group <gtppp_group>
    gtppp charging-agent address <address>
    gtppp storage-server <address> port <port>
    gtppp max-cdrs 255 wait-time 300
    end
    ```
Switching CDRs

Switching CDRs from HDD to GSS

show configuration | grep gtpp

Step 2 Change the GTPP storage server mode to “Remote”.

- If configuring to the default GTPP group:

```
configure

context <billing>

gtpp storage-server mode remote

gtpp max-cdrs 255 wait-time 300

end
```

show configuration | grep gtpp

- If configuring to a specific GTPP group:

```
configure

context <billing>

  gtpp group <gtpp_group>

    gtpp storage-server mode remote

    gtpp max-cdrs 255 wait-time 300

end
```

show configuration | grep gtpp

**Important:** Ensure that the file format, GTPP dictionary and LRSN Enabled are set properly on GSS in the gss.cfg file. Also, the correct version of GSS has to be installed and started on the Solaris machine.

Step 3 Check and confirm that new CDRs are being written to files by GSS.

On the HDD side, remaining CDRs are immediately flushed to a CDR file. At this point, the transition is complete.

**LRSN Disabled**

To switch CDRs from HDD to GSS with LRSN disabled:

**Important:** This configuration change must be undertaken in a maintenance window, when the load is minimum.

Step 1 Configure the GSS server, and ensure that GSS and GGSN have no connectivity issues.

- If configuring to the default GTPP group:

```
configure
```
context <billing>

gtpp charging-agent address <address>
gtpp storage-server <address> port <port>
gtpp max-cdrs 255 wait-time 300
end

show configuration | grep gtpp

* If configuring to a specific GTPP group:

configure

context <billing>

gtpp group <gtpp_group>
gtpp charging-agent address <address>
gtpp storage-server <address> port <port>
gtpp max-cdrs 255 wait-time 300
end

show configuration | grep gtpp

**Step 2** Change the GTPP storage server mode to “Remote”.

* If configuring to the *default* GTPP group:

configure

context <billing>

gtpp storage-server mode remote
gtpp max-cdrs 255 wait-time 300
end

show configuration | grep gtpp

* If configuring to a specific GTPP group:

configure

context <billing>

gtpp group <gtpp_group>
gtpp storage-server mode remote
gtpp max-cdrs 255 wait-time 300

end

show configuration | grep gtpp

Step 3: Check and confirm that new CDRs are being written to files by GSS.
On the HDD side, remaining CDRs are immediately flushed to a CDR file. At this point, the transition is complete.

**Important**: Ensure that the file format, GTPP dictionary and LRSN Disabled are set properly on GSS in the `gss.cfg` file. Also, the correct version of GSS has to be installed and started on the Solaris machine.
Switching CDRs from GSS to HDD

This section describes how to switch CDRs from GSS to HDD with:

- **LRSN Enabled**
- **LRSN Disabled**

**LRSN Enabled**

To switch CDRs from GSS to HDD with LRSN enabled:

```
Step 1  Ensure that GSS is up and running, and that GGSN is able to deliver CDRs to GSS.
Start the changes from a known good state.

Step 2  Add the HDD configuration.
- If configuring to the *default* GTPP group:

  ```
  configure
  
  gtpp single-source centralized-lrsn-creation
  
  context <billing>
  
  gtpp storage-server local file format <file_format_as_in_gss.cfg>
  
  gtpp storage-server local file rotation volume mb 40
  
  gtpp storage-server local file rotation cdr-count
  <max_CDR_per_file_as_in_gss.cfg>
  
  gtpp storage-server local file rotation time-interval
  <max_file_gen_period_as_in_gss.cfg>
  
  gtpp dictionary <gtpp_dict_as_in_gss.cfg>
  
  gtpp storage-server mode local
  
  end
  
  show configuration | grep gtpp
  
  Important: Note that `gtpp storage-server mode local` must be added at the end.
  ```

- If configuring to a specific GTPP group:

  ```
  configure
  ```
Switching CDRs

Switching CDRs from GSS to HDD

| Important: Note that \texttt{gtpp storage-server mode local} must be added at the end. |

- **Step 3**: Ensure that GSS is still up and running so that already pending requests towards GSS are fully delivered. Without flushing out the existing pending requests to GSS, GGSN will not switch to HDD.

- **Step 4**: Check and confirm that new CDRs are being written to HDD.

- **Step 5**: On the GSS side, you must wait for the time period it takes for the hard file generation, so that remaining CDRs are flushed to CDR file.

- **Step 6**: At this point, the transition is complete and you can bring the GSS offline.

**LRSN Disabled**

To switch CDRs from GSS to HDD with LRSN disabled:

| Important: This configuration change must be undertaken in a maintenance window, when the load is minimum. |

- **Step 1**: Ensure that GSS is up and running and GGSN is able to deliver CDRs to GSS. Start the changes from a known good state.

- **Step 2**: Add the HDD configuration.
  - If configuring to the \texttt{default} GTPP group:
    
    \begin{verbatim}
    configure
    context <billing>
    gtpp storage-server local file format <file_format_as_in_gss.cfg>
    \end{verbatim}

    show configuration | grep gtpp
Switching CDRs from GSS to HDD

```bash
  gtpp storage-server local file rotation volume mb 40
  gtpp storage-server local file rotation cdr-count
  <max_CDR_per_file_as_in_gss.cfg>
  gtpp storage-server local file rotation time-interval
  <max_file_gen_period_as_in_gss.cfg>
  gtpp dictionary <gtpp_dict_as_in_gss.cfg>
  gtpp storage-server mode local

  end

  show configuration | grep gtpp
```

**Important:** Note that `gtpp storage-server mode local` must be added at the end.

- If configuring to a specific GTPP group:
  ```
  configure

  context <billing>

  gtpp group <gtpp_group>

  gtpp storage-server local file format <file_format_as_in_gss.cfg>
  gtpp storage-server local file rotation volume mb 40
  gtpp storage-server local file rotation cdr-count
  <max_CDR_per_file_as_in_gss.cfg>
  gtpp storage-server local file rotation time-interval
  <max_file_gen_period_as_in_gss.cfg>
  gtpp dictionary <gtpp_dict_as_in_gss.cfg>

  gtpp storage-server mode local

  end

  show configuration | grep gtpp
  ```
  
  **Important:** Note that `gtpp storage-server mode local` must be added at the end.

**Step 3** Ensure that GSS is still up and running so that already pending requests towards GSS is fully delivered. Without flushing out the existing pending requests to GSS, GGSN will not switch to HDD.

**Step 4** Check and confirm that new CDRs are being written to HDD.

**Step 5** On the GSS side, you must wait for the time period it takes for the hard file generation, so that remaining CDRs are flushed to CDR file.
Step 6  At this point, the transition is complete and you can bring the GSS offline.