

GTPP Interface Administration and Reference, StarOS Release 21.21

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CONTENTS

PREFACE

About this Guide xvii

Conventions Used xvii

Supported Documents and Resources xviii

Related Documentation xviii

Contacting Customer Support xix

CHAPTER 1

GTPP Accounting Overview 1

GTPP Interface Overview 1

CDR Transport by GTPP 3

Path Protocol 3

GTPP Message Types 4

Usage of GTPP Header in Charging 5

Information Elements 5

GTPP Messages 6

Node Alive Request 6

Node Alive Response 7

Redirection Request 7

Redirection Response 8

Data Record Transfer Request 9

Information Elements in Data Record Transfer Request 9

Packet Transfer Command IE 9

Data Record Packet IE 10

Sequence Numbers of Released Packets IE 10

Sequence Numbers of Canceled Packets IE 11

Private Extension IE 12

Data Record Transfer Response 12

Handling Error Response Cause 13
Charging Characteristics 13
Charging Records 15
File Format for CDRs 16
Evolved Packet Data Gateway Call Detail Records (ePDG-CDRs) 18
ePDG-CDR Format 18
Standard G-CDRs 18
G-CDR Format 19
Enhanced G-CDRs 19
eG-CDR Format 19
PDN Gateway Call Detail Records (PGW-CDRs) 19
PGW-CDR Format 19
Serving Gateway Call Detail Records (SGW-CDRs) 19
SGW-CDR Format 19
Standard SGSN CDRs 19
S-CDR Format 19
Wireless LAN Call Detail Records (WLAN-CDRs) 20
WLAN-CDR Format 20
Triggers for Generation of Charging Records 20
ePDG-CDR Triggers 20
ePDG-CDR Charging Information Addition 20
Triggers for ePDG-CDR Closure 21
GGSN CDR Triggers 22
G-CDR Triggers 22
eG-CDR Triggers 22
PGW-CDR Triggers 24
PGW-CDR Charging Information Addition 26
S-CDR Triggers 27
Triggers for S-CDR Closure 27
Triggers for S-CDR Charging Information Addition 29
SGW-CDR Triggers 30
SGW-CDR Charging Information Addition 32
WLAN-CDR Triggers 32
WLAN-CDR Charging Information Addition 33

Supported Features 34
CDR Push Functionality 34
Zero Volume CDR Suppression 35
Automatic Transfer of Stranded CDRs on ICSR 35
Limitations 36
How this Feature Works 36
Restructuring of CDR Module 36
GTPP Group Configuration with Same CGF Server IP and Different Ports 37
Limitations 38

CHAPTER 2 GTPP Interface Configuration 39
Configuring the GPRS Tunneling Protocol 39
Configuring GTPP for ePDG 40
Configuring GTPP for GGSN 41
Configuring GTPP for P-GW and eG-CDR 48
Configuring GTPP for PDG and TTG 57
Configuring GTPP for S-GW 64
Configuring GTPP for SGSN 70
Sample Configuration for SGSN when HDD is Used 78
Sample Configuration for SGSN when GSS is Used 79
Gathering Statistics 79

CHAPTER 3 Controlled S-GW CDR Generation 81
Feature Summary and Revision History 81
Feature Changes 82
Command Changes 82

CHAPTER 4 ePDG CDR Field Reference 83
CDR Fields Supported in ePDG-CDRs 83
custom24 Dictionary 84
ASN.1 Definition for Fields in custom24 95

CHAPTER 5 ePDG CDR Field Descriptions 101
CDR Fields 101

Access Point Name Network Identifier 101
APN Selection Mode 102
Cause for Record Closing 102
Charging Characteristics 102
Charging Characteristics Selection Mode 103
Charging ID 103
Duration 103
Dynamic Address Flag 104
Dynamic Address Flag Extension 104
ePDG Address Used 104
ePDG IPv4 Binary Address 104
ePDG IPv6 Binary Address 105
ePDGiPv6Address 105
ePDG IPv6 Binary Address 105
iMSsignalingContext 105
List of Traffic Data Volumes 106
Change Of Charging Condition 106
Local Record Sequence Number 108
MACAddress of AP 108
Node ID 109
PDN Connection Id 109
PDP PDN Type 109
PGW Address used 110
PGW IPv4 Binary Address 110
PGW Ipv6 Binary Address 111
PGW PLMN Identifier 111
RAT Type 111
Record Opening Time 111
Record Sequence Number 112
Record Type 112
Served IMSI 113
Served MSISDN 113
Served PDP PDN Address 114
PDP IP Address 114

Served PDP PDN Address Extension 115
PDP IP Address 115
Start Time 116
Stop Time 117
UE Tunnel Information 117
UE Tunnel Endpoint IP Address 118
UE Tunnel Endpoint Port 118
ePDG Tunnel Endpoint IP Address 118
ePDG Tunnel Endpoint Port 118

CHAPTER 6 GGSN CDR Field Reference 119
CDR Fields Supported in G-CDRs 120
custom6 Dictionary 120
ASN.1 Definition for Fields in custom6 Dictionary 164
standard Dictionary 171
CDR Fields Supported in eG-CDRs 173
custom6 Dictionary 173
ASN.1 Definition for Fields in custom6 Dictionary 217
custom19 Dictionary 224
ASN.1 Definition for Fields in custom19 Dictionary 273
standard Dictionary 280

CHAPTER 7 GGSN CDR Field Descriptions 283
CDR Fields 284
Access Point Name Network Identifier 284
APN Selection Mode 284
CAMEL Information 284
Cause for Record Closing 285
Charging Characteristics 286
Charging ID 286
ChSelectionMode 286
Diagnostics 287
Direct Tunnel Related Record Extensions 287
Duration 288

Dynamic Address Flag 288
External Charging Identifier 289
GGSN Address 289
IMS Signalling Context 289
List of Service Data Volumes 289
List of Traffic Data Volumes 293
Local Record Sequence Number 294
Low Access Priority Indicator 294
MS Time Zone 294
Network Initiated PDP Context 294
Node ID 295
PDP Type 295
PSFurnishChargingInformation 295
Radio Access Technology (RAT) Type 296
Record Extensions 296
Record Opening Time 297
Record Sequence Number 297
Record Type 297
Served IMEISV 297
Served IMSI 298
Served MSISDN 298
Served PDP Address 298
Served PDP PDN Address Extension 298
Service Level CDR 299
SGSN Address 300
SGSN PLMN Identifier 300
User Location Information 301

CHAPTER 8 **P-GW CDR Field Reference** 303
custom24 Dictionary 303
ASN.1 Definition for Fields in custom24 Dictionary 321

CHAPTER 9 **P-GW CDR Field Descriptions** 331
CDR Fields 331

Access Point Name Network Identifier 331
AF Record Information 332
AF-ChargingIdentifier 332
APN Selection Mode 333
Cause for Record Closing 333
Charging Characteristics 334
Charging Characteristics Selection Mode 334
Charging ID 335
Diagnostics 335
Network Specific Cause (GTPP custom34 Dictionary) 335
Duration 336
Dynamic Address Flag 336
List of RAN Secondary RAT Usage Reports 336
RAN Secondary RAT Usage Report 337
List of Service Data 338
Data Service Volume Block 339
Local Sequence Number 347
Low Access Priority Indicator 347
MS Time Zone 348
Node ID 348
PDN Connection Id 349
PDP PDN Type 349
P-GW Address 349
P-GW PLMN Identifier 350
PSFurnishChargingInformation 350
RAT Type 351
Record Extension (GTPP custom34 Dictionary) 351
Record Extension (GTPP custom38 Dictionary) 353
Service Level CDR (GTPP custom38 Dictionary) 353
Record Opening Time 356
Record Sequence Number 357
Record Type 357
Served IMEISV 357
Served IMSI 358

Served MNNAI 358
Served MSISDN 359
Served PDP PDN Address 360
Served PDP PDN Address Extension 360
Serving Node Address 361
Serving Node PLMN Identifier 361
Serving Node Type 361
Start Time 362
Stop Time 363
TWAN ULI 364
User Location Information 364

CHAPTER 10 SGSN CDR Field Reference 367
CDR Fields Supported in S-CDRs 368
standard Dictionary 368
custom6 Dictionary 370
ASN.1 Definition for Fields in custom6 Dictionary 384
custom8 Dictionary 390
custom13 Dictionary 393
ASN.1 Definition for Fields in custom13 Dictionary 406
custom24 Dictionary 412
ASN.1 Definition for Fields in custom24 Dictionary 428
CDR Fields Supported in S-SMO-CDRs 434
standard, custom1 – custom42 Dictionaries 435
CDR Fields Supported in S-SMT-CDRs 436
standard, custom1 – custom42 Dictionaries 436
CDR Fields Supported in M-CDR 438
standard, custom1 – custom42 Dictionaries 438
CDR Fields Supported in LCS-MT-CDRs 439
standard, custom1 – custom42 Dictionaries 439
CDR Fields Supported in LCS-MO-CDRs 442
standard, custom1 – custom42 Dictionaries 442

CHAPTER 11 SGSN CDR Field Descriptions 445

CDR Fields 446
Access Point Name Network Identifier 446
Access Point Name Operator Identifier 446
APN Selection Mode 446
CAMEL Information 447
Cause for Record Closing 447
Cell Identifier 448
Change Condition 448
Change of Charging Characteristics 448
Change of Charging Condition 449
Change Time 449
Charging Characteristics 449
Charging Characteristics Selection Mode 449
Charging ID 450
Data Volume GPRS Downlink 450
Data Volume GPRS Uplink 451
Default Transaction/SMS Handling 452
Diagnostics 452
Duration 452
Dynamic Address Flag 453
Event Time Stamp 453
GGSN Address 453
IP Address 453
IPv4 Binary Address 454
IPv6 Binary Address 454
LCS Cause 454
LCS Client Identity 455
LCS Client Type 455
LCS Priority 455
LCS QoS 455
Level of CAMEL services 456
List of Traffic Data Volumes 456
List of Traffic Volumes 457
Local Record Sequence Number 457

Location 458
Location Area Code (LAC) 458
Location Estimate 458
Location Type 459
Low Access Priority Indicator 459
Measurement Duration 459
MLC Number 459
MS Network Capability 459
Network Initiated PDP Context 460
Node ID 460
Notification To MS User 460
Number of DPs encountered 461
PDP Type 461
pLMNIdentifier 461
Positioning Data 462
Privacy Override 462
QoS Negotiated 462
QoS Requested 462
Radio Access Technology (RAT) Type 463
Record Extensions 463
Record Opening Time 463
Record Sequence Number 464
Record Type 464
Recording Entity 464
RNC Unsent Downlink Volume 465
Routing Area Code (RAC) 465
SCF Address 465
Served IMEI 465
Served IMSI 466
Served PDP Address 466
Served PDP PDN Address Extension 466
PDP IP Address 467
Served MSISDN 467
Service Key 468

SGSN Address 468
SGSN Change 468
SGSN 2G Downlink Dropped Bytes 468

CHAPTER 12 S-GW CDR Field Reference 471
CDR Fields Supported in SGW-CDRs 471
custom6 Dictionary 472
List of Traffic Data Volumes 475
List of Secondary RAT Usage Reports 477
ASN.1 Definition for Fields in custom6 478
custom24 Dictionary 485
ASN.1 Definition for Fields in custom24 510

CHAPTER 13 S-GW CDR Field Descriptions 519
CDR Fields 519
Access Point Name Network Identifier 519
APN Selection Mode 520
Cause for Record Closing 520
Charging Characteristics 521
Charging Characteristics Selection Mode 521
Charging ID 521
Diagnostics 521
gsm0408Cause 522
networkSpecificCause (only for GTPP custom34 and custom35 Dictionaries) 522
Duration 523
Dynamic Address Flag 523
List of Traffic Data Volumes 523
Change Of Charging Condition 523
iMSsignalingContext 528
List of Served Node Addresses 528
Served Node IPv4 Binary Address 529
Served Node IPv6 Binary Address 529
Local Record Sequence Number 529
Low Access Priority Indicator 529

MS Time Zone 530
Node ID 530
PDN Connection Id 530
PDP PDN Type 531
PGW Address used 531
PGW IPv4 Binary Address 532
PGW IPv6 Binary Address 532
RAT Type 532
Record Extensions 533
Record Opening Time 533
Record Sequence Number 534
Record Type 534
Served IMEISV 534
Served IMSI 535
Served MSISDN 535
Served PDP PDN Address 536
PDP IP Address 536
Served PDP PDN Address Extension 537
PDP IP Address 537
Serving Node PLMN Identifier 538
Serving Node Type 538
SGW Address Used 539
SGW IPv4 Binary Address 539
SGW IPv6 Binary Address 539
SGW Change 539
Start Time 540
Stop Time 540
User CSG Information 541
CSG ID 541
CSG Access Mode 542
CSG Membership Indication 542
User Location Information 542

CHAPTER 14 **WLAN CDR Field Reference** 545

CDR Fields Supported in WLAN-CDRs 546
standard, custom1 – custom6 Dictionaries 546

CHAPTER 15 WLAN CDR Field Descriptions 553
CDR Fields 553
Access Point Name Network Identifier 553
APN Selection Mode 554
Cause for Record Closing 554
Charging Characteristics 554
Charging Characteristics Selection Mode 555
Charging ID 555
Diagnostics 556
gsm0408Cause 556
Dynamic Address Flag 556
Duration 556
Local Record Sequence Number 557
List of Traffic Data Volumes 557
Change Of Charging Condition 557
Node ID 559
PDG Address 560
PDG IPv4 Binary Address 560
PDG IPv6 Binary Address 560
PDP Type 561
RAT Type 561
Record Opening Time 561
Record Sequence Number 562
Record Type 562
Served IMSI 562
Served MSISDN 563
Served WLAN PDP Address 564
WLAN UE Remote Address 564

CHAPTER 16 HDD Storage 567
Overview 567

Benefits 568
Supported Records on HDD 568
Accounting Request Records (ACR) 568
Charging Data Records (CDR) 569
Diameter Records 570
Event Data Records (EDR) 570
Event Records 570
Reporting Event Data Records (REDR) 571
Usage Data Records (UDR) 571
Hardware Overview 572
How HDD Works 572
CDR Streaming via GTPP 573
CDR Streaming Workflow 574
Assumptions / Limitations 574
Deployment Scenarios 574
HDD Configuration 575
Configuring HDD 575
Configuring EDR/UDR Parameters 575
Viewing Statistics 577
Pushing EDR/UDR Files Manually 577
Retrieving EDR and UDR Files 577
Configuring CDR Push 577
Viewing Statistics 578
Pushing CDR Files Manually 578
Retrieving CDR Files 579

APPENDIX A

Switching CDRs 581
Switching CDRs from HDD to GSS 581
LRSN Enabled 581
LRSN Disabled 582
Switching CDRs from GSS to HDD 584
LRSN Enabled 584
LRSN Disabled 585



About this Guide

Note The HA, HSGW, PDSN, and SecGW products have reached end of life and are not supported in this release. Any references to these products (specific or implied) their components or functions including CLI commands and parameters in this document are coincidental and are not supported. Full details on the end of life for these products are available at https://www.cisco.com/c/en/us/products/collateral/wireless/asr-5000-series/eos-eol-notice-c51-740422.html.

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 5500 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, on page xvii
- Supported Documents and Resources, on page xviii
- Contacting Customer Support , on page xix

Conventions Used

The following tables describe the conventions used throughout this documentation.

Icon	Notice Type	Description
No image	Information Note	Provides information about important features or instructions.
No image	Caution	Alerts you of potential damage to a program, device, or system.

Icon	Notice Type	Description
No image	Warning	Alerts you of potential personal injury or fatality. May also alert you of potential electrical hazards.

Typeface Conventions	Description
Text represented as a `screen display`	This typeface represents displays that appear on your terminal screen, for example: `Login:`
Text represented as **commands**	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.
Text represented as a **command** *variable*	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.
Text represented as menu or sub-menu names	This typeface represents menus and sub-menus that you access within a software application, for example: Click the **File** menu, then click **New**

Supported Documents and Resources

Related Documentation

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

The following related product documents are also available:

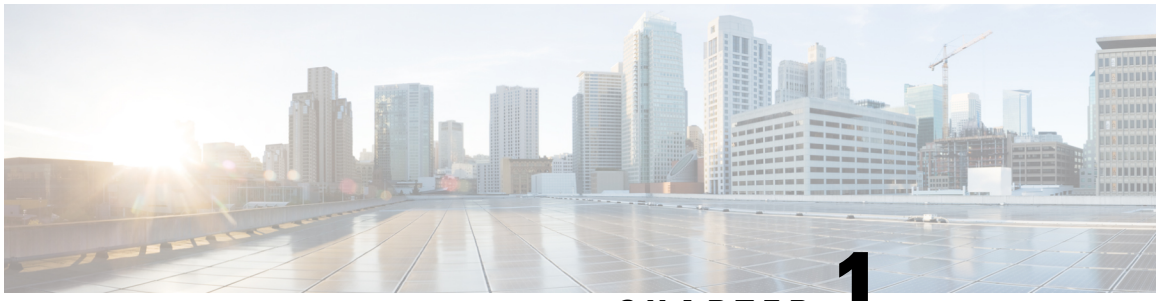
- *AAA Interface Administration and Reference*
- *ASR 5500 Installation Guide*
- *Command Line Interface Reference*
- *IPSec Reference*
- Platform-specific System Administration Guides
- Product-specific Administration Guides

- *Release Change Reference*
- *SNMP MIB Reference*
- *Statistics and Counters Reference*
- *Statistics and Counters Reference - Bulk Statistics Descriptions*
- *Thresholding Configuration Guide*

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 5500 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, on page 1
- Path Protocol, on page 3
- GTPP Message Types, on page 4
- GTPP Messages, on page 6
- Charging Characteristics, on page 13
- Charging Records, on page 15
- Triggers for Generation of Charging Records, on page 20
- Supported Features, on page 34

GTPP Interface Overview

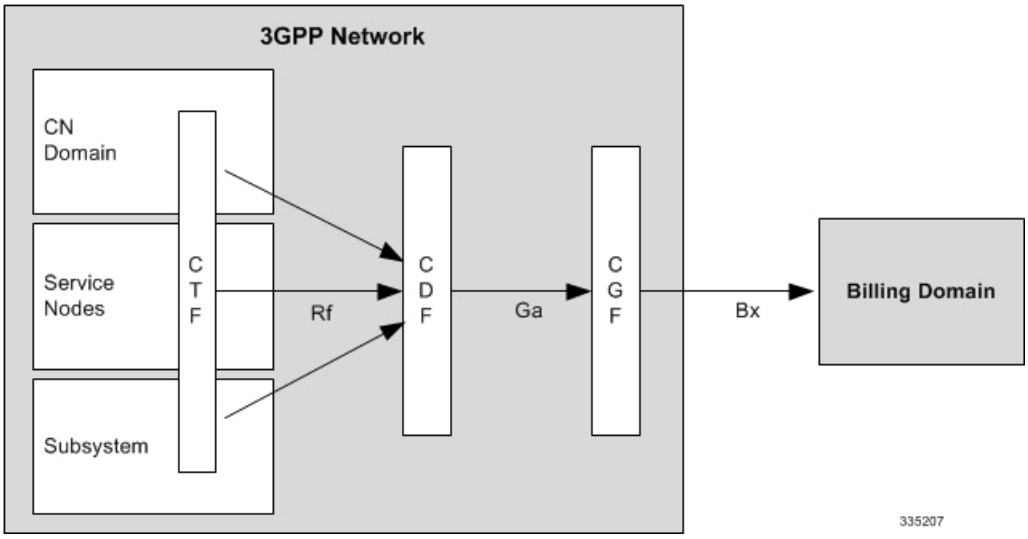
This section provides information on GTPP interface between Charging Gateway Function (CGF) and Cisco Systems' licensed products running on the ASR 5500 core platforms, including the GGSN, P-GW, S-GW, and SGSN in General Packet Radio Service (GPRS), Universal Mobile Telecommunications System (UMTS) data 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.

Figure 1: 3GPP Offline Charging Architecture



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).

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 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

Message Type value (Decimal)	GTPP Message
1	Echo Request
2	Echo Response
3	Version Not Supported
4	**Node Alive Request**
5	**Node Alive Response**
6	**Redirection Request**
7	**Redirection Response**
240	**Data Record Transfer Request**
241	**Data Record Transfer Response**
Others	Reserved for future use

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

TLV Information Element Types	
254	Address of Recommended Node
253	Requests Responded
252	Data Record Packet
251	Charging Gateway Address (this IE is also used in TS 29.060 [200])
250	Sequence Numbers of Canceled Packets
249	Sequence Numbers of Released Packets
TV Information Element Types	
127	Charging ID
126	Packet Transfer Command

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.

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 3: Node Alive Request Message

Information Element	Presence Requirement
Node Address	Mandatory
Alternative Node Address	Optional
Private Extension	Optional

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, will be sent as a response to a received *Node Alive Request*.

Table 4: Node Alive Response Message

Information Element	Presence Requirement
Private Extension	Optional

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* describes an intra-PLMN node containing a CGF, and not a node in any other PLMN.

Table 5: Redirection Request Message

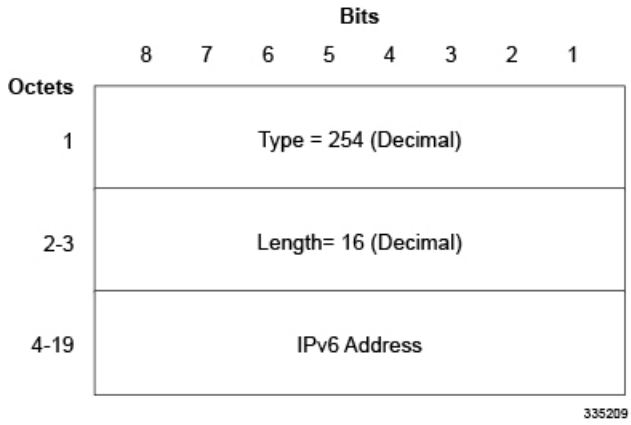
Information Element	Presence Requirement
Cause	Mandatory
Address of Recommended Node	Optional
Alternative Address of Recommended Node	Optional
Private Extension	Optional

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.

Figure 2: Address of Recommended Node IE



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 will be sent as a response of a received Redirection Request.

The information elements of this message are listed in the following table.

Table 6: Redirection Response Message

Information Element	Presence Requirement
Cause	Mandatory
Private Extension	Optional

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

Information Element	Presence Requirement
Packet Transfer Command	Mandatory
Data Record Packet	Conditional
Sequence Numbers of Released Packets	Conditional
Sequence Numbers of Canceled Packets	Conditional
Private Extension	Optional

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.

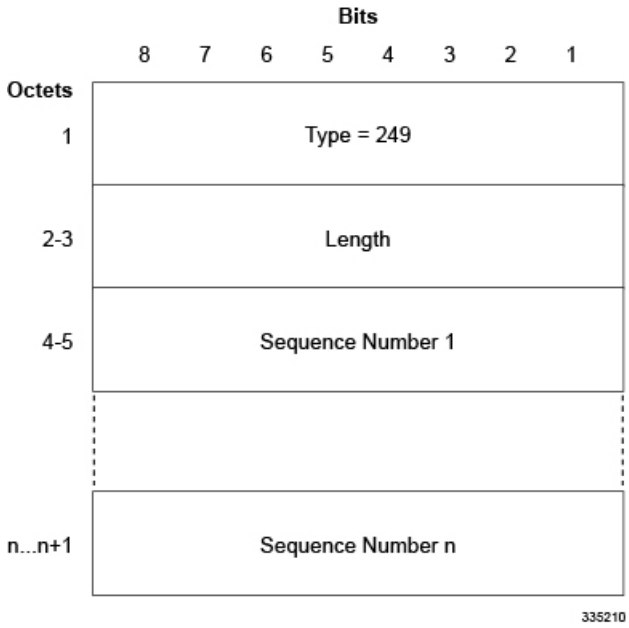
There are two fields identifying the CDR format: Data Record Format and Data Record Format Version.

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:

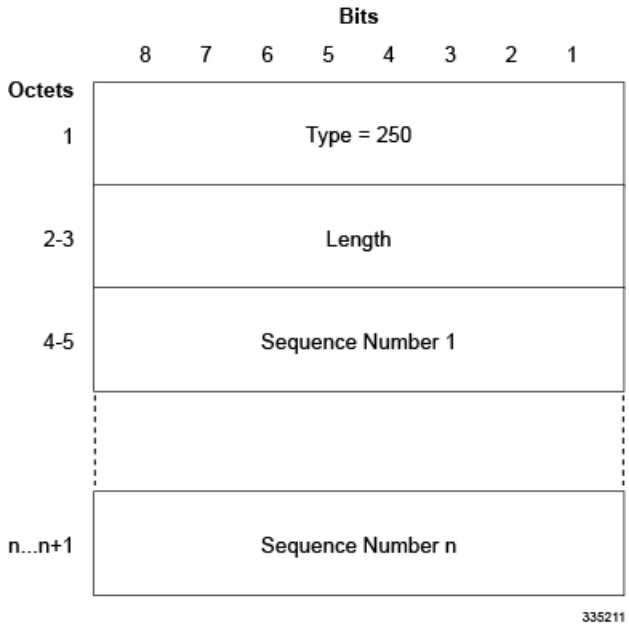
Figure 3: Sequence Numbers of Released Packets IE



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 4: Sequence Numbers of Canceled Packets IE



Private Extension IE

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

Data Record Transfer Response

The message will 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

CLI command configured on GGSN	Sent by SGSN	Sent by AAA	CC used	chargingCharSelMode
no cc-sgsn	**no cc**	**no cc**	Default	Home/Visiting/Roaming Default
		cc	Default	Home/Visiting/Roaming Default
	cc	**no cc**	SGSN	SGSN Supplied
		cc	SGSN	SGSN Supplied

CLI command configured on GGSN	Sent by SGSN	Sent by AAA	CC used	chargingCharSelMode
cc-sgsn use-ggsn	**no cc**	**no cc**	GGSN	GGSN Override
		cc	GGSN	GGSN Override
	cc	**no cc**	GGSN	GGSN Override
		cc	GGSN	GGSN Override
cc-sgsn radius-returned	**no cc**	**no cc**	Default	Home/Visiting/Roaming Default
		cc	AAA	AAA Supplied
	cc	**no cc**	SGSN	SGSN Supplied
		cc	AAA	AAA Supplied
cc-sgsn radius-returned use-ggsn	**no cc**	**no cc**	GGSN	GGSN Override
		cc	AAA	AAA Supplied
	cc	**no cc**	GGSN	GGSN Override
		cc	AAA	AAA Supplied

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.

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:

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

  - **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|CDR2FFFFFF|CDR3FFFFF..|..CDRnFFFF|

    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|CDR2FFFFFF|CDR3FFFFF..|..CDRnFFFF|

    where | represents the end of a 8K 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

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.

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 9: Triggers for ePDG-CDR Charging Information Addition

Trigger Conditions	Description/Behavior
QoS Change	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 UBRequest to modify the QoS for the session.
Tariff Time Change	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.
CDR Closure	Open "List of Traffic Data Volumes" containers will be closed and added to the ePDG-CDR.

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 3

Closure Conditions	Description/Behavior

End of bearer within the ePDG	Deactivation of the bearer (either default or dedicated) in the ePDG will result in the CDR being closed. The trigger condition covers:
	• termination of bearer;
	• any abnormal release (as listed below):
	  • GTP-C/GTP-U path failures in S2b interface
	  • Dead Peer Detection in SWu interface.
	  • IKESA/IPSESA rekey failure

Partial Record Reason	OAM&P; reasons permit the closure of the CDR for internal reasons. The trigger condition covers: • data volume limit; CDR generated based on every uplink/downlink/total volume limit. • time (duration) limit; CDR generated for every configured "x" seconds time • maximum number of charging condition changes (QoS/tariff time change); CDR generated when the max bucket limit is reached. By default its 4.Please check "cc profile <> buckets <>" CLI under accouting-policy configuration mode. • management intervention; (clear subscriber <>)

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 "sgsns". Before this, the new SGSN address is added to the list of SGSN IP addresses in the CDR. If "sgsns 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 11: Cause for Record Closing

Cause	Scenarios	Partial/Final	Value	Supported
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 **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 12: Cause for Record Closing

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

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

Trigger Conditions	Description/Behavior
IP-CAN bearer modification	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.
Tariff Time Change	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.
DCCA Failure-Handling procedure triggering	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.

Trigger Conditions	Description/Behavior
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 4

Cause For Record Closure				
Cause	**Scenarios**	**Partial/Final**	**Value**	**Configurable**
normalRelease	• delete PDP from MS • delete PDP from GGSN • PDP Release due to ISRAU scenario	Final	0	No
abnormalRelease	• Path failure • Attach on Attach	Final	4	No
SGSN Change	PDP Release in old SGSN due to ISRAU scenario.	Final	18	No
volumeLimit	configured volume threshold has been exceeded	Partial	16	Yes
timeLimit	configured interval has been reached	Partial	17	Yes
maxChangeCondition	limit for the LOTV containers was exceeded	Partial	19	Yes

Cause For Record Closure				
Cause	**Scenarios**	**Partial/Final**	**Value**	**Configurable**
managementIntervention	e.g. using the command "**gtpp interim now**" and also "**clear subscribers all**"	Partial	20	No
managementIntervention	i.e. using the command "**clear subscribers all**"	Final	20	No
intraSGSNIntersystemChange	change of radio interface from GSM to UMTS or vice-versa	Partial	21	No

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 5

Change Condition				
Cause	**Scenario**	**Partial/Final**	**Value**	**Configurable**
qoSChange	A change in the QoS will result in a "List of Traffic Data Volumes" container being added to the CDR.	Partial	0	Yes
tariffTime	On reaching the Tariff Time Change a "List of Traffic Data Volumes" container will be added to the CDR.	Partial	1	Yes

Change Condition				
Cause	**Scenario**	**Partial/Final**	**Value**	**Configurable**
Direct Tunnel establishment	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.	Partial	8	Yes
Direct Tunnel Removal	When the SGSN establishes or removes a Direct Tunnel a "List of Traffic Data Volumes" container will be added to the CDR.	Partial	9	Yes
recordClosure	A list of "List of Traffic Data Volumes" container will be added to the S-CDR.	-	2	No

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 16: Cause for Record Closing 6

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



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".



Important The unsupported triggers mentioned above will be supported when the functionality is available.

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

Trigger Conditions	Description/Behavior
QoS Change	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.
Tariff Time Change	After reaching the Tariff Time Change, open "List of Traffic Data Volumes" containers are closed and added to the CDR.
User Location Change	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.
ULI Change	When the ULI changes, then a data volume container is added to the field "List of Service Data Volumes".
Apn-Ambr Change	If APN AMBR changes container need to be added to a bearer based on the configuration of the trigger CLI command.
CDR Closure	Open "List of Traffic Data Volumes" containers are closed and added to the SGW-CDR.

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 7

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

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

Cause	Scenarios	Partial/Final	Value	Configurable
QoS Change	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.	Partial	0	Yes
tariffTime	On reaching the Tariff Time Change a "List of Traffic Data Volumes" container will be added to the CDR.	Partial	1	Yes
recordClosure	A list of "List of Traffic Data Volumes" container will be added to the WLAN-CDR.	-	2	No

Supported Features

This section provides the list of features that are supported by GTPP interface.

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/<gtpp-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.

Important After you configure the **gtpp storage-server local file push** CLI command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the System Administration Guide for your deployment.

For information on how to configure push functionality, refer to the *Configuring CDR Push* section in the *HDD Storage* chapter of this guide.

Zero Volume CDR Suppression

Important Use of the Zero Volume CDR Suppression feature requires that a valid ECS license key be installed. This feature is applicable to all types of CDRs – GGSN CDRs, PGW-CDRs, SGW-CDRs, and SGSN CDRs. Contact your Cisco account representative for information on how to obtain a license.

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-cdrs: 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 **[default | no] gtpp suppress-cdrs zero-volume { 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 5500 Command Line Interface Reference*.

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. The **gtpp push-to-active url** 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.

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.

GTPP 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 GTPP 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*.

GTPP Group Configuration with Same CGF Server IP and Different Ports

In a multi-product deployment environment where CDRs are received from different gateway services like ePDG, SaMOG and (pseudo) P-GW (in Local Breakout scenario), the mediation server finds it difficult to differentiate between the CDRs. Easy identification of CDRs is possible if CDRs corresponding to each gateway service are mapped to different ports of the same CGF server. To achieve this, CLI support is provided to configure multiple GTPP groups with the same CGF server IP address and different port numbers. This configuration provides the flexibility to send the ePDG, SaMOG and P-GW LBO CDRs to the same CGF server on different ports.

For ePDG and SaMOG, different GTPP groups should be configured in the respective call-control profiles. For P-GW LBO, GTPP group is selected from APN configuration.

In releases prior to 20.0, configuration of CGF server with the same IP address but different ports was not allowed within and across GTPP groups. In release 20.1 and later, configuration of CGF server with the same IP address and different ports is allowed across the GTPP groups. With this change, whenever AAA proxy logs are displayed, it includes both CGF IP address and port.

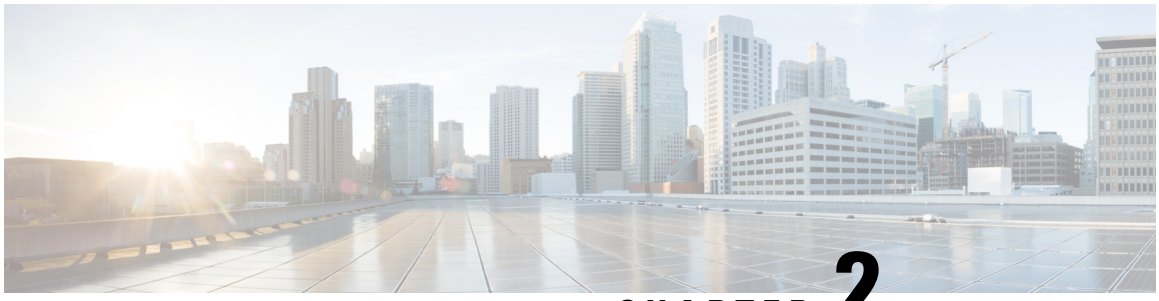
The use of optional keyword **port** in the **gtpp test accounting**, **show gtpp counters**, **show gtpp statistics** and **clear gtpp statistics** CLI commands enables this functionality. When port is specified along with IP address in these CLI commands, then the CGF server with the specified IP address and port is only considered. If the port is not specified, then all GTPP servers with the specified IP address will be considered irrespective of the configured port.

For more information on these CLI commands, refer to the *Command Line Interface Reference* guide.

Limitations

The following are the known limitations with this feature:

- Configuration of same IP address and different port is not permitted within a GTPP group. That is, it is not allowed to configure primary and secondary servers in a GTPP group with the same IP and different port.



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, on page 39
- Gathering Statistics, on page 79

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 presented. 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
     context context_name
          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
     context context_name
          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 gtpp_group
               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

This section provides the GTPP configuration for GGSN.

1. Configure the GTPP group and accounting context configuration in APN level and also specify the accounting mode.

```
configure
     context source
          apn apnname1.com
          accounting-mode gtpp
          gtpp group group1 accounting-context billing
          end
```

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

```
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.

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

The following table list all configuration commands related to the creation and formatting of G-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.
- The Rulebase Configuration mode sets the thresholds for various triggers.

Table 20: G-CDR Configuration Parameters

Command	Default	Range	Comment
gtpp group *name* in billing context			

Command	Default	Range	Comment
gtpp trigger volume-limit	Enabled	no, enabled	When this trigger is disabled no partial record closure occurs when volume limit is reached.
gtpp trigger time-limit	Enabled	no, enabled	When this trigger is disabled no partial record closure occurs when the configured time limit is reached.
gtpp trigger tariff-time-change	Enabled	no, enabled	When this trigger is disabled container closure does not happen for a tariff-time change.
gtpp trigger sgsn-change-limit [also-intra-sgsn-multiple-address-group-change]	Enabled	no, enabled	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.
gtpp trigger inter-plmn-sgsn-change	Enabled	no, enabled	Disabling this trigger ignores an Inter-PLMN SGSN change and doesn't release a G-CDR.
gtpp trigger qos-change	Enabled	no, enabled	Disabling this trigger ignores a qos-change and does not open a new GCDR for it.
gtpp trigger rat-change	Enabled	no, enabled	No partial record closure for a RAT change occurs when this trigger is disabled.
gtpp trigger ms-timezone-change	Enabled	no, enabled	No partial record closure for a time zone change occurs when this trigger is disabled.

Command	Default	Range	Comment
gtpp attribute diagnostics	No	no, enabled	Includes the Diagnostic field in the CDR that is created when PDP contexts are released
gtpp attribute duration-ms	No	no, enabled	Specifies that the information contained in the mandatory Duration field be reported in milliseconds instead of seconds (as the standards require).
gtpp attribute plmn-id	Enabled	no, enabled	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.
gtpp attribute local -record-sequence -number	no	no, enabled	Includes the Local Record Sequence Number together Node ID field in the CDR that is created when PDP contexts are released.
gtpp attribute node-id-suffix *string*	no	string between 1 to16 characters	Specifies the string suffix to use in the NodeID field of GTPP G-CDRs. With the default setting of "no" the GGSN uses the GTPP context name for the NodeId field.
"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.

Command	Default	Range	Comment
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.

Command	Default	Range	Comment
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.

Command	Default	Range	Comment
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.
cc behavior no-records	No	1-12	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.
"apn ***name*****"**			

Command	Default	Range	Comment
cc-home behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	When the GGSN is configured to reject the charging characteristics sent by the SGSN for "home" 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 "Or"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.
cc-roaming behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	Same as above, but for "roaming" subscribers
cc-visting behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	Same as above, but for "visiting" subscribers.
cc-sgsn	No		Causes the GGSN's accepting of the specified CC from the SGSN(s).
cc-sgsn radius-returned	No		GGSN accepts CC provided by Radius
cc-sgsn radius-returned use-ggsn profile *index*	No	index=0-15	GGSN accepts CC from AAA server, or uses *index* if not provided
cc-sgsn use-ggsn profile *index*	No	index=0-15	GGSN uses profile *index* and sets bits 0-3 of the CC to *index*, overriding all other ways of providing CC
cc-sgsn use-ggsn behaviour *bits*	0xFFF	0x000-0xFFF	GGSN sets bits 4-31 of the CC to *bits*, overriding all other ways of providing CC

Configuring GTPP for P-GW and eG-CDR

This section provides the offline charging configuration for P-GW. The P-GW offline charging configuration uses ECS and eG-CDRs.

1. Configure the ACS parameters as follows:

```
configure
  active-charging service ECS-SVC
    ruledef IP_ANYMATCH
      ip any-match =TRUE
    #exit
  charging-action CHARGING-ANY
    content-id 3
    billing-action egcdr
  #exit
  rulebase RULEBASE_1
    billing-records egcdr
    action priority 103ruledef IP_ANYMATCH charging-action CHARGING-ANY
    egcdr threshold interval 60
    egcdr threshold volume total 100000
  #exit
#exit
```

2. Configure the context SGi:

```
configure
  context SGi
    ip access-list ECS
      redirect css service ECS_any
    #exit
    apn ipv4.com
      selection-mode subscribed sent-by-ms
      accounting-mode none
      ip access-group ECS in
      ip access-group ECS out
      ip address pool name IPV4-Pool-Group
      active-charging rulebase RULEBASE_1
      gtpp group default accounting-context SGi
    exit
    gtpp group default
      gtpp charging-agent address 192.0.0.1
      gtpp max-cdrs 2 wait-time 10
      gtpp dictionary custom24
      gtpp server 192.0.0.2 max 100
    exit
```

The following tables list all configuration commands related to the creation and formatting of eG-CDR and 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 21: eG-CDR Configuration Parameters

Command	Default	Range	Comment
gtpp group *name* in billing context			
gtpp trigger egcdr max-losdv	no	no, enabled	When this trigger is enabled a partial record will be generated once the maximum configured number of eG-CDR service containers has been reached.
gtpp egcdr lotdv-max-containers *int*	int=8	int=1..8	This parameter allows changing the maximum number of traffic volume containers in the LOTV field of the eG-CDR.
gtpp egcdr losdv-max-containers *int*	int=10	int=1..255	This parameter allows changing the maximum number of service data containers in the eG-CDR.

Command	Default	Range	Comment
gtpp egcdr final-record include-content-ids (all | only-with-traffic) closing-cause (same-in-all-partials | unique)	only-with-traffic same-in-all-partials		The CLI option 'include-content-ids' allows controlling the service containers that are included in the final eG-CDR generated for a subscriber. With "all", not only the service containers which are currently counting traffic are included, but also all other containers which may have been closed earlier for this subscriber session with a "partial" cause value. The CLI option 'closing-cause' allows controlling the cause for record closing in the final eG-CDR in case multiple eG-CDRs need to be generated for final closure reason such as 'Normal Release'. By default if multiple eG-CDRs are generated for end of subscriber session all the eG-CDRs have the same cause for record closing.
gtpp egcdr service-idle-timeout *seconds*	seconds=0	seconds=0, 10-86400	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 "ServiceIdleOut".
rulebase *name* in Active Charging Service			

Command	Default	Range	Comment
timestamp rounding egcdr (ceiling | floor | round-off)	round-off		Defines the method to determine the value for time stamp and duration fields in the eG-CDR: ceiling will always use the next full second, floor cuts off all milliseconds, and round off will use the standard rounding mechanism to use the closest full second value (i.e. rounding down for milliseconds 1-499, and rounding up for milliseconds 500-999).
egcdr threshold interval *seconds*	no	seconds=60..40000000	Sets the interval for generating a partial eG-CDR
egcdr threshold volume (downlink *octets* | uplink *octets* **| total** *octets* **)**	no	octets=10000-400000000	Sets the volume limit in downlink only, uplink only or for the total after which a partial eG-CDR.
egcdr service-data-flow threshold interval *seconds*	no	seconds=60..40000000	Sets the interval for generating partial service containers. The eG-CDR is not closed unless the maximum configured limit of service containers has been reached and this trigger is not disabled.
egcdr service-data-flow threshold volume (downlink *octets* **| uplink** *octets* | *total octets* **)**	no	octets=10000-400000000	Sets the volume limit in downlink only, uplink only or for the total after which a partial service container is generated. The eG-CDR is not closed unless the maximum configured limit of service containers has been reached and this trigger is not disabled.

Command	Default	Range	Comment
egcdr tariff minute *minute* **hour** *hour*	no	minute=0..59 hour=0..23	Specifies a single tariff time change which triggers the closing and reopening of a traffic data volume container. The command can be repeated up to 4 times to define multiple tariff time changes.
apn ***name***			
active-charging-service rulebase *string*		string= 1..63 characters	Selects the default rulebase to be applied to a subscriber session.
cc-home behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	When the GGSN is configured to reject the charging characteristics sent by the SGSN for "home" 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 "Or"ing the bit strings together and convert the result to hexadecimal. Other than for G-CDRs, this setting does not impact the triggers for CDRs, it is just used to set the default content for the CC field in the CDR.
cc-roaming behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	Same as above, but for "roaming" subscribers
cc-visting behavior *bits* **profile** *index*	bits=0x000 index=8	bits=0x000-0xFFF index=0-15	Same as above, but for "visiting" subscribers.
cc-sgsn	no		Causes the GGSN's accepting of the specified CC from the SGSN(s).

Command	Default	Range	Comment
cc-sgsn radius-returned	no		GGSN accepts CC provided by Radius
cc-sgsn radius-returned use-ggsn profile *index*	no	index=0-15	GGSN accepts CC from AAA server, or uses *index* if not provided
cc-sgsn use-ggsn profile *index*	no	index=0-15	GGSN uses profile *index* and sets bits 0-3 of the CC to *index*, overriding all other ways of providing CC
cc-sgsn use-ggsn behaviour *bits*	0xFFF	0x000-0xFFF	GGSN sets bits 4-31 of the CC to *bits*, overriding all other ways of providing CC

Table 22: PGW-CDR Configuration Parameters

Command	Default	Comment
GTPP Configuration mode - "gtpp group <name>" in billing context		
gtpp trigger volume-limit	Enabled	When this trigger is enabled, partial record closure occurs when the volume limit is reached.
gtpp trigger time-limit	Enabled	When this trigger is enabled, partial record closure occurs when the configured time limit is reached.
gtpp trigger tariff-time-change	Enabled	When this trigger is enabled, container closure occurs for a tariff-time change.
gtpp trigger qos-change	Enabled	When this trigger is enabled, container closure occur for qos-change.
gtpp trigger rat-change	Enabled	Partial record closure for a RAT change occurs when this trigger is enabled.
gtpp trigger ms-timezone-change	Enabled	Partial record closure for a time zone change occurs when this trigger is enabled.
gtpp attribute plmn-id	Enabled	Specifying this option includes the "PLMN Id" field in the CDR.

Command	Default	Comment
gtpp trigger serving -node-change-limit	Enabled	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.
gtpp attribute diagnostics	No	Includes the "Diagnostic" field in the CDR that is created when PDP contexts are released.
gtpp attribute duration-ms	No	Specifying this option results in the mandatory "Duration" field in the CDR to be recorded in milliseconds rather than seconds.
gtpp attribute imei	Enabled	Specifying this option includes the "IMEI" field in the CDR.
gtpp attribute local-record-sequence- number	No	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.
gtpp attribute msisdn	Enabled	Specifying this option includes the "MSISDN" field in the CDR.
gtpp attribute node-id-suffix *<string>*	No string between 1 and 16 characters	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.
gtpp attribute rat	Enabled	Specifying this option includes the "RAT" field in the CDR.
gtpp attribute record-extensions rat	No	Enables encoding of the RAT in the record-extension field of the CDR.

Command	Default	Comment
gtpp attribute apn-ni	Enabled	Specifying this option includes field accessPointNameNI in the CDR.
gtpp attribute pdp-type	Enabled	Specifying this option includes the pdpPDNType field in the CDR.
gtpp attribute pdp-address	Enabled	Specifying this option includes the servedPDPPDNAddress field in the CDR.
gtpp attribute dynamic-flag	Enabled	Specifying this option includes the dynamicAddressFlag field in the CDR.
gtpp attribute node-id	Enabled	Specifying this option includes the nodeID field in the CDR.
gtpp attribute apn-selection-mode	Enabled	Specifying this option includes the apnSelectionMode field in the CDR.
gtpp attribute charging -characteristic -selection -mode	Enabled	Specifying this option includes the chChSelectionMode field in the CDR.
gtpp attribute ms-time-zone	Enabled	Specifying this option includes the mSTimeZone field in the CDR.
gtpp attribute uli	Enabled	Specifying this option includes the userLocationInformation field in the CDR.
gtpp attribute losdv	Enabled	Specifying this option includes the LOSDVs field in the CDR.
gtpp attribute served-mnai	Enabled	Specifying this option includes the servedMNAI field in the CDR.
gtpp attribute pgw-plmn-id	Enabled	Specifying this option includes the p-GWPLMNIdentifier field in the CDR.
gtpp attribute start-time	Enabled	Specifying this option includes the startTime field in the CDR.
gtpp attribute stop-time	Enabled	Specifying this option includes the stopTime field in the CDR.
gtpp attribute pdn-connection-id	Enabled	Specifying this option includes the pDNConnectionID field in the CDR.

Command	Default	Comment
gtpp storage-server local file format		Defines the file format for CDR files created on the hard disk. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
gtpp storage-server local file compression	None	Compresses billing files with gzip. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
Rulebase Configuration mode		
egcdr threshold interval *<seconds>* **no egcdr threshold interval**	No	Specifies the threshold for the time interval.

Command	Default	Comment
egcdr threshold volume { downlink | uplink | total <*bytes*> **}**	No	Specifies the downlink, uplink, and total volumes that must be met before closing an accounting record. • **downlink** *bytes* is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000. • **uplink** *bytes* is measured in octets and can be configured to any integer value from 100,000 to 4,000,000,000. • **total** *bytes* 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.
egcdr tariff minute <*mins*> **hour** <*hours*> **no egcdr tariff** <*mins*> **hour** <*hours*>	No	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.
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.

Configuring GTPP 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
               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 PDG service.

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

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

```
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

Command	Default	Comment
GTPP Configuration mode - "gtpp group <name>" in billing context		

Command	Default	Comment
gtpp trigger volume-limit	Enabled	When this trigger is enabled, partial record closure occurs when the volume limit is reached.
gtpp trigger time-limit	Enabled	When this trigger is enabled, partial record closure occurs when the configured time limit is reached.
gtpp trigger tariff-time-change	Enabled	When this trigger is enabled, container closure occurs for a tariff-time change.
gtpp trigger qos-change	Enabled	Enabling this trigger opens a new CDR for a QoS change.
gtpp trigger rat-change	Enabled	Partial record closure for a RAT change occurs when this trigger is enabled.
gtpp trigger ms-timezone-change	Enabled	Partial record closure for a time zone change occurs when this trigger is enabled.
gtpp attribute cell-plmn-id	Enabled	Specifying this option includes the "Cell PLMN Id" field in the CDR.
gtpp attribute diagnostics	No	Specifying this option includes the "Diagnostic" field in the CDR that is created when PDP contexts are released.
gtpp attribute duration-ms	No	Specifying this option results in the mandatory "Duration" field in the CDR to be recorded in milliseconds rather than seconds.
gtpp attribute imei	Enabled	Specifying this option includes the "IMEI" field in the CDR.

Command	Default	Comment
gtpp attribute local-record-sequence-number	No	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.
gtpp attribute msisdn	Enabled	Specifying this option includes the "MSISDN" field in the CDR.
gtpp attribute node-id-suffix *<string>*	No string between 1 and 16 characters	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".
gtpp attribute rat	Enabled	Specifying this option includes the "RAT" field in the CDR.
gtpp attribute record-extensions rat	No	Specificing this option enables encoding of the RAT in the record-extension field of the CDR.
gtpp storage-server local file format		Defines the file format for CDR files created on the hard disk. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

Command	Default	Comment
gtpp storage-server local file compression	None	Compresses generated billing files with gzip. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
"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.

Command	Default	Comment
cc profile <*index*> **interval** <*seconds*> **[downlink** <*down_octets*> **uplink** <*up_octets*> **| total** <*total_octets*> **]**	No	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 (uplink and downlink) is reached within the time interval is measured in seconds and can be configured to any integer value from 60 to 4000000. *down_octets* is the downlink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000. *up_octets* is the uplink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000. *total_octets* is the total traffic volume measured in octets and can be configured to any integer value from 0 to 1000000.

Command	Default	Comment
cc profile <*index*> **volume { downlink** <*vol_down_octets*> **uplink** <*vol_up_octets*> **| total** <*total_octets*> **}**	No	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 100000 to 4000000000. • *vol_up_octets* is measured in octets and can be configured to any integer value from 100000 to 4000000000. • *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
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.

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
          end
```

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.

```
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 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.

```
configure
     context source
          sgw-service sgw1
          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.

```
configure
     context source
          sgw-service sgw1
          accounting context dest1 gtpp group sgw
          end
```

5. Configure the GTPP group related parameters.

```
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 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

Command	Default	Comment
GTPP Configuration mode - "gtpp group <name>" in billing context		
gtpp trigger volume-limit	Enabled	When this trigger is enabled, partial record closure occurs when the volume limit is reached.

Command	Default	Comment
gtpp trigger time-limit	Enabled	When this trigger is enabled, partial record closure occurs when the configured time limit is reached.
gtpp trigger tariff-time-change	Enabled	When this trigger is enabled, container closure occurs for a tariff-time change.
gtpp trigger qos-change	Enabled	Enabling this trigger opens a new CDR for a QoS change.
gtpp trigger rat-change	Enabled	Partial record closure for a RAT change occurs when this trigger is enabled.
gtpp trigger ms-timezone-change	Enabled	Partial record closure for a time zone change occurs when this trigger is enabled.
gtpp attribute apn-ambr-change	disabled	No partial record closure for an apn-ambr-change occurs when this trigger is disabled.
gtpp attribute cell-plmn-id	Enabled	Specifying this option includes the "Cell PLMN Id" field in the CDR.
gtpp attribute diagnostics	No	Specifying this option includes the "Diagnostic" field in the CDR that is created when PDP contexts are released.
gtpp attribute duration-ms	No	Specifying this option results in the mandatory "Duration" field in the CDR to be recorded in milliseconds rather than seconds.
gtpp attribute imei	Enabled	Specifying this option includes the "IMEI" field in the CDR.

Command	Default	Comment
gtpp attribute local-record-sequence-number	No	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.
gtpp attribute msisdn	Enabled	Specifying this option includes the "MSISDN" field in the CDR.
gtpp attribute node-id-suffix *<string>*	No string between 1 and 16 characters	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".
gtpp attribute rat	Enabled	Specifying this option includes the "RAT" field in the CDR.
gtpp attribute record-extensions rat	No	Specificing this option enables encoding of the RAT in the record-extension field of the CDR.
gtpp storage-server local file format		Defines the file format for CDR files created on the hard disk. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

Command	Default	Comment
gtpp storage-server local file compression	None	Compresses generated billing files with gzip. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
gtpp attribute served-pdp-pdn-address-extension	None	Allows the operator to configure the served-pdp-pdn-extension field in S-CDR. This CLI introduced in 14.0 release.
gtpp attribute apn-ambr	None	Specifying this option includes optional field "APN-AMBR" in the CDR as part of epcQOSInformationContent.
gtpp attribute imsi-unauthenticated-flag	None	Specifying this option includes optional field "IMSI Unauthenticated Flag" in the CDR.
gtpp attribute user-csg-information	None	Specifying this option includes optional field "User CSG Information" in the CDR.
gtpp attribute dynamic-flag-extension	None	Specifying this option includes optional field "Dynamic Address Flag Extension" in the CDR.
gtpp attribute sgw-ipv6-addr	None	Specifying this option includes optional field "sgw-ipv6-addr" in the CDR.
gtpp attribute sna-ipv6-addr	None	Specifying this option includes optional field "servingNodeiPv6Address" in the CDR.
gtpp attribute pgw-ipv6-addr	None	Specifying this option includes optional field " pgw-ipv6-addr" in the CDR.

Command	Default	Comment
"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.
cc profile <*index*> **interval** <*seconds*> **[downlink** <*down_octets*> **uplink** <*up_octets*> **| total** <*total_octets*> **]**	No	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 (uplink and downlink) is reached within the time interval is measured in seconds and can be configured to any integer value from 60 to 4000000. *down_octets* is the downlink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000. *up_octets* is the uplink traffic volume measured in octets and can be configured to any integer value from 0 to 1000000. *total_octets* is the total traffic volume measured in octets and can be configured to any integer value from 0 to 1000000.

Command	Default	Comment
cc profile <*index*> **volume { downlink** <*vol_down_octets*> **uplink** <*vol_up_octets*> **| total** <*total_octets*> **}**	No	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 100000 to 4000000000. • *vol_up_octets* is measured in octets and can be configured to any integer value from 100000 to 4000000000. • *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
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
```



Important After you configure the **gtpp single-source private-extensions** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

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 25: S-CDR Configuration Parameters

Command	Default Value	Range	Comment
gtpp group <*name*> in billing context			
Trigger Related Configuration			
gtpp trigger volume-limit	enabled	no, enabled	When this trigger is disabled no partial record closure occurs when volume limit is reached.
gtpp trigger time-limit	enabled	no, enabled	When this trigger is disabled no partial record closure occurs when the configured time limit is reached.

Command	Default Value	Range	Comment
gtpp trigger tariff-time-change	enabled	no, enabled	When this trigger is disabled container closure does not happen for a tariff-time change.
gtpp trigger qos-change	enabled	no, enabled	Disabling this trigger ignores a qos-change and does not open a new CDR for it.
CDR attribute related configuration			
gtpp attribute diagnostics	no	no, enabled	Includes the Diagnostic field in the CDR that is created when PDP contexts are released.
gtpp attribute duration-ms	no	no, enabled	Specifying this option results in mandatory "Duration" field in the CDR to be recorded in milliseconds rather than seconds.
gtpp attribute imei	enabled	no, enabled	Specifying this option includes field "IMEI" in the CDR.
gtpp attribute camel-info	disabled	no, enabled	If enabled include CAMEL related information in the CDR provided if Ge interface is enabled.

Command	Default Value	Range	Comment
gtpp attribute local-record-sequence-number	no	no, enabled	Specifying this option includes optional fields "Local Record Sequence Number" and "Node-ID" in the CDR. Since the "Local Record Sequence Number" has to be unique within one node (identified by "Node-ID"), "Node-ID" 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 "Local Record Sequence Number" and "Node ID" fields to uniquely identify a CDR.
gtpp attribute msisdn	enabled	no, enabled	Specifying this option includes field "MSISDN" in the CDR.
gtpp attribute node-id-suffix *<string>*	no	string from 1 to 16 characters	Specifies the string suffix to use in the Node-ID field of S-CDRs. With the default setting of "no" the SGSN uses the GTPP context name for the Node-Id field.
gtpp attribute rat	enabled	no, enabled	Specifying this option includes field "RAT" in the CDR.
HDD related configuration			

Command	Default Value	Range	Comment
gtpp storage-server local file format *<custom1-custom6>*	custom4	enabled	Defines the file format for CDR files created on the hard disk. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
gtpp storage-server local file compression	none	none gzip	Allows to compress generated billing files with gzip. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

Command	Default Value	Range	Comment
gtpp storage-server mode { local | remote }	remote	enabled	This enables HDD storage.
gtpp storage-server local file rotation cdr-count *<1000-65535>*	cdr-count 10000	no, enabled	Configures cdr-count for file rotation. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
gtpp storage-server local file rotation volume mb *<2MB-40MB>*	4MB	no, enabled	Configures file volume for file rotation. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

Command	Default Value	Range	Comment
gtpp storage-server local file rotation time-interval	3600	no, enabled	Configures time-interval for file rotation. **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.
sgsn-service <*name*> in Gn context or "gprs-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*> **interval** <*seconds*>	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.

Command	Default Value	Range	Comment
cc profile <*index*> **volume** *volume* **{ downlink** <*octets*> **uplink** <*octets*> **| total** <*octets*> **}**	no	index=0 -1 5 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.
sgsn-operator-policy { default | name <*name*> **}**			

Command	Default Value	Range	Comment
cc behavior no-records	no	1-12	Specifies the behavior bit upon which the SGSN 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.
cc prefer	hlr-value	local- valuehlr-value	Specify the preference for local/HLR CC settings.
cc local-value behavior <*bits*> **profile** <*index*>	bits=0x000index=8	bits= 0x000-0xFFF index=0-15	When no CC is provided by the HLR or the local-value is preferred, then this command specifies the charging characteristics to be used.
sgsn-operator-policy { default | name <*name*> } , apn			
cc local-value-for-scdrs behaviour <*bits*>	no	bits= 0x000-0xFFF	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.
cc prefer	no	hlr-value-for-scdrshlr-value-for-scdrs	Define if HLR or local CC value is used in S-CDR.

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.

```
configure
     context source
          gtpp group default
          gtpp dictionary custom10
          gtpp storage-server mode local
          gtpp storage-server local file format custom3
          gtpp storage-server local file rotation cdr-count 1000
          gtpp storage-server local file rotation time-interval 4000
          gtpp storage-server local file rotation volume mb 8
          end
```

Important After you configure **gtpp storage-server mode local**, **gtpp storage-server local file format** *custom3* , **gtpp storage-server local file rotation cdr-count***1000* , and **gtpp storage-server local file rotation time-interval** *4000* CLI commands, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

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
          gtpp group default
          gtpp charging-agent address 192.168.201.1
          gtpp storage-server 192.168.201.12 port 50000
          gtpp dictionary custom10
          end
```

Gathering Statistics

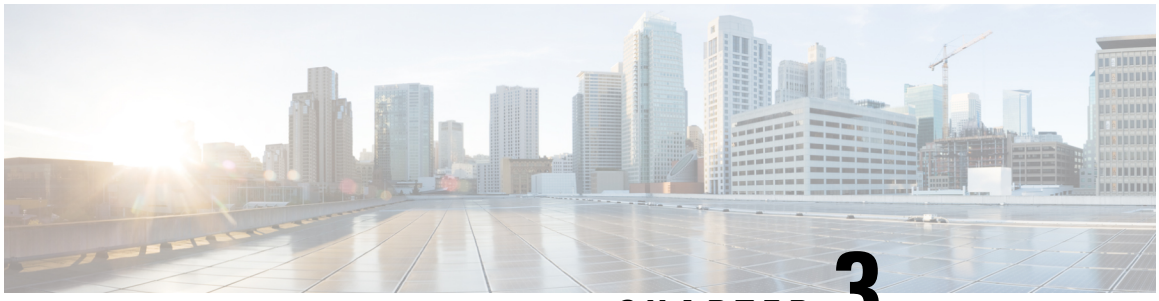
The following table lists the commands that can be used to gather GTPP statistics.

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

Table 26: Gathering Statistics 0

Statistics/Information	Action to Perform
GTPP statistics for Charging Gateway Functions	At the Exec Mode prompt, enter the following command: **show gtpp statistics cgf-address** *cgf_address*
Information on the number of CDRs stored in HDD	At the Exec Mode prompt, enter the following command: **show gtpp storage-server local file statistics** **Important** After you configure this command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

Statistics/Information	Action to Perform
Information on the GTPP accounting server configuration	At the Exec Mode prompt, enter the following command: **show gtpp accounting servers group name** *group_name*
Information on the CDR storage server status	At the Exec Mode prompt, enter the following command: **show gtpp storage-server status**



CHAPTER 3

Controlled S-GW CDR Generation

- Feature Summary and Revision History, on page 81
- Feature Changes, on page 82
- Command Changes, on page 82

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	• S-GW • SAEGW (Pure-S call)
Applicable Platform(s)	• ASR 5500 • VPC - DI • VPC - SI
Feature Default	Disabled – Configuration Required
Related Changes in This Release	Not Applicable
Related Documentation	• *GTPP Interface Administration and Reference* • *Command Line Interface Reference*

Revision History

Important Revision history details are not provided for features introduced before releases 21.2 and N5.1.

Revision Details	Release
In release 21.7.2, the enhancement made in release 21.7 is now fully qualified and is generally available.	21.7.2

Revision Details	Release
With this release, generating S-GW CDR can be controlled using Charging-Characteristics profile value. **Important** This enhancement in release 21.7 is not fully qualified and is available only for testing purposes.	21.7
First introduced.	Pre 21.2

Feature Changes

With this enhancement, generating S-GW CDR can be controlled based on certain Charging-Characteristics profile value received in Charging-Characteristics IE inside Create Session Request. The functionality can be enabled and configured using the Command Line Interface.

Command Changes

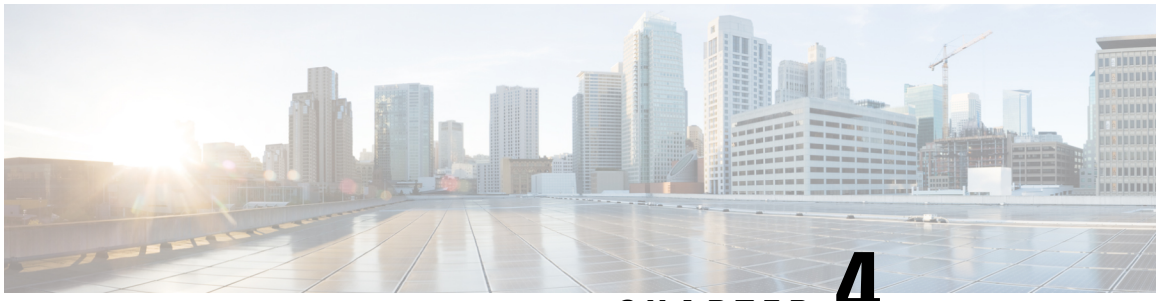
cc gen-cdr-for-profile

Use the following CLI commands to enable the Controlled S-GW CDR Generation.

```
configure
  call-control-profile profile_name
    cc gen-cdr-for-profile { [ 0 ] [ 1 ] [ 10 ] [ 11 ] [ 12 ] [ 13 ] [
14 ] [
15 ] [ 2 ] [ 3 ] [ 4 ] [ 5 ] [ 6 ] [ 7 ] [ 8 ] [ 9 ] }
    end
```

NOTES:

- **0 … 15**: Configures CC-profile number 0 for S-GW CDR generation ... Configures CC-profile number 15 for S-GW CDR generation.
- If previously configured, use the **no cc gen-cdr-for-profile** CLI command to disable the feature. In other words, the S-GW CDR generation happens as before.
- Existing CLI commands for S-GW CDR generation are not impacted:
  - The **cc gen-cdr-for-profile** CLI command takes effect only if the existing **cc behavior-bit no-records** CLI command has no impact based on Charging-Characteristics profile value received.
  - The existing **accounting-mode gtpp** CLI command is still required for S-GW CDR generation.
- The Controlled S-GW CDR Generation feature will not work if the **cc prefer local-value** CLI command is configured.
- Subsequent configuration of **cc gen-cdr-for-profile** CLI command results in earlier values being discarded.
- The values of **cc gen-cdr-for-profile** CLI command are applicable only for new subscribers connected after the CLI is configured.



CHAPTER 4

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 27: Dictionary Table Key

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be present in a CDR if certain conditions are met.
OM	Operator Provisionable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.

• CDR Fields Supported in ePDG-CDRs, on page 83

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.

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Record Type	0	M	ePDG IP CAN bearer record.	Integer	1	0x80
Served IMSI	3	M	IMSI of the served party.	BCD encoded octet string	3-8	0x83
ePDGAddressUsed	4	M	The control plane IP address of the S-GW used.	Choice	6 (IPv4) or 18 (IPv6)	0xa4
ePDG BINARY IPV4 ADDRESS	4-0	M	The octet string includes the Gn address of the GGSN service in binary coding.	Octet string	4	0x80
ePDG BINARY IPV6 ADDRESS	4-0	M	The octet string included in the field described includes the Gn address of the GGSN service in binary coding.	Octet string	16	0x81
Charging ID	5	M	IP CAN bearer identifier used to identify IP CAN bearer in different records created by PCNs.	Integer	1-5	0x85

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Access Point Name Network Identifier	7	M	The logical name of the connected access point to the external packet data network (network identifier part of APN).	IA5 string	1-63	0x87
PDP/PDN Type	8	M	This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).	Octet string	2	0x88
Served PDP/PDN Address	9	M	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.	Choice	8 (IPv4) or 20 (IPv6)	0xa9
PDP IP Address	9-0	M	This field contains the IP address for the PDP context.	Choice	6 (IPv4) or 18 (IPv6)	0xa0
PDP IPV4 Address	9-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the S-GW in binary coding.	Octet string	4	0x80

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDP IPV6 Address	9-0-0	M	The octet string included in the field described above includes the IPv6 address assigned to the subscriber by the S-GW in binary coding.	Octet string	16	0x81
Dynamic Address Flag	11	O	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.	Boolean	1	0x8b

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
List of Traffic Data Volumes	12	M	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.	Sequence		0xac
Change of charging condition	12-0	M	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.	Sequence		0x30

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Data Volume GPRS Uplink	12-0-3	M	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.	Integer	1-5	0x83

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Data Volume GPRS Downlink	12-0-4	M	The Data Volume GPRS Downlink field is a part of the ChangeOfChaCondition 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.	Integer	1-5	0x84
Change Condition	12-0-5	M	The Change Condition field is part of the ChangeOfChaCondition element in the List of Traffic Volumes. It defines the reason for closing the container.	Enumerated	1	0x85

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Change Time	12-0-6	M	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.	BCD encoded octet string	9	0x86
Record Opening Time	13	M	Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.	BCD encoded octet string	9	0x8d
Duration	14	M	This field contains the duration in seconds for the record.	Integer	1-5	0x8e
Cause for Record Closing	15	M	This field contains a reason for the closure of the CDR.	Integer	1	0x8f
Record Sequence Number	17	O	Partial record sequence number, only present in case of partial records.	Integer	1-5	0x91

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Node ID	18	O	Name of the recording entity.	IA5 string	5-20	0x92
Local Record Sequence Number	20	O	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.	Integer	1-5	0x94
APN Selection Mode	21	M	An index indicating how the APN was selected.	Enumerated	1	0x95
Served MSISDN	22	O	The primary MSISDN of the subscriber.	Integer	1-9	0x96
Charging Characteristics	23	M	The Charging Characteristics applied to the IP CAN bearer.	Hex Value Octet string	2	0x97
Charging Characteristics Selection Mode	24	O	Holds information about how Charging Characteristics were selected.	Enumerated	1	0x98
RAT Type	30	O	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.	Integer	1	9e

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
P-GW Address Used	36	M	This field is the P-GW IP Address for the Control Plane.	Choice	6 (IPv4) or 18 (IPv6)	bf24
P-GW Binary IPV4 Address	36-0	M	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.	Octet String	4	0x80
P-GW Binary IPV6 Address	36-0	M	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.	Octet String	16	0x81
P-GW PLMN Identifier	37	O		Octet string	3	9f25
Start Time	38	O	This field holds the time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.	BCD encoded octet string	9	9f26

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Stop Time	39	O	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.	BCD encoded octet string	9	9f27
PDN Connection ID	40	O	This field holds the PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.	Integer	1-5	9f28
Served PDP PDN Address Extension	43	O	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.	Choice	8 (IPv4)	bf2b
PDP IP Address	43-0	M	This field contains the IP address for the PDP context.	Choice	6 (IPv4)	0xa0

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDP IPV4 Address	43-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by S-GW in binary coding.	Octet String	4 (IPv4)	0x80
dynamicAddressFlagExt	47	O	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.	Boolean	1	9f2f
ePDGIPv6AddressUsed	48	O	The control plane IPv6 address, in case of IPv4v6 dual stack, of the ePDG.	Choice	18 (IPv6)	bf 30

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
ePDG BINARY IPV6 ADDRESS	48-0	O	The octet string in this field includes the Gn address of the GGSN service in binary coding.	Octet string	16 (IPv6)	0x81

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.

```
--------------------------------------------------------------------------------
--
--    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,
    servedPDPPDNAddress                    [9] PDPAddress OPTIONAL,
    dynamicAddressFlag                       [11] DynamicAddressFlag OPTIONAL,
    listOfTrafficVolumes                  [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,

    recordOpeningTime                        [13] TimeStamp,
    duration                                            [14] CallDuration,
    causeForRecClosing                       [15] CauseForRecClosing,
    recordSequenceNumber                   [17] INTEGER OPTIONAL,
    nodeID                                              [18] NodeID OPTIONAL,
    localSequenceNumber                    [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode                          [21] APNSelectionMode OPTIONAL,
    servedMSISDN                                 [22] MSISDN OPTIONAL,
    chargingCharacteristics             [23] ChargingCharacteristics,
    chChSelectionMode                        [24] ChChSelectionMode OPTIONAL,
    rATType                                             [30] RATType OPTIONAL,
    p-GWAddressUsed                          [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier                       [37] PLMN-Id OPTIONAL,
    startTime                                           [38] TimeStamp OPTIONAL,
```

```
    stopTime                                            [39] TimeStamp OPTIONAL,
    pDNConnectionChargingID              [40] ChargingID OPTIONAL,
    servedPDPPDNAddressExt                [43] PDPAddress OPTIONAL,
    dynamicAddressFlagExt                  [47] DynamicAddressFlag OPTIONAL,
    ePDGiPv6AddressUsed                      [48] GSNAddress OPTIONAL,
    ueTunnelInfo                                    [103] UETunnelInfo OPTIONAL,
    macAddressOfAP                                [104] MACAddress OPTIONAL
}
 --
 -- Note: ueTunnelInfo & macAddressOfAP are available only in custom38 dictionary.
 --

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),
     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, P-GW, TDF and IP-Edge
     roamingDefault                (4), -- For SGSN, S-GW, P-GW, TDF and IP-Edge
     visitingDefault                (5), -- For SGSN, S-GW, P-GW, TDF and IP-Edge
     fixedDefault                     (6) -- For TDF and IP-Edge
}

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,
     ---- see TS 29.002
     diameterResultCodeAndExperimentalResult    [7] INTEGER
     ---- See TS 29.338, TS 29.337
}

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,
      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))
 --
 -- This is in the same format as octets 2,3,and 4 of the Routing Area Identity (RAI) IE
specified
 --    in 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 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

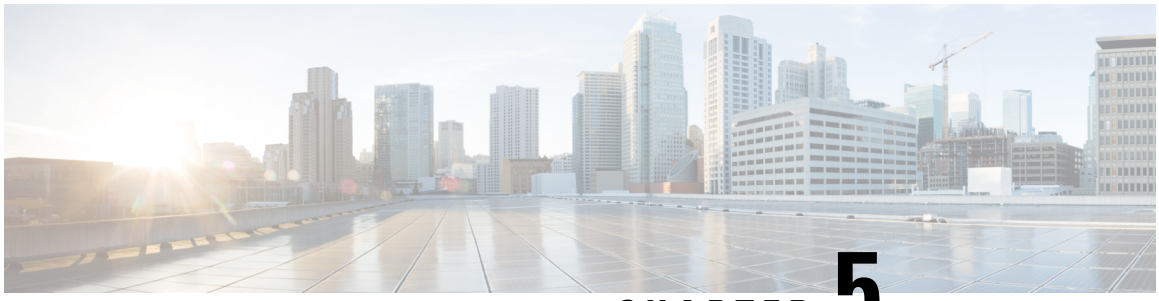
MSISDN::= ISDN-AddressString
                --
 -- See TS 23.003
                --

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
                --

UETunnelInfo ::= SET
{
      ueTunnelIpAddress                    [0] GSNAddress,
      ueTunnelPort                              [1] Port,
      epdgTunnelIpAddress                [2] GSNAddress,
      epdgTunnelPort                          [3] Port
}
Port    ::= OCTET STRING (SIZE(2))
MACAddress  ::= OCTET STRING (SIZE(6))

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 5

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, on page 101

CDR Fields

Access Point Name Network Identifier

This field contain 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 "-". This is controlled by the CLI command "**gtpp attribute apn-ni**".

Format

IA5string

Length

1-63 bytes

APN Selection Mode

An index indicating how the APN was selected. This is controlled by the CLI command "**gtpp attribute apn-selection-mode**".

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)

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. This is controlled by the CLI command "**gtpp attribute charging-characteristic-selection-mode**".

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. This is controlled through the CLI command "**gtpp attribute dynamic-flag**".

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. This is controlled through the CLI command "**gtpp attribute dynamic-flag-extension**".

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.

Format

Octet string

Length

4 bytes

ePDGiPv6Address

This field indicates the control plane IPv6 address, in case of IPv4v6 dual stack, of the ePDG on S2b interface. This is controlled using the CLI command "**gtpp attribute sgw-ipv6-addr**".

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:

```
ChangeCondition    ::=    ENUMERATED
{
        qosChange              (0),
        tariffTime            (1),
        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:

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 available only in custom38 GTPP dictionary.

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 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 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. This is controlled by the CLI command "**gtpp attribute pdn-connection-id**".

Format

Integer

Length

1-5 bytes

PDP PDN Type

This field is controlled through the CLI command "**gtpp attribute pdp-type**".

-- OCTET 1: PDP Type Organization

```
Spare '1111'          PDP Type Organization Value
```

PDP Type Organization	Value
ETSI	0
IETF	1

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 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. This is controlled by the CLI command "**gtpp attribute pgw-plmn-id**".

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. This is controlled through the CLI command "**gtpp attribute rat**".

RAT Types	Values (Decimal)
WLAN	3

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. 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

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. This is controlled through the CLI command "**gtpp attribute msisdn**".

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. This is controlled through the CLI command "**gtpp attribute pdp-address**".

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. This is controlled through the CLI command "**gtpp attribute start-time**".

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

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. This is controlled through the CLI command "**gtpp attribute stop-time**".

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. 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 available only in custom38 GTPP dictionary.

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

6 or 18 bytes depending on the encoded IP address type

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

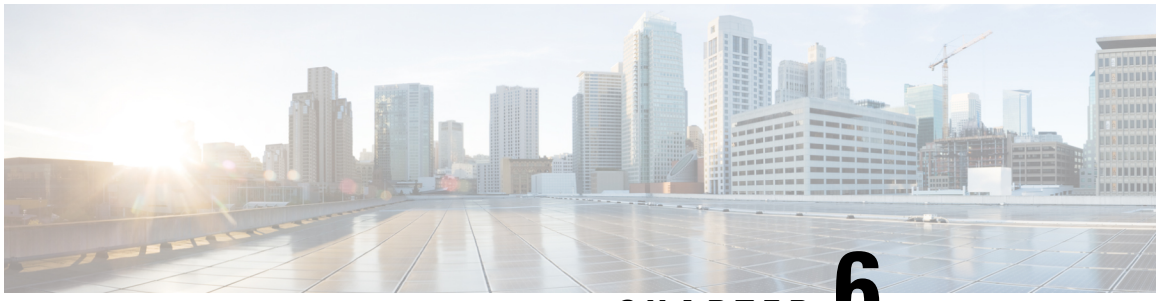
This field is the ePDG Tunnel endpoint port on SWu interface.

Format

Octet string

Length

2 bytes



CHAPTER 6

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 28: Dictionary Table Key 0

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be present in a CDR if certain conditions are met.
OM	Operator Provisionable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.

- CDR Fields Supported in G-CDRs, on page 120
- CDR Fields Supported in eG-CDRs, on page 173

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).

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Record Type	0	M	The field identifies the type of the record: • S-CDR (sgsnPDPRecord) 18 (0x12) • G-CDR (ggsnPDPRecord) 19 (0x13) • eG-CDR (egsnPDPRecord) 70 (0x46)	Integer	1	80
Network initiated PDP context	1	O	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.	Boolean	1	81

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.	BCD encoded octet string	3-8	83
GGSN Address	4	M	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.	Choice	6	a4

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
GGSN IPv4 Binary Address	4-0	M	The octet string included in the field described above includes the Gn address of the GGSN service in binary coding.	Octet string	4	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Charging ID	5	M		Integer	1-5	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			850101-85017F 128 – 32,767 85020080-85027FFF 32,768 – 8,388,607 8503008000-85037FFFFF 8,388,608 – 2,147,483,647 850400800000-85047FFFFF 2,147,483,648 – 4,294,967,295 8505008000000-850500FFFFFFF			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
SGSN Address	6	M	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.	Sequence	6-30	a6

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
SGSN IPv4 Binary Address	6-0	M	The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.	Octet String	4	80
Access Point Name Network Identifier	7	M	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 | virtual }**	IA5string	1-63	87

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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 • 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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 "FF". This field is missing if the address allocation method was "static", 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 "Change of Charging Condition" as described in the next field. The maximum number of containers is configurable.	Sequence	Variable length	ac

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
ChangeOfChar Condition	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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
GPRS Uplink data volume	12-0-3	M	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.	Integer	1-5	83

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
GPRS Downlink data volume	12-0-4	M	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.	Integer	1-5	84

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Change Condition	12-0-5	M		Enumerated (Integer)	1	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			established (new sessions). Failover for ongoing sessions is not supported. Failover for new sessions is always supported. • Rate Limit: 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			• 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.			
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Failurehandling Continue	12-0-7	O	Failure handling continue element is present if failure handling procedure is executed by GGSN	Boolean	1	87
Record Opening Time	13	M	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.	BCD encoded octet string	9	8d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Duration	14	M	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.	Integer	1-5	8e

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Cause for Record Closing	15	M	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	Integer	1	8f

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Diagnostics	16	O	This field is included in the CDR when the PDP context is released and when the option **gtpp attribute diagnostics** is configured. Only the choice of **gsm0408Value** is used. This field is supported for G-CDRs only (not eG-CDRs).	Choice	3	b0

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
gsm0408Cause	16-0	M		Integer	1	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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.	Integer	1-5	91

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Node ID	18	M		IA5string	5-20	92

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			This field contains an identifier string for the node that had generated the CDR. On the ASR 5500 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 to16 characters, defined using the **gtpp attribute node-id** command. If this node-id-suffix is not configured, the GGSN			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Charging Characteristics Selection Mode	24	O		Enumerated (Integer)	1	98

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
			• 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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 "home" SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.	Octet string	3	9b
Served IMEISV	29	O	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.	BCD encoded octet string	8	9d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
MS Time Zone	31	O	This field contains the "Time Zone" 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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	Variable length	bf22
Service Data Volume Block	34-0	O		Sequence	Variable length	30
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
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
Result Code	34-0-3	O	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.	Integer	1-5	83
Local Sequence number	34-0-4	M	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.	Integer	1-5	84

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Time of first usage	34-0-5	M	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.	BCD encoded octet string	9	85
Time of last usage	34-0-6	M	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.	BCD encoded octet string	9	86
Usage time	34-0-7	M	The difference between "time of first usage" and "time of last usage".	Integer	1-5	87
Service condition change	34-0-8	M	The reason for closing the service data container for triggers like SGSN change, QoS change, Rat change, time and volume triggers, etc.	Bit string	5	88

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
QoS negotiated	34-0-9	O	The negotiated QoS applied for the service data flow.	Octet string	4-15	89
sgsn-Address	34-0-10	M	The valid SGSN IP address during the service data recording interval.	Choice	6	aa
SGSN-IPv4-Binary Address	34-0-10-0	M	The octet string included in the field "sgsn-Address" includes either control plane or user plane address of the SGSN in binary coding.	Octet string	4	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
SGSN PLMN identifier	34-0-11	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 "home" SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.	Octet string	3	8b

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
FBC Data volume uplink	34-0-12	M	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.	Integer	1-5	8c

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
FBC data volume downlink	34-0-13	M	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.	Integer	1-5	8d
Time of report	34-0-14	M	A time stamp defining the moment when the service data container is closed.	BCD encoded octet string	9	8e
RAT Type	34-0-15	O	The valid radio access technology type during the service data recording interval.	Integer	1	8f

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Failurehandling Continue	34-0-16	O	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 "credit-control" mode or can be received from the server in the "Credit-Control-Failure-Handling" 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.	Boolean	1	90

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 Code
Service Identifier	34-0-17	O	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	Integer	1-5	91

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 ASR 5500 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 ASR 5500 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,
        sgsnPLMNIdentifier             [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),
        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),
        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] 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
}

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 (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
        qoSChange                                               (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. 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
END
```

standard Dictionary

G-CDR fields based on 3GPP TS 32.215 V4.6.0 (2003-12) (R4).

Field	Category	Description
Record Type	M	GGSN PDP context record.
Network initiated PDP context	OC	A flag that is present if this is a network-initiated PDP context.
Served IMSI	M	IMSI of the served party.
GGSN Address	M	The control plane IP address of the GGSN used.
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs.
SGSN Address	M	List of SGSN addresses used during this record.

Field	Category	Description
Access Point Name Network Identifier	OM	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP Type	OM	PDP type, i.e. IP, PPP, or IHOSS:OSP
Served PDP Address	OC	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.
Dynamic Address Flag	OC	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.
List of Traffic Data Volumes	OM	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.
Record Opening Time	M	Time stamp when PDP context is activated in this GGSN or record opening time on subsequent partial records.
Duration	M	Duration of this record in the GGSN.
Cause for Record Closing	M	The reason for the release of record from this GGSN.
Diagnostics	OM	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	OM	Name of the recording entity.

Field	Category	Description
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	OM	An index indicating how the APN was selected.
Served MSISDN	OM	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics applied to the PDP context.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.
SGSN PLMN Identifier	OM	SGSN PLMN identifier (MCC and MNC) used during this record.

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).

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Record Type	0	M	The field identifies the type of the record: • S-CDR (sgsnPDPRecord) 18 (0x12) • G-CDR (ggsnPDPRecord) 19 (0x13) • eG-CDR (egcdrRecord) 70 (0x46)	Integer	1	80
Network initiated PDP context	1	O	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.	Boolean	1	81

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.	BCD encoded octet string	3-8	83
GGSN Address	4	M	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.	Choice	6	a4
GGSN IPv4 Binary Address	4-0	M		Octet string	4	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Charging ID	5	M		Integer	1-5	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			850101-85017F 128 – 32,767 85020080 -85027FFF 32,768 – 8,388,607 8503008000 -85037FFFFF 8,388,608 – 2,147,483,647 850400800000 -85047FFFFF 2,147,483,648 – 4,294,967,295 85050080000000 -85050FFFFFFF			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
SGSN Address	6	M	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.	Sequence	6-30	a6

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
SGSN IPv4 Binary Address	6-0	M	The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.	Octet String	4	80
Access Point Name Network Identifier	7	M	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 | virtual }**	IA5string	1-63	87

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 • 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 "FF". This field is missing if the address allocation method was "static", 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 "Change of Charging Condition" as described in the next field. The maximum number of containers is configurable.	Sequence		ac

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
ChangeOfChar Condition	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		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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
GPRS Uplink data volume	12-0-3	M	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.	Integer	1-5	83

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
GPRS Downlink data volume	12-0-4	M	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.	Integer	1-5	84

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Change Condition	12-0-5	M		Enumerated (Integer)	1	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			(new sessions). Failover for ongoing sessions is not supported. Failover for new sessions is always supported. • Reached Time Limit: 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			• 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.			
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Failurehandling Continue	12-0-7	O	Failure handling continue element is present if failure handling procedure is executed by GGSN	Boolean	1	87
Record Opening Time	13	M	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.	BCD encoded octet string	9	8d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Duration	14	M	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.	Integer	1-5	8e

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Cause for Record Closing	15	M	This field contains a reason for the closure of the CDR. Supported values: • normalRelease: 0 • abnormalRelease: 4 • volumeLimit: 16 • timeLimit: 17 • sGSNChange: 18 • maChangeCond: 19 • managementIntervention: 20 • rATChange: 22 • mSTimeZoneChange: 23	Integer	1	8f

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Diagnostics	16	O	This field is included in the CDR when the PDP context is released and when the option **gtpp attribute diagnostics** is configured. Only the choice of **gsm0408Value** is used. This field is supported for G-CDRs only (not eG-CDRs).	Choice	3	b0

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
gsm0408Cause	16-0	M		Integer	1	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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.	Integer	1-5	91

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Node ID	18	M		IA5string	5-20	92

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			This field contains an identifier string for the node that had generated the CDR. On the ASR 5500 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 to16 characters, defined using the **gtpp attribute node-id** command. If this node-id-suffix is not configured, the GGSN			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Charging Characteristics Selection Mode	24	O		Enumerated (Integer)	1	98

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			• 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 "home" SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.	Octet string	3	9b
Served IMEISV	29	O	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.	BCD encoded octet string	8	9d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
MS Time Zone	31	O	This field contains the "Time Zone" 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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		bf22
ChangeOfService Condition	34-0	O		Sequence		30
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Result Code	34-0-3	O	The result code AVP. This contains the result code after the interconnection with the CRF.	Integer	1-5	83
Local Sequence number	34-0-4	M	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.	Integer	1-5	84
Time of first usage	34-0-5	M	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.	BCD encoded octet string	9	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Time of last usage	34-0-6	M	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.	BCD encoded octet string	9	86
Usage time	34-0-7	M	The difference between "time of first usage" and "time of last usage".	Integer	1-5	87
Service condition change	34-0-8	M	The reason for closing the service data container for triggers like SGSN change, QoS change, RAT change, time and volume triggers, etc.	Bit string	5	88

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
QoS negotiated	34-0-9	O		Octet string	4-15	89

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			are multiple LOSDVs with same content-id but different service-id, QOS-Info will be present in every such LOSDV.			
sgsn-Address	34-0-10	M	The valid SGSN IP address during the service data recording interval.	Choice	6	aa
SGSN-IPv4-Binary Address	34-0-10-0	M		Octet string	4	80
SGSN PLMN identifier	34-0-11	O	The valid SGSN PLMN ID during the service data recording interval.	Octet string	3	8b

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
FBC Data volume uplink	34-0-12	M	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.	Integer	1-5	8c

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
FBC data volume downlink	34-0-13	M	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.	Integer	1-5	8d
Time of report	34-0-14	M	A time stamp defining the moment when the service data container is closed.	BCD encoded octet string	9	8e
RAT Type	34-0-15	O	The valid RAT type during the service data recording interval.	Integer	1	8f
Failurehandling Continue	34-0-16	O	A Boolean expression included if the failure handling condition has been executed.	Boolean	1	90

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Service Identifier	34-0-17	O	The service identifier may designate an end user service, a part of an end user service or an arbitrarily formed group thereof.	Integer	1-5	91

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 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 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 ASR 5500 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 ASR 5500 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] 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,
        sgsnPLMNIdentifier             [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.
        --

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),
        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)
}

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,
        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
        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 (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
        qoSChange                                              (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. 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
END
```

custom19 Dictionary

eG-CDR fields for TS 32.298 v7.4.0 (R7).

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Record Type	0	M	The field identifies the type of the record: • [illegible] 18 (0x12) • [illegible] 19 (0x13) • [illegible] 70 (0x46)	Integer	1	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Network initiated PDP context	1	O	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.	Boolean	1	81
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.	BCD encoded octet string	3-8	83

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
GGSN Address	4	M	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.	Choice	6	a4
GGSN IPv4 Binary Address	4-0	M	The octet string included in the field described above includes the Gn address of the GGSN service in binary coding.	Octet string	4	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Charging ID	5	M		Integer	1-5	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			850101-85017F 128 – 32,767 85020080 -85027FFF 32,768 – 8,388,607 8503008000 -85037FFFFF 8,388,608 – 2,147,483,647 850400800000 -85047FFFFF 2,147,483,648 – 4,294,967,295 8505008000000- 850500FFFFFFF			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
SGSN Address	6	M	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.	Sequence	6-30	a6

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
SGSN IPv4 Binary Address	6-0	M	The octet string included in the field described above includes either control plane or user plane address of the SGSN in binary coding.	Octet String	4	80
Access Point Name Network Identifier	7	M	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 | virtual }**	IA5string	1-63	87

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 • 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 "FF". This field is missing if the address allocation method was "static", 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 "Change of Charging Condition" as described in the next field. The maximum number of containers is configurable.	Sequence	Variable length	ac

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
ChangeOfCharCondition	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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
GPRS Uplink data volume	12-0-3	M	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.	Integer	1-5	83

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
GPRS Downlink data volume	12-0-4	M	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.	Integer	1-5	84

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Change Condition	12-0-5	M		Enumerated (Integer)	1	85

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			(new sessions). Failover for ongoing sessions is not supported. Failover for new sessions is always supported. • Rat&Time, 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			• 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.			
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Failurehandling Continue	12-0-7	O	Failure handling continue element is present if failure handling procedure is executed by GGSN	Boolean	1	87
User Location Information	12-0-8	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 GTP message.	Octet string	8	88

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Record Opening Time	13	M	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.	BCD encoded octet string	9	8d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Duration	14	M	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.	Integer	1-5	8e

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Cause for Record Closing	15	M	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	Integer	1	8f
Diagnostics	16	O	This field is included in the CDR when the PDP context is released and when the option **gtpp attribute diagnostics** is configured. Only the choice of **gsm0408Value** is used. This field is supported for G-CDRs only (not eG-CDRs).	Choice	3	b0

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
gsm0408Cause	16-0	M		Integer	1	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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.	Integer	1-5	91

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Node ID	18	M		IA5string	5-20	92

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			This field contains an identifier string for the node that had generated the CDR. On the ASR 5500 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 to16 characters, defined using the **gtpp attribute node-id** command. If this node-id-suffix is not configured, the GGSN			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Charging Characteristics Selection Mode	24	O		Enumerated (Integer)	1	98

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			• 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.			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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 "home" SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.	Octet string	3	9b
Served IMEISV	29	O	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.	BCD encoded octet string	8	9d

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
MS Time Zone	31	O	This field contains the "Time Zone" 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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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	Variable length	bf22
Service Data Volume Block	34-0	O		Sequence	Variable length	30
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

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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
Result Code	34-0-3	O	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.	Integer	1-5	83
Local Sequence number	34-0-4	M	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.	Integer	1-5	84

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Time of first usage	34-0-5	M	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.	BCD encoded octet string	9	85
Time of last usage	34-0-6	M	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.	BCD encoded octet string	9	86
Usage time	34-0-7	M	The difference between "time of first usage" and "time of last usage".	Integer	1-5	87
Service condition change	34-0-8	M	The reason for closing the service data container for triggers like SGSN change, QoS change, Rat change, time and volume triggers, etc.	Bit string	5	88

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
QoS negotiated	34-0-9	O		Octet string	4-15	89

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			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			

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
			are multiple LOSDVs with same content-id but different service-id, QOS-Info will be present in every such LOSDV.			
sgsn-Address	34-0-10	M	The valid SGSN IP address during the service data recording interval.	Choice	6	aa
SGSN-IPv4-Binary Address	34-0-10-0	M	The octet string included in the field "sgsn-Address" includes either control plane or user plane address of the SGSN in binary coding.	Octet string	4	80

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
SGSN PLMN identifier	34-0-11	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 "home" SGSN. For home SGSNs without the RAI a locally configured PLMN-ID can be sent instead.	Octet string	3	8b

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
FBC Data volume uplink	34-0-12	M	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.	Integer	1-5	8c

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
FBC data volume downlink	34-0-13	M	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.	Integer	1-5	8d
Time of report	34-0-14	M	A time stamp defining the moment when the service data container is closed.	BCD encoded octet string	9	8e
RAT Type	34-0-15	O	The valid radio access technology type during the service data recording interval.	Integer	1	8f

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Failurehandling Continue	34-0-16	O	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 "credit-control" mode or can be received from the server in the "Credit-Control-Failure-Handling" 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.	Boolean	1	90

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
Service Identifier	34-0-17	O	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	Integer	1-5	91
User Location Information	34-0-20	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 GTP message	Octet string	8	94

Field	Tag number	Category	Description	Format	Size (in bytes)	ASN1 code
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	Variable 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,
        sgsnPLMNIdentifier               [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.
        --

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),
        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
{
        --
        -- 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. 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

END
```

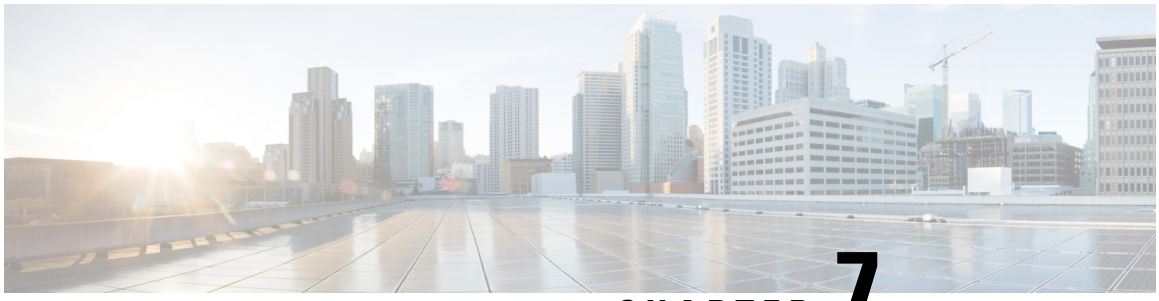
standard Dictionary

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

Field	Category	Description
Record Type	M	GPRS GGSN PDP context record.
Network initiated PDP context	C	Present if this is a network-initiated PDP context.
Served IMSI	M	IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied).
Served MSISDN	O	The primary MSISDN of the subscriber.
GGSN Address	M	The IP address of the GGSN used.
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs.
SGSN Address	M	List of SGSN addresses used during this record.
Access Point Name Network Identifier	M	The logical name of the connected access point to the external packet data network (network identifier part of APN).

Field	Category	Description
APN Selection Mode	O	An index indicating how the APN was selected.
PDP Type	M	PDP type, i.e. IP, PPP, or IHOSS:OSP.
Served PDP Address	M	PDP address, i.e. IPv4 or IPv6 address.
Dynamic Address Flag	C	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation.
List of Traffic Data Volumes	M	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. **Important** Only one LOTV container per eG-CDR.
Record Opening Time	M	Time stamp when this record was opened.
Duration	M	Duration of this record in the GGSN.
Cause for Record Closing	M	The reason for the release of record from this GGSN.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	O	Name of the recording entity.

Field	Category	Description
Local Record Sequence Number	O	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Charging Characteristics	C	The Charging Characteristics flag retrieved from subscriber's data as described in TS 32.015 sub clause 6.1.6.5.



CHAPTER 7

GGSN CDR Field Descriptions

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

Also see the *Field Reference for CDRs in GGSN* chapter for information on CDR fields supported in G-CDRs and 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, on page 284

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.

Format

Unsigned integer

Length

1 byte

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

Hex value octet string

Length

2 bytes

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 gttp 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

```
-- 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

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.

Important The List of Service Data Volumes field will be present in a GGSN CDR only if there is non-zero data consumption.

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 **gtpp egcdr charging-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

Length

- Service Identifier: 4 bytes
- Rating Group: 4 bytes
- Charging Rulebase Name: 1-63 bytes
- Result Code: 4 bytes
- Local Seq No: 4 bytes
- Time of first usage: 9 bytes
- Time of last usage: 9 bytes
- Usage time: 4 bytes
- User Location Information: 6-13 bytes
- Service change condition: 32 bits (4 bytes) (see note below)
- QoS negotiated: 12 bytes
- Sgsn-address: 4 bytes
- SGSN PLMN identifier: 3 bytes
- FBC data volume uplink: 4 bytes
- FBC data volume downlink: 4bytes
- Time of Report: 9 bytes
- Rat Type: 1 byte
- Failurehandling Continue: 1 byte



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 conatiner 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

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 custom39 GTPP dictionary for eG-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 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.
--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

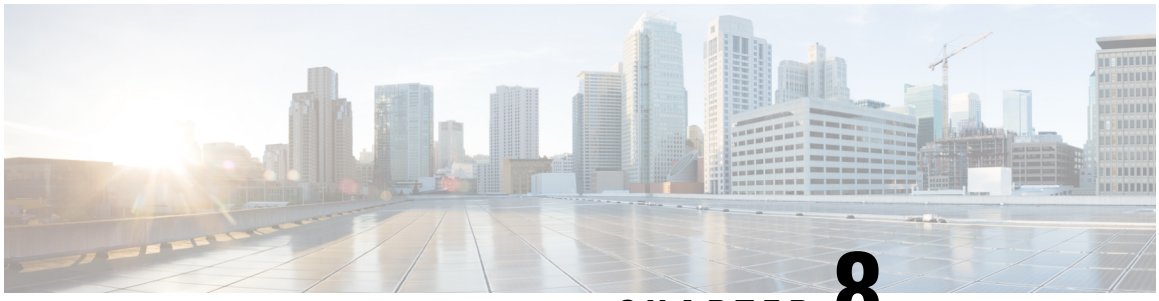
The User Location Information for the MS if provided by the SGSN to the GGSN during the PDP context activation/modification procedure.

Format

Octet string

Length

8 bytes



CHAPTER 8

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 use keys described in the following table.

Table 29: Dictionary Table Key 4

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be present in a CDR if certain conditions are met.
OM	Operator Provisionable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.

• custom24 Dictionary, on page 303

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.

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Record Type	0	M	P-GW IP CAN bearer record	Integer	1	80
Served IMSI	3	M	IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied)	BCD encoded octet string	3-8	83
P-GW Address	4	M	The control plane IP address of the P-GW used.	Octet String	6 or 18 bytes (depending on v4 or v6 address)	a4
Charging ID	5	M	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs	Integer	1-5	85
Serving Node Address	6	M	List of serving node control plane IP addresses (e.g. SGSN, MME, etc.) used during this record.	Sequence	6-98 or 18-292 bytes	a6
Access Point Name Network Identifier	7	OM	The logical name of the connected access point to the external packet data network (network identifier part of APN).	IA5string	1-63	87

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
PDP/PDN Type	8	OM	Indicates PDP type (IP, PPP, or IHOSS:OSP) or PDN type (IPv4, IPv6, or IPv4v6).	Octet string	2	88
Served PDP/PDN Address	9	OC	IP address allocated for the PDP context / PDN connection (IPv4 or IPv6), if available.	Octet string	8 or 20	a9
Dynamic Address Flag	11	OC	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.	Boolean	1	8b
Record Opening Time	13	M	Timestamp when IP CAN bearer is activated in this P-GW or record opening time on subsequent partial records.	BCD encoded octet string	9	8d

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Duration	14	M	Duration of this record in the P-GW.	Integer	1-5	8e
Cause for Record Closing	15	M	The reason for the release of a record from this P-GW.	Integer	1	8f
Diagnostics	16	OC	Includes a more detailed technical reason (as defined in TS 32.250) for the release of the connection.	Integer	1-5	b0
Record Sequence Number	17	C	Partial record sequence number, only present in case of partial records.	Integer	1-5	91
Node ID	18	OM	Name of the recording entity.	IA5string	1-20	92
Local Sequence Number	20	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.	Integer	1-5	94
APN Selection Mode	21	OM	An index indicating how the APN was selected.	Enumerated	1	95
Served MSISDN	22	OM	The primary MSISDN of the subscriber.	BCD encoded octet string	1-9	96

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Charging Characteristics	23	M	The Charging Characteristics applied to the IP CAN bearer.	Octet string	2	97
Charging Characteristics Selection Mode	24	OM	Holds information about how Charging Characteristics were selected.	Enumerated	1	98
Serving Node PLMN Identifier	27	OM	Serving node PLMN Identifier (MCC and MNC) used during this record, if available.	Octet string	3	9b
PS Furnish Charging Information	28	OC	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.	Sequence	Variable	BC

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
PS Free Format Data	28-0-1	OC	This field contains charging information sent by the OCS in the Diameter Credit Control CreditControlAnswer messages as defined in TS 32.251. The data can be sent either in one Diameter Credit Control CreditControlAnswer message or several Diameter Credit Control CreditControlAnswer messages with append indicator. This data is transferred transparently in the PS Furnish Charging Information field of the relevant call records.	Sequence	Variable	

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
PS Free Format Append Indicator	28-0-2	OC	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.	Sequence	Variable	
Served IMEISV	29	OC	IMEISV of the ME, if available.	BCD encoded octet string	8	9d

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
RAT Type	30	OC	Indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.	Integer	1	9e
MS Time Zone	31	OC	Indicates the offset between universal time and local time in steps of 15 minutes where the MS currently resides.	Octet string	2	9f1f
User Location Information	32	OC	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.	Octet string	5-13	9f20

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
List of Service Data	34	OM	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. **Important** The List of Service Data field will be present in a P-GW CDR only if there is non-zero data consumption.	Sequence	Variable	bf22
Data Service Volume Block	34-0	OM	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.	Sequence	Variable	30
Rating Group	34-0-1	OM	Service flow identity also known as content-ID	Integer	1-5	81

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Charging Rulebase Name	34-0-2	OC	Name of the Rulebase used for charging	IA5string	1-16	82
Result Code	34-0-3	OC	Result code shared by OCS	Integer	1-5	83
Local Sequence Number (LOSD)	34-0-4	OC	Service data container sequence number	Integer	1-5	84
Time of First Usage	34-0-5	OC	Timestamp for the first IP packet to be transmitted for the service data flow	BCD encoded octet string	9	85
Time of Last Usage	34-0-6	OC	Timestamp for the last IP packet to be transmitted for the service data flow	BCD encoded octet string	9	86
Time Usage	34-0-7	OC	Difference in seconds within range of 0 to 4294967295 between "time of first usage" and "time of last usage"	Integer	1-5	87
Service Condition Change	34-0-8	OC	Reason for closing the service data container	Bit string	5	88
QoS Information Negotiated	34-0-9	OC	Authorized QoS for the IP-CAN bearer	Sequence	Variable	a9
QCI	34-9-1	O		Integer	1-5	

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Maximum Requested Bandwith UL	34-9-2	O		Integer	1-5	
Maximum Requested Bandwith DL	34-9-3	O		Integer	1-5	
Guaranteed Bitrate UL	34-9-4	O		Integer	1-5	
Guaranteed Bitrate DL	34-9-5	O		Integer	1-5	
ARP	34-9-6	O		Integer	1-5	
APN Aggregate Maximum Bitrate UL	34-9-7	O		Integer	1-5	
APN Aggregate Maximum Bitrate DL	34-9-8	O		Integer	1-5	
Extended Maximum Requested BW UL	34-9-9	O		Integer	1-5	0x89
Extended Maximum RequestedBW DL	34-9-10	O		Integer	1-5	0x8a
Extended GBR UL	34-9-11	O		Integer	1-5	0x8B
Extended GBR DL	34-9-12	O		Integer	1-5	0x8C
Extended APN AMBR UL	34-9-13	O		Integer	1-5	0x8D
Extended APN AMBR DL	34-9-14	O		Integer	1-5	0x8e

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Serving Node Address (LOSD)	34-0-10	OC	IP address of the serving node (SGSN/S-GW) control plane	Octet string	6 or 18	aa
Data Volume FBC Uplink	34-0-12	OC	Number of octets received in the uplink direction for this container 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.	Integer	1-5	8c

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Data Volume FBC Downlink	34-0-13	OC	Number of octets transmitted in the downlink direction for this container 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.	Integer	1-5	8d
Time of Report	34-0-14	OM	Timestamp defining the moment when the service data container is closed	BCD encoded octet string	9	8e
Failure Handling Continue	34-0-16	OC	Identifier for failure handling	Boolean	1	90
Service Identifier	34-0-17	OC	Identifier for a service	Integer	1-5	91
PS Furnish Charging Information	34-0-18	OC	This field includes charging information per rating group in case it is sent by OCS.	Sequence	Variable	b2

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
User Location Information (LOSD)	34-0-20	OC	Location of the user known at the time when container is created	Octet string	6-13	94
Serving node Type	35	M	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.	Sequence of serving Node Type	3-48	bf23
Served MNNAI	36	OC	Mobile Node Identifier in NAI format (based on IMSI), if available.	Set	Variable	bf24
P-GW PLMN Identifier	37	OC	PLMN identifier (MCC MNC) of the P-GW.	Octet string	3	9f25
Start Time	38	OC	The time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.	Octet string	9	9f26

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
Stop Time	39	OC	The time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.	Octet string	9	9f27
PDN Connection Id	41	OM	PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.	Integer	1-5	9f29
Served PDP PDN Address Extension	45	OC	This field contains the IPv4 address allocated for the PDP context/PDN connection when dual-stack IPv4-IPv6 is used.	Octet string	8	bf2d
List of RAN Secondary RAT Usage Reports	73	OC	This field includes one or more containers reported from the RAN for a secondary RAT.	Sequence of RAN Secondary RAT Usage Report	Variable	0xbf49

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
RAN Secondary RAT Usage Report	73-0	M	This field includes one or more containers reported from the RAN for a secondary RAT.	Sequence	Variable	0x30
Data Volume Uplink	73-0-1	M	This field includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The counting and reporting from RAN of uplink data volumes is optional.	Integer	9	0x81
Data Volume Downlink	73-0-2	M	This field includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.	Integer	9	0x82

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
RAN Start Time	73-0-3	M	This field is a time stamp, which defines the moment when the volume container is opened by the RAN.	Timestamp	9	0x83
RAN End Time	73-0-4	M	This field is a time stamp, which defines the moment when the volume container is closed by the RAN.	Timestamp	9	0x84
Secondary RAT Type	73-0-5	OC	This field contains the RAT type for the secondary RAT.	Integer	1	0x85
UE Local IP Port Info	253	O	This field includes the S2b user Local IP Port information.	Sequence	34	0xbf817d
uELocalIPAddress	253-0	O	This field includes the UWAN user IP Address.	IP Address	32	0xa0
uDPSourcePort	253-1	O	This field includes the UWAN user Source Port.	Integer	2	0x81

Field	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 Code
AF recordinformation	19	O	This field includes the AF Charging Identifier and associated flow identifiers generated by the AF, and received by the P-GW over Gx interfaces. **Note** 'Flows' information is not supported on Cisco P-GW .	Sequence	Variable	0xb3
AF chargingIdentifier	19-1	O	This field contains the AF Charging Identifier that is sent by the AF.	octetstring	Variable	0x81

Notes:

- Variable size vary depending on the **charging id** value sent by the PCRF.
- 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.
- In StarOS release 21.16.7 and in later releases, the **aFChargingIdentifier** field is not part of the 3GPP 32.298 Release 6 and 7 specifications. This field is an Release15 attribute and it can be present in Release 8 dictionary if enabled through the **gtpp attribute af-record-info** CLI command. This attribute is available only for the dictionaries custom35, custom24, custom44, custom48, custom50,custom52,custom53, and custom34 when the CLI command **gtpp attribute af-record-info** is configured.

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.

```
GPRS-PGW-Charging-DataTypes-REL8 DEFINITIONS IMPLICIT TAGS ::=
BEGIN

-- ------------------------------------------------------------------------------
--
--    GPRS RECORDS
--
-- 3GPP 32.298V8.7.0 AND 3GPP 32.251V8.8.0
-- ------------------------------------------------------------------------------

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                                          [5] ChargingID,
    servingNodeAddress                                  [6] SEQUENCE OF GSNAddress,
    accessPointNameNI                                   [7] AccessPointNameNI OPTIONAL,
    pdpPDNType                                          [8] PDPType OPTIONAL,
    servedPDPPDNAddress                                 [9] PDPAddress OPTIONAL,
    dynamicAddressFlag                                  [11] DynamicAddressFlag OPTIONAL,
    recordOpeningTime                                   [13] TimeStamp,
    duration                                            [14] CallDuration,
    causeForRecClosing                                  [15] CauseForRecClosing,
    diagnostics                                         [16] Diagnostics OPTIONAL,
    recordSequenceNumber                                [17] INTEGER OPTIONAL,
    nodeID                                              [18] NodeID OPTIONAL,
    localSequenceNumber                                 [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode                                    [21] APNSelectionMode OPTIONAL,
    servedMSISDN                                        [22] MSISDN OPTIONAL,
    chargingCharacteristics                             [23] ChargingCharacteristics,
    chChSelectionMode                                   [24] ChChSelectionMode OPTIONAL,
    servingNodePLMNIdentifier                           [27] PLMN-Id OPTIONAL,
    pSFurnishChargingInformation                        [28] PSFurnishChargingInformation
OPTIONAL,
    servedIMEISV                                        [29] IMEI OPTIONAL,
    rATType                                             [30] RATType OPTIONAL,
    mSTimeZone                                          [31] MSTimeZone OPTIONAL,
    userLocationInformation                             [32] OCTET STRING OPTIONAL,
   listOfServiceData                                   [34] SEQUENCE OF ChangeOfServiceCondition
 OPTIONAL,
    servingNodeType                                     [35] SEQUENCE OF ServingNodeType,
    servedMNNAI                                         [36] SubscriptionID OPTIONAL,
    p-GWPLMNIdentifier                                  [37] PLMN-Id OPTIONAL,
    startTime                                           [38] TimeStamp OPTIONAL,
    stopTime                                            [39] TimeStamp OPTIONAL,
    pDNConnectionID                                     [41] ChargingID OPTIONAL,
    servedPDPPDNAddressExt                              [45] PDPAddress OPTIONAL,
    listOfRANSecondaryRATUsageReports                   [73] SEQUENCE OF
RANSecondaryRATUsageReport OPTIONAL,
    uELocalIPAddressPort                                [253] UELocalIPPortInfo 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),
                cAMELInitCallRelease                             (5),
                volumeLimit                                      (16),
                timeLimit                                        (17),
                servingNodeChange                                (18),
                maxChangeCond                                    (19),
                managementIntervention                           (20),
                intraSGSNIntersystemChange                       (21),
                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,
                aFRecordInformation                           [19] SEQUENCE OF
```

```
AFRecordInformation OPTIONAL,
                userLocationInformation                      [20] OCTET STRING OPTIONAL,
               datapacketsFBCUplink                         [254] DataPacketGPRS OPTIONAL,

                datapacketsFBCDownlink                       [255] DataPacketGPRS OPTIONAL

                   }
AFChargingIdentifier            ::= OCTET STRING
AFRecordInformation               ::= SEQUENCE
{
      aFChargingIdentifier             [1] AFChargingIdentifier
}
   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"
}



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.
                --

DataPacketGPRS                ::= INTEGER
                --
                -- The packets counts of data transferred.
                --

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,
     aPNAggregateMaxBitrateUL                   [7] INTEGER OPTIONAL,
     aPNAggregateMaxBitrateDL                   [8] INTEGER OPTIONAL,
     extendedMaxRequestedBWUL                   [9] INTEGER OPTIONAL,
     extendedMaxRequestedBWDL                   [10] INTEGER OPTIONAL,
     extendedGBRUL                              [11] INTEGER OPTIONAL,
     extendedGBRDL                              [12] INTEGER OPTIONAL,
     extendedAPNAMBRUL                          [13] INTEGER OPTIONAL,
     extendedAPNAMBRDL                          [14] INTEGER OPTIONAL
}
FailureHandlingContinue    ::= BOOLEAN
                --
-- This parameter is included when the failure handling procedure has been executed and new

-- containers are opened. This parameter shall be included in the first and subsequent
-- containers opened after the failure handling execution.
                --

FFDAppendIndicator         ::= BOOLEAN

FreeFormatData             ::= OCTET STRING (SIZE(1..160))
                --
--
-- Free formatted data as sent in the FurnishChargingInformationGPRS
-- see TS 29.078 [217]
                --
GSNAddress::= IPAddress

--IA5String::= OCTET STRING

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

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
                --

PSFurnishChargingInformation          ::= SEQUENCE
{
                pSFreeFormatData                [1] FreeFormatData,
                pSFFDAppendIndicator            [2] FFDAppendIndicator OPTIONAL
}

UELocalIPPortInfo                ::= SEQUENCE
{
    --
    -- The S2b user Local IP Port Information
    --
    uELocalIPAddress                            [0] IPAddress OPTIONAL,
    uDPSourcePort                               [1] INTEGER OPTIONAL
}

UELocalIPAddress        ::= IPAddress
UDPSourcePort           ::= INTEGER

RatingGroupId           ::= INTEGER

QoSInformation          ::= OCTET STRING (SIZE (4..255))
--
-- This octet string
-- is a 1:1 copy of the contents (i.e. starting with octet 5) of the "Bearer Quality of
-- Service" information element specified in TS 29.274 [92].
--

RANSecondaryRATUsageReport ::= SEQUENCE
                -- ]
{
                dataVolumeUplink                [1] DataVolumeGPRS,
                dataVolumeDownlink              [2] DataVolumeGPRS,
                rANStartTime                    [3] TimeStamp,
                rANEndTime                      [4] TimeStamp,
                secondaryRATType                [5] SecondaryRATType OPTIONAL
}

SecondaryRATType ::= INTEGER
{
                reserved (0),
                nR (1) -- New Radio 5G
}
```

```
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
    sGSNPLMNIDChange                                    (2),        -- bearer modification
    tariffTimeSwitch                                    (3),        -- tariff time change
    pDPContextRelease                                   (4),        -- bearer release
    rATChange                                           (5),        -- bearer modification
    serviceIdledOut                                    (6),        -- IP flow idle out, DCCA
 QHT expiry
    reserved1                                           (7),        -- old: QCTexpiry is no
report event
    configurationChange                                 (8),        -- configuration change
    serviceStop                                         (9),        -- IP flow termination
    dCCATimeThresholdReached                            (10),       -- DCCA quota
reauthorization
    dCCAVolumeThresholdReached                          (11),       -- DCCA quota
reauthorization
    dCCAServiceSpecificUnitThresholdReached             (12),       -- DCCA quota
reauthorization
    dCCATimeExhausted                                   (13),       -- DCCA quota
reauthorization
    dCCAVolumeExhausted                                 (14),       -- DCCA quota
reauthorization
    dCCAValidityTimeout                                 (15),       -- DCCA quota validity
time (QVT expiry)
    reserved2                                          (16),       -- reserved due to no use
 case,
                -- old: return Requested is covered by (17),(18)
    dCCAReauthorisationRequest                          (17),       -- DCCA quota
reauthorization request by OCS
    dCCAContinueOngoingSession                          (18),       -- DCCA failure handling
 (CCFH), continue IP flow
    dCCARetryAndTerminateOngoingSession                 (19),       -- DCCA failure handling
 (CCFH), terminate IP flow after DCCA retry
    dCCATerminateOngoingSession                        (20),       -- DCCA failure handling,
 terminate IP flow
    cGI-SAIChange                                       (21),       -- bearer modification
    rAIChange                                           (22),       -- bearer modification
    dCCAServiceSpecificUnitExhausted                    (23),       -- DCCA quota
reauthorization
    recordClosure                                       (24),       -- PGW-CDR closure
    timeLimit                                          (25),       -- intermediate recording
```

```
    volumeLimit                                          (26),       -- intermediate recording

    serviceSpecificUnitLimit                             (27),       -- intermediate recording

    envelopeClosure                                       (28),
    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,
                subscriptionIDData              [1]           UTF8String
}
SubscriptionIDType                ::= ENUMERATED
{
                eND-USER-E164                   (0),
                eND-USER-IMSI                   (1),
                eND-USER-SIP-URI                (2),
                eND-USER-NAI                    (3),
                eND-USER-PRIVATE                (4)
}

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

IPAddress::= CHOICE
{
                iPBinaryAddress                                 IPBinaryAddress

        --Currently only IPBinaryAddress is supported in PGWCDR
}

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

```
}

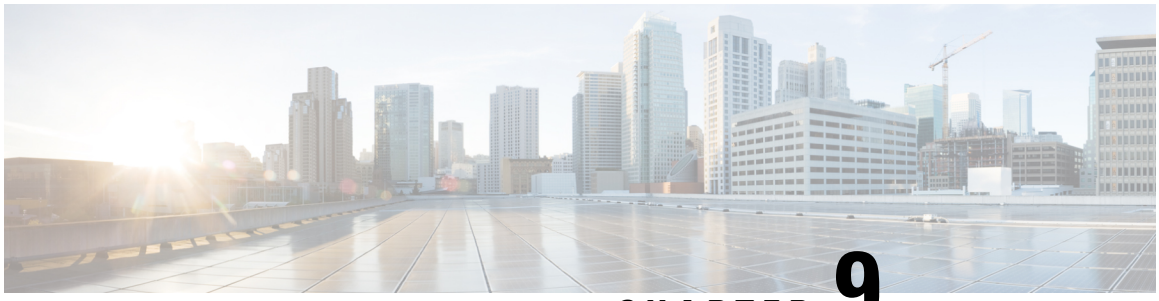

LocalSequenceNumber ::= INTEGER (0..4294967295)
                --
                -- Sequence number of the record in this node
                -- 0.. 4294967295 is equivalent to 0..2**32-1, unsigned integer in four
octets


MSISDN::= ISDN-AddressString
                --
                -- See TS 23.003
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
[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 9

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)

Also see the *Field Reference for CDRs in P-GW* chapter for information on CDR fields supported in 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, on page 331

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

AF Record Information

This field includes the **AF Charging Identifier** and associated flow identifiers generated by the AF and received by the P-GW over Gx interfaces.

Note 'Flows' information is not supported on Cisco P-GW currently. The **AF Record Information** field is not part of the 3GPP 32.298 Release 6 and 7 specifications. The **AF Record Information** field is an Release 15 attribute and it is present in Release 8 dictionary if enabled through the gtpp attribute **af-record-info** CLI command. This attribute will be available for the dictionaries custom35, custom24, custom44, custom48, custom50,custom52,custom53, and custom34 only when the CLI command gtpp attribute **af-record-info** is configured.

Format

Sequence OF

Section

Holds the OCTET String size

AF-ChargingIdentifier

The AF-Charging-Identifier AVP (AVP code 505) contains the AF Charging Identifier that is sent by the AF. This information is used for charging correlation with bearer layer. The IM CN subsystem Charging Identifier (ICID) value is globally unique across all 3GPP IMS networks for a time period of at least one month. This implies that neither the node that generated this ICID nor any other IMS Network Element can reuse this value before the uniqueness period expires. The one month minimum uniqueness period count starts from the time of release of the ICID and is achieved by using node specific information, for example, high-granularity time information , or topology or location information.

Format

Octet string

Length

variable

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

Lists 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

1 byte

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

Field Name	Description	Format	ASN.1 Code
identifier	OBJECT IDENTIFIER for diagnostics	OCTET STRING	6
significance	BOOLEAN DEFAULT FALSE	BOOLEAN	81
information	SEQUENCE OF CauseInformation		A2
CauseInformation	SEQUENCE		30
msgTimestamp	message TimeStamp	TimeStamp	81
msgType	message Type	INTEGER	82
msgSourceIp	Source IP Address	IP Address	A3

Field Name	Description	Format	ASN.1 Code
msgCause	Cause Code	OCTET STRING	84
abnormalTerminationCause	Abnormal Termination Cause Code	ENUM	83

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 RAN Secondary RAT Usage Reports

This field includes one or more containers reported from the RAN for a secondary RAT.

Format

Sequence of RAN Secondary RAT Usage Report

Length

Variable

RAN Secondary RAT Usage Report

This field includes one or more containers reported from the RAN for a secondary RAT.

Each container includes the following fields.

Format

Sequence

Length

Variable

Data Volume Downlink

This field includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.

Format

Integer

Length

9 bytes

Data Volume Uplink

This field includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The counting and reporting from RAN of uplink data volumes is optional.

Format

Integer

Length

9 bytes

RAN Start Time

This field is a time stamp, which defines the moment when the volume container is opened by the RAN.

Format

Timestamp

Length

9 bytes

RAN End Time

This field is a time stamp, which defines the moment when the volume container is closed by the RAN.

Format

Timestamp

Length

9 bytes

Secondary RAT Type

This field contains the RAT type for the secondary RAT.

Format

Integer

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.



Important The List of Service Data field will be present in a P-GW CDR only if there is non-zero data consumption.

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.

Format

Sequence

Length

Variable

Charging Rulebase Name

The name of the Rulebase used for charging. This is the group name of charging rules.

Format

IA5string

Length

1–63 bytes

Data Volume FBC Downlink

The number of octets transmitted during the use of the packet data services in the downlink direction.

Format

Integer

Length

1–5 bytes

Data Volume FBC Uplink

The number of octets received during the use of the packet data services in the uplink direction.

Format

Integer

Length

1–5 bytes

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.

Format

Boolean

Length

1 byte

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:

Field Name	Value	Format	Category
qCI	1	Integer	
maxRequestedBandwithUL	2	Ineger	Optional
maxRequestedBandwithDL	3	Integer	Optional
guaranteedBitrateUL	4	Integer	Optional
guaranteedBitrateDL	5	Integer	Optional
aRP	6	Integer	Optional
extendedMaxRequestedBWUL	9	Integer	Optional
extendedMaxRequestedBWDL	10	Integer	Optional
extendedGBRUL	11	Integer	Optional
extendedGBRDL	12	Integer	Optional
extendedAPNAMBRUL	13	Integer	Optional

Field Name	Value	Format	Category
extendedAPNAMBRDL	14	Integer	Optional

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_COMMON_APPLICATION 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
- serviceIdledOut (6), IP flow idle out, DCCA QHT expiry
- reserved (7), old: QCTexpiry is no report event
- configurationChange (8), configuration change
- serviceStop (9), IP flow termination
- dCCATimeThresholdReached (10), DCCA quota reauth.
- dCCAVolumeThresholdReached (11), DCCA quota reauth.

- dCCAServiceSpecificUnitThresholdReached (12), DCCA quota reauth.
- dCCATimeExhausted (13), DCCA quota reauth.
- dCCAVolumeExhausted (14), DCCA quota reauth.
- dCCAValidityTimeout (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 reauthorization 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 reauthorization
- 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 CGISAIChange 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 CGISAIChange 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".

Format

Integer

Length

1–5 bytes

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 , custom38 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:

Format Variable	Meaning
n	The first digit is th.e Sessmgr restart counter having a value between 0 and 7.
ddd	The number of the session manager instances generating the CDR.
STRING	This is a configured Node-ID-Suffix having any string between 1 and 16 characters, defined using the **gtpp attribute node-id** 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 **gtpp attribute local-record-sequence-number** is configured.

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

```
Spare '1111'                PDP Type Organization Value
```

PDP Type Organization	Value
ETSI	0
IETF	1

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

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 PMLN Identifier (Mobile Country Code and Mobile Network Code).

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

Format

Sequence

Length

Variable

RAT Type

Holds the value of RAT Type, as provided to S-GW and P-GW, described in TS 29.274 for eGTP case.

RAT Types	Values (Decimal)
<reserved>	0
UTRAN	1
GERAN	2
WLAN	3
GAN	4
HSPA Evolution	5
EUTRAN	6
<spare>	7-255

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.

Field Name	Description	Format	ASN.1 Code
recordExtensions (#19)	ManagementExtensions	SET OF ManagementExtension	0xB3
ManagementExtension	SEQUENCE of RAN Causecode		0x30
identifier	OBJECT IDENTIFIER for RAN cause code	OCTET STRING	0x6
significance	BOOLEAN DEFAULT FALSE	BOOLEAN	0x81
information	SEQUENCE OF CauseInformation	OCTET STRING	0xA2
CauseInformation	SEQUENCE		0x30
msgTimestamp	message TimeStamp	TimeStamp	0x81
msgType	message Type	INTEGER	0x82
msgSourceIp	Source IP Address	IP Address	0x83
msgCause	Cause Code	OCTET STRING	0x84
recordExtensions	ManagementExtensions	SET OF ManagementExtension	0xB3
ManagementExtension	uplink packet count SEQUENCE		0x30
identifier	OBJECT IDENTIFIER for uplink data	OCTET STRING	0x6
significance	BOOLEAN DEFAULT FALSE	BOOLEAN	0x81
information	ANY DEFINED BY identifier		0xA2
identifier value	uplink packet count	INTEGER	0x2
ManagementExtension	downlink packet count SEQUENCE		0x30
identifier	OBJECT IDENTIFIER for downlink data	OCTET STRING	0x6
significance	BOOLEAN DEFAULT FALSE	BOOLEAN	0x81

Field Name	Description	Format	ASN.1 Code
information	ANY DEFINED BY identifier		0xA2
identifier value	downlink packet count	INTEGER	0x2

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: YYMMDDhhmmssShhmm

Format Variable	Meaning	Encoding Format
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 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)

Format

Integer

Length

1 byte

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,

subscriptionIDData [1] UTF8String

}

SubscriptionIDType ::= ENUMERATED

{

END_USER_E164 (0),

END_USER_IMSI (1),

END_USER_SIP_URI (2),

END_USER_NAI (3),

END_USER_PRIVATE (4)

}

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: <= 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

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:

```
-- 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 GGSNPDPRecord 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 orIPv6 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.

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: YYMMDDhhmmssShhmm

Format Variable	Meaning	Encoding Format
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

Format Variable	Meaning	Encoding Format
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 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.

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: YYMMDDhhmmssShhmm

Format Variable	Meaning	Encoding Format
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

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".

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.



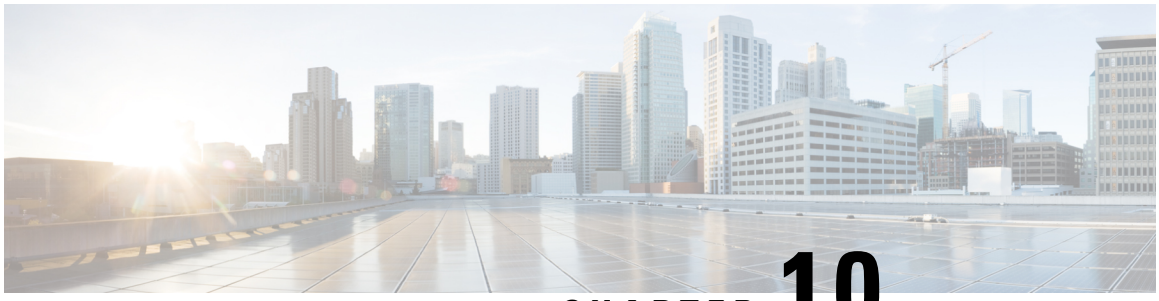
Important This behavior change is applicable to Release 10 GTPP dictionaries for P-GW.

Format

Octet string

Length

6–13 bytes



CHAPTER 10

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 30: Dictionary Table Key 6

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be present in a CDR if certain conditions are met.
OM	Operator Provisionable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.

Abbreviation	Meaning	Description
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.
A	Added in Charging Gateway	A field included in the Charging Gateway.

- CDR Fields Supported in S-CDRs, on page 368
- CDR Fields Supported in S-SMO-CDRs, on page 434
- CDR Fields Supported in S-SMT-CDRs, on page 436
- CDR Fields Supported in M-CDR, on page 438
- CDR Fields Supported in LCS-MT-CDRs, on page 439
- CDR Fields Supported in LCS-MO-CDRs, on page 442

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).

Field	Category	Description
Record Type	M	SGSN PDP context record.
Network Initiated PDP Context	OC	A flag that is present if this is a network-initiated PDP context.
Served IMSI	M	IMSI of the served party.
Served IMEI	OC	The IMEI of the ME, if available.
SGSN Address	OM	The IP address of the current SGSN.
MS Network Capability	OM	The Mobile Station Network Capability.
Routing Area Code (RAC)	OM	RAC at the time of "Record Opening Time".
Location Area Code (LAC)	OM	LAC at the time of "Record Opening Time".
Cell Identifier	OM	Cell identity for GSM or Service Area Code (SAC) for UMTS at the time of "Record Opening Time".

Field	Category	Description
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs.
GGSN Address Used	M	The control plane IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP context.
Access Point Name Network Identifier	OM	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP Type	OM	PDP type, i.e. IP, PPP, IHOSS:OSP.
Served PDP Address	OC	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.
List of Traffic Data Volumes	OM	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.
Record Opening Time	M	Time stamp when PDP context is activated in this SGSN or record opening time on subsequent partial records.
Duration	M	Duration of this record in the SGSN.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for closure of the record from this SGSN.
Diagnostics	OM	A more detailed reason for the release of the connection.

Field	Category	Description
Record Sequence Number	C	Partial record sequence number in this SGSN. Only present in case of partial records.
Node ID	OM	Name of the recording entity.
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	OM	An index indicating how the APN was selected.
Access Point Name Operator Identifier	OM	The Operator Identifier part of the APN.
Served MSISDN	OM	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics applied to the PDP context.
System Type	OC	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.
RNC Unsent Downlink Volume	OC	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.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.

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.

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Record Type	0	M	The field identifies the type of the record.	Integer	1	80
Network initiated PDP context	1	O	This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.	Boolean	1	81
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party.	BCD encoded octet string.	3 - 8	83
Served IMEI	4	O	This field contains the international mobile equipment identity (IMEI) of the equipment served.	BCD encoded octet string. IMEISV will be sent in case if IMEI is not available.	8	84
SGSN Address	5	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	9 - 17	A5

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
SGSN Text IPv4 Address	5-0	M	This field represents the IPv4 text address.	Octet string	7 - 15	82
MS Network Capability	6	O	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.	Octet string	1 - 8	86
Routing Area	7	O	This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located.	Octet string	1	87
Location Area Code	8	O	This field contains the Location Area Code (LAC) of the location area in which the served party is currently located.	Octet string	2	88

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Cell Identifier	9	O	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.	Octet string	2	89
Charging ID	10	M	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.	Octet string	1 - 5	8a
GGSN Address	11	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	9 - 17	AB
GGSN Text IPV4 Address	11-0	M	This field represents the IPv4 text address.	Octet string	7 - 15	82

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Access Point Name Network Identifier	12	M	This field contains the Network Identifier part of the Access Point Name (APN).	IA5 string	1 - 63	8c
PDP Type	13	O	This field defines the PDP type, e.g. IP or PPP	Octet string	2	8d
Served PDP Address	14	O	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.	Choice	11 - 19	ae
Served PDP IP Address	14-0	M	Only the choice of IP Address is supported by the SGSN for the field described above.	Choice	9 - 17	a0
Served PDP IPV4 Text Address	14-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in text coding.	Octet string	7 - 15	82

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
List of Traffic Volumes	15	M		Sequence		af
Change Of Charging Condition	15-0	M	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.	Sequence		30
QoS Requested	15-0-1	O	The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation.	Octet string	4 - 12	81
QoS Negotiated	15-0-2	O	QoS Negotiated indicates the applied QoS accepted by the network.	Octet string	4 - 12	82

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Data Volume GPRS Uplink	15-0-3	M	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.	Integer	1 - 4	83
Data volume GPRS Downlink	15-0-4	M	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.	Integer	1 - 4	84

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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 octet string	6	90
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 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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Local Record Sequence Number	24	O	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** command, the local record sequence number will be incremented for S-CDRs.		1 - 5	98
APN Selection Mode	25	O	This field indicates how the APN was selected.	Enumerated integer	1	99
Access Point Name Operator Identifier	26	M	This field contains the Operator Identifier part of the Access Point Name (APN).	IA5 string	1 - 37	9a

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served MSISDN	27	O	The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.	BCD encoded octet string	1 - 9	9b
Charging Characteristics	28	M	Lists the charging characteristics applied to the PDP context by the SGSN.	Hex value octet string	2	9c
RAT Type	29	O	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.	Integer	1	9d
cAMELInformationPDP	30	O	This field is supported if Ge interface is supported. CLI **gtpp attribute camel-info** needs to be enabled to populate this field.		1 - n	be

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
SCF Address	30-0	O	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.	Address string	1 - 11	81
Service Key	30-1	O	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.	Integer	1 - 5	82
defaultTransactionHandling	30-2	O	This field indicates whether or not a CAMEL encountered a default GPRS-handling or SMS-handling.	Enumerated integer	1	83
cAMELAccessPointNameNI	30-3	O				84
cAMELAccessPointNameOI	30-4	O				85

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
NumberOfDPEncountered	30-5	O	This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements "Level of CAMEL service" field.	Integer	1 - 5	86
Level Of Camel Service	30-6	O	This field describes briefly the complexity of CAMEL invocation.	Bit string	2	87
freeFormatData	30-7	O				88
ffDAppendIndicator	30-8	O				89
RNC Unsent Volume	31	O	This field contains the unsent downlink (from RNC to MS) data volume in bytes.	Integer	1 - 5	9f1f
Charging Characteristics Selection Mode	32	O	This field specifies how the Charging Characteristics was selected	Enumerated integer	1	9f20
Dynamic Address Flag	33	O	This field indicates that the PDP address has been dynamically allocated for that particular PDP context.	Boolean	1	9f21

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
ServedPDP PDN Address Extension	36	O	This field contains the IPv4 address allocated for the PDP context/PDN connection when dual-stack IPv4-IPv6 is used.	Octet string	8	bf2d

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-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
}

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,
changeTime[6]                             TimeStamp
}


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
{
 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..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

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
                 --

END
```

custom8 Dictionary

S-CDR fields in this dictionary are based on 3GPP TS 32.298 v7.4.0 specification.

Field	Category	Description
Record Type	M	SGSN PDP context record.
Network Initiated PDP Context	OC	A flag that is present if this is a network-initiated PDP context.
Served IMSI	M	IMSI of the served party.
Served IMEI	OC	The IMEI of the ME, if available.

Field	Category	Description
SGSN Address	OM	The IP address of the current SGSN.
MS Network Capability	OM	The mobile station Network Capability.
Routing Area Code (RAC)	OM	RAC at the time of "Record Opening Time".
Location Area Code (LAC)	OM	LAC at the time of "Record Opening Time".
Cell Identifier	OM	Cell identity for GSM or Service Area Code (SAC) for UMTS at the time of "Record Opening Time".
Charging ID	M	PDP context identifier used to identify this PDP context in different records created by GSNs.
GGSN Address Used	M	The control plane IP address of the GGSN currently used. The GGSN address is always the same for an activated PDP context.
Access Point Name Network Identifier	OM	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP Type	OM	PDP type, i.e. IP, PPP, IHOSS:OSP.
Served PDP Address	OC	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.
List of Traffic Data Volumes	OM	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.

Field	Category	Description
Record Opening Time	M	Time stamp when PDP context is activated in this SGSN or record opening time on subsequent partial records.
Duration	M	Duration of this record in the SGSN.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for closure of the record from this SGSN.
Diagnostics	OM	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number in this SGSN. Only present in case of partial records.
Node ID	OM	Name of the recording entity.
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	OM	An index indicating how the APN was selected.
Access Point Name Operator Identifier	OM	The Operator Identifier part of the APN.
Served MSISDN	OM	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics applied to the PDP context.
RAT Type	OC	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.

Field	Category	Description
RNC Unsent Downlink Volume	OC	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.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.
Dynamic Address Flag	OC	Indicates whether served PDP address is dynamic, which is allocated during PDP context activation. This field is missing if address is static.

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.

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Record Type	0	M	The field identifies the type of the record.	Integer	1	80
Network initiated PDP context	1	O	This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.	Boolean	1	81

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party.	BCD encoded octet string.	3 - 8	83
Served IMEI	4	O	This field contains the international mobile equipment identity (IMEI) of the equipment served.	BCD encoded octet string. IMEISV will be sent in case if IMEI is not available.	8	84
SGSN Address	5	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	9 - 17	A5
SGSN Binary IPv4 Address	5-0	M	This field represents the IPv4 binary address.	Octet string	7 - 15	82
MS Network Capability	6	O	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.	Octet string	1 - 8	86

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Routing Area	7	O	This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located.	Octet string	1	87
Location Area Code	8	O	This field contains the Location Area Code (LAC) of the location area in which the served party is currently located.	Octet string	2	88
Cell Identifier	9	O	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.	Octet string	2	89

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Charging ID	10	M	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	Octet string	1 - 5	8a
GGSN Address	11	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	9 - 17	AB
GGSN Binary IPV4 Address	11-0	M	This field represents the IPv4 binary address.	Octet string	7 - 15	82
Access Point Name Network Identifier	12	M	This field contains the Network Identifier part of the Access Point Name (APN).	IA5 string	1 - 63	8c
PDP Type	13	O	This field defines the PDP type, e.g. IP or PPP	Octet string	2	8d

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served PDP Address	14	O	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.	Choice	11 - 19	ae
Served PDP IP Address	14-0	M	Only the choice of IP Address is supported by the SGSN for the field described above.	Choice	9 - 17	a0
Served PDP IPV4 Binary Address	14-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in binary coding.	Octet string	7 - 15	82
List of Traffic Volumes	15	M		Sequence		af

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Change Of Charging Condition	15-0	M	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.	Sequence		30
QoS Requested	15-0-1	O	The Quality of Service Requested field contains the QoS desired by the MS at PDP context activation.	Octet string	4 - 12	81
QoS Negotiated	15-0-2	O	QoS Negotiated indicates the applied QoS accepted by the network.	Octet string	4 - 12	82
Data Volume GPRS Uplink	15-0-3	M	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.	Integer	1 - 4	83

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Data volume GPRS Downlink	15-0-4	M	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.	Integer	1 - 4	84
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
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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 octet string	6	90
Record Opening Time	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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Local Record Sequence Number	24	O	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** command, the local record sequence number will be incremented for S-CDRs.		1 - 5	98
APN Selection Mode	25	O	This field indicates how the APN was selected.	Enumerated integer	1	99
Access Point Name Operator Identifier	26	M	This field contains the Operator Identifier part of the Access Point Name (APN).	IA5 string	1 - 37	9a

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served MSISDN	27	O	The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.	BCD encoded octet string	1 - 9	9b
Charging Characteristics	28	M	Lists the charging characteristics applied to the PDP context by the SGSN.	Hex value octet string	2	9c
Rat Type	29	O	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.	Integer	1	9d
cAMELInformationPDP	30	O	This field is supported if Ge interface is supported. CLI **gtpp attribute camel-info** needs to be enabled to populate this field.		1 - n	be

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
SCF Address	30-0	O	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.	Address string	1 - 11	81
Service Key	30-1	O	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.	Integer	1 - 5	82
defaultTransactionHandling	30-2	O	This field indicates whether or not a CAMEL encountered a default GPRS-handling or SMS-handling.	Enumerated integer	1	83
cAMELAccessPointNameNI	30-3	O				84
cAMELAccessPointNameOI	30-4	O				85

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
NumberOfDPEncountered	30-5	O	This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements "Level of CAMEL service" field.	Integer	1 - 5	86
Level Of Camel Service	30-6	O	This field describes briefly the complexity of CAMEL invocation.	Bit string	2	87
freeFormatData	30-7	O				88
fFDAppendIndicator	30-8	O				89
RNC Unsent Volume	31	O	This field contains the unsent downlink (from RNC to MS) data volume in bytes.	Integer	1 - 5	9f1f
Charging Characteristics Selection Mode	32	O	This field specifies how the Charging Characteristics was selected	Enumerated integer	1	9f20
Dynamic Address Flag	33	O	This field indicates that the PDP address has been dynamically allocated for that particular PDP context.	Boolean	1	9f21

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.

```
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
}

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,
 changeTime[6]                                     TimeStamp
}
```

```
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
{
 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..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

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
```

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.

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Record Type	0	M	The field identifies the type of the record.	Integer	1	80
Network initiated PDP context	1	O	This field indicates that the PDP context was network initiated. This field is missing in case of mobile activated PDP context.	Boolean	1	81
Served IMSI	3	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party.	BCD encoded octet string.	3 - 8	83

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served IMEI	4	O	This field contains the international mobile equipment identity (IMEI) of the equipment served.	BCD encoded octet string. IMEISV will be sent in case if IMEI is not available.	8	84
SGSN Address	5	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	6	A5
SGSN Binary IPv4 Address	5-0	M	This field represents the IPv4 binary address.	Octet string	4	80
MS Network Capability	6	O	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.	Octet string	1 - 8	86

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Routing Area	7	O	This field contains the Routing Area Code (RAC) of the routing area in which the served party is currently located.	Octet string	1	87
Location Area Code	8	O	This field contains the Location Area Code (LAC) of the location area in which the served party is currently located.	Octet string	2	88
Cell Identifier	9	O	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.	Octet string	2	89

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Charging ID	10	M	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	Octet string	1 - 5	8a
GGSN Address	11	M	This field provides the current SGSN IP Address for the Control Plane.	Choice	9 - 17	AB
GGSN Binary IPV4 Address	11-0	M	This field represents the IPv4 binary address.	Octet string	7 - 15	80
Access Point Name Network Identifier	12	M	This field contains the Network Identifier part of the Access Point Name (APN).	IA5 string	1 - 63	8c
PDP Type	13	O	This field defines the PDP type, e.g. IP or PPP	Octet string	2	8d

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served PDP Address	14	O	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.	Choice	11 - 19	ae
Served PDP IP Address	14-0	M	Only the choice of IP Address is supported by the SGSN for the field described above.	Choice	9 - 17	a0
Served PDP IPV4 Binary Address	14-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by GGSN in binary coding.	Octet string	7 - 15	80
List of Traffic Volumes	15	M		Sequence		af

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Change Of Charging Condition	15-0	M	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.	Sequence		30
QoS Requested	15-0-1	O	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.	Octet string	4 - 17	81
QoS Negotiated	15-0-2	O	QoS Negotiated indicates the applied QoS accepted by the network. In Rel.9, the QoS length is from 4 bytes to 17 bytes.	Octet string	4 - 17	82

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Data Volume GPRS Uplink	15-0-3	OC	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. **Important** This attribute will not be sent for Direct Tunnel (DT) sessions.	Integer	1 - 4	83

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Data volume GPRS Downlink	15-0-4	OC	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. **Important** This attribute will not be sent for Direct Tunnel (DT) sessions.	Integer	1 - 4	84
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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.	BCD encoded octet string	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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
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
Local Record Sequence Number	24	O	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 central-node-id** the local record sequence number will be incremented for S-CDRs.	Octet string	1 - 5	98
APN Selection Mode	25	O	This field indicates how the APN was selected.	Enumerated integer	1	99

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Access Point Name Operator Identifier	26	M	This field contains the Operator Identifier part of the Access Point Name (APN).	IA5 string	1 - 37	9a
Served MSISDN	27	O	The field tracks the Mobile Station (MS) ISDN number (MSISDN) of the subscriber which is transparently copied from the Create PDP Context Request message.	BCD encoded octet string	1 - 9	9b
Charging Characteristics	28	M	Lists the charging characteristics applied to the PDP context by the SGSN.	Hex value octet string	2	9c
Rat Type	29	O	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station.	Integer	1	9d
cAMELInformationPDP	30	O	This field is supported if Ge interface is supported. CLI **gtpp attribute camel-info** needs to be enabled to populate this field.		1 - n	be

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
SCF Address	30-0	O	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.	Address string	1 - 11	81
Service Key	30-1	O	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.	Integer	1 - 5	82

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
defaultGPRS-Handling	30-2	O	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.	Enumerated integer	1	83
cAMELAccessPointNameNI	30-3	O				84
cAMELAccessPointNameOI	30-4	O				85
NumberOfDPEncountered	30-5	O	This field indicates how many armed CAMEL detection points (TDP and EDP) were encountered and complements "Level of CAMEL service" field.	Integer	1 - 5	86
Level Of Camel Service	30-6	O	This field describes briefly the complexity of CAMEL invocation.	Bit string	2	87
freeFormatData	30-7	O				88

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
fFDAppendIndicator	30-8	O				89
RNC Unsent Volume	31	O	This field contains the unsent downlink (from RNC to MS) data volume in bytes.	Integer	1 - 5	9f1f
Charging Characteristics Selection Mode	32	O	This field specifies how the Charging Characteristics was selected	Enumerated integer	1	9f20
Dynamic Address Flag	33	O	This field indicates that the PDP address has been dynamically allocated for that particular PDP context.	Boolean	1	9f21
MSUnauthenticatedFlag	34	O		Null	0	9f22
userCSGInformation	35	O			N/A	9f23

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Served PDP PDN Address Extension	36	O	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 adress is included in Served PDP Address or Served PDP/PDN Address. This field is missing if the PDP/PDN address is IPv4 or IPv6.			bf24
PDP IP Address	36-0	M	This field contains the IP address for the PDP context.	Choice	6 (IPV4)	0xa0
PDP IPv4 Binary Address	36-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by of the GGSN in binary coding.	Octet string	4 (IPV4)	0x80

Field Name	Tag Number	Category	Description	Format	Size in byte	ASN1 code
Low Access Priority Indicator	37	O	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.	Null	0	9f25



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", " fFDAppendIndicator", "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.

```
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
}

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,
    servedPDPPDNAddressExt                 [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,
dataVolumeGPRSUplink[3]              DataVolumeGPRS OPTIONAL,
dataVolumeGPRSDownlink[4]           DataVolumeGPRS OPTIONAL,
changeCondition[5]                         ChangeCondition,
changeTime[6]                                  TimeStamp
}


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
{
 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. 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

SCFAddress::= 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)

Field	Category	Description
Record Type	M	SGSN Mobile Originated SMS.
Served IMSI	M	The IMSI of the subscriber.
Served IMEI	OC	The IMEI of the ME, if available.
Served MSISDN	OM	The primary MSISDN of the subscriber.
MS Network Capability	OM	The mobile station network capability.
Service Centre	OM	The address (E.164) of the SMS-service centre.
Recording Entity	OM	The E.164 number of the SGSN.
Location Area Code	OM	The Location Area Code from which the message originated.
Routing Area Code	OM	The Routing Area Code from which the message originated.
Cell Identifier	OM	The Cell Identity for GSM or Service Area Code (SAC) for UMTS from which the message originated.
Message Reference	M	A reference provided by the MS uniquely identifying this message.
Event Time Stamp	M	The time at which the message was received by the SGSN from the subscriber.
SMS Result	C	The result of the attempted delivery if unsuccessful.
Record Extensions	OC	A set of network operator/ manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Node ID	OM	Name of the recording entity.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.

Field	Category	Description
Charging Characteristics	M	The Charging Characteristics flag set used by the SGSN.
System Type	OC	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.
Destination Number	OM	The destination short message subscriber number.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.



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).

Field	Category	Description
Record Type	M	SGSN Mobile Terminated SMS.
Served IMSI	M	The IMSI of the subscriber.
Served IMEI	OC	The IMEI of the ME, if available.
Served MSISDN	OM	The primary MSISDN of the subscriber.
MS Network Capability	OM	The mobile station network capability.
Service Centre	OM	The address (E.164) of the SMS-service centre.
Recording Entity	OM	The E.164 number of the SGSN.

Field	Category	Description
Location Area Code	OM	The Location Area Code to which the message was delivered.
Routing Area Code	OM	The Routing Area Code to which the message was delivered.
Cell Identifier	OM	The Cell Identity for GSM or Service Area Code (SAC) for UMTS to which the message was delivered.
Event Time Stamp	M	Delivery time stamp, time at which message was sent to the MS by the SGSN.
SMS Result	C	The result of the attempted delivery if unsuccessful.
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Node ID	OM	Name of the recording entity.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Charging Characteristics	M	The Charging Characteristics flag set used by the SGSN.
System Type	OC	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.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.

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).

Field	Category	Description
Record Type	M	SGSN mobility management record.
Served IMSI	M	IMSI of the MS.
Served IMEI	OC	The IMEI of the ME, if available.
SGSN Address	OM	The IP address of the current SGSN.
MS Network Capability	OM	The mobile station network capability.
Routing Area Code	OM	Routing Area at the time of the Record Opening Time.
Local Area Code	OM	Location Area Code at the time of Record Opening Time.
Cell Identifier	OM	The Cell Identity for GSM or Service Area Code (SAC) for UMTS at the time of the Record Opening Time.
Change of Location	OC	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.
Record Opening Time	M	Timestamp when MS is attached to this SGSN or record opening time on following partial record.
Duration	OM	Duration of this record.
SGSN Change	C	Present if this is first record after SGSN change.
Cause for Record Closing	M	The reason for the closure of the record in this SGSN.

Field	Category	Description
Diagnostics	OM	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number in this SGSN; only present in case of partial records.
Node ID	OM	Name of the recording entity.
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Served MSISDN	OM	The primary MSISDN of the subscriber.
Charging Characteristics	M	The Charging Characteristics used by the SGSN.
System Type	OC	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.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.

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).

Field	Category	Description
Record Type	M	SGSN Mobile Terminated LCS.

Field	Category	Description
Recording Entity	M	The E.164 number of the SGSN.
LCS Client Type	M	The type of the LCS client that invoked the Location Request (LR).
LCS Client Identity	M	This field contains additional identification information of the LCS Client.
Served IMSI	M	The IMSI of the subscriber.
Served MSISDN	OM	The primary MSISDN of the subscriber.
SGSN Address	OM	The IP address of the current SGSN.
Location Type	M	The type of the estimated location.
LCS QoS	C	Quality of Service for a location request.
LCS Priority	C	Priority of the location request.
MLC Number	M	The ISDN (E.164) number of the requesting GMLC.
Event Time stamp	M	The time at which the Perform_Location_Request is sent by the SGSN.
Measurement Duration	OM	The duration of processing the location request.
Notification To MS User	C	The privacy notification to MS user that was applicable when the LR was invoked.
Privacy Override	C	This parameter indicates the override MS privacy by the LCS client.
Location	OM	The Location Area Code (LAC) and Cell Identity (CI) when the location request is received.
Routing Area Code	OM	The Routing Area Code to which the LCS terminated.

Field	Category	Description
Location Estimate	OC	An estimate of a geographic location of the subscriber if the subscriber is contained in a geographic position and the location request is successful.
Positioning Data	C	This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS.
LCS Cause	OC	This parameter provides the reason for an unsuccessful location request.
Cause for Record Closing	M	The reason for closure of the record from this SGSN.
Node ID	OM	Name of the recording entity.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Charging Characteristics	M	The Charging Characteristics flag set used by the SGSN.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.
RAT Type	OC	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.

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

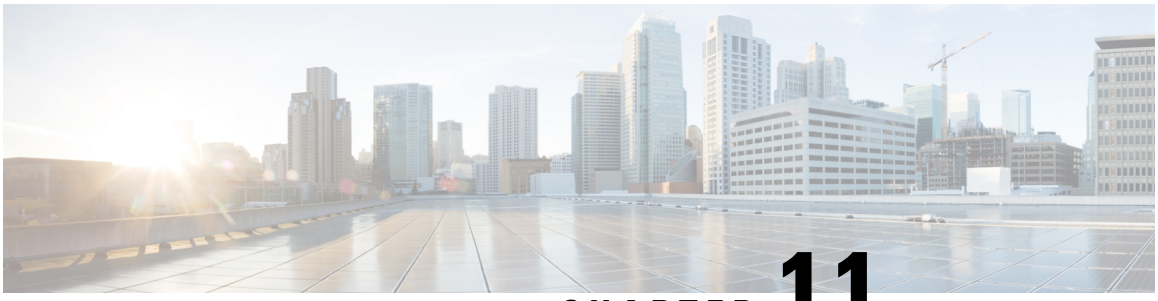
For TS 32.298 v8.7.0 (R8) / TS 29.002 v8.7.0 (R8).

Field	Category	Description
Record Type	M	SGSN Mobile Originated LCS.
Recording Entity	M	The E.164 number of the SGSN.
LCS Client Type	C	The type of the LCS client that invoked the Location Request (LR).
LCS Client Identity	C	This field contains additional identification information of the LCS Client.
Served IMSI	M	The IMSI of the subscriber.
Served MSISDN	OM	The primary MSISDN of the subscriber.
SGSN Address	OM	The IP address of the current SGSN.
Location Method	M	The type of the location request.
LCS QoS	C	Quality of Service for a location request.
LCS Priority	OC	Priority of the location request.
MLC Number	M	The ISDN (E.164) number of the requesting GMLC.
Event Time stamp	M	The time at which the Perform_Location_Request is sent by the SGSN.
Measurement Duration	OM	The duration of processing the location request.
Location	OM	The Location Area Code (LAC) and Cell Identity (CI) when the location request is received.
Routing Area Code	OM	The Routing Area Code to which the LCS originated.

Field	Category	Description
Location Estimate	OC	An estimate of a geographic location of the subscriber if the subscriber is contained in a geographic position and the location request is successful.
Positioning Data	C	This parameter provides positioning data associated with a successful or unsuccessful location attempt for a target MS.
LCS Cause	OC	This parameter provides the reason for an unsuccessful location request.
Cause for Record Closing	M	The reason for closure of the record from this SGSN.
Node ID	OM	Name of the recording entity.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
Charging Characteristics	M	The Charging Characteristics flag set used by the SGSN.
Charging Characteristics Selection Mode	OM	Holds information about how Charging Characteristics were selected.
System Type	OC	This field indicates the type of air interface used. 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.

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.



CHAPTER 11

SGSN CDR Field Descriptions

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, on page 446

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.

Format

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.

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.

Format

BCD encoded octet string

Length

6 Bytes

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.

Important This attribute will not be sent for Direct Tunnel (DT) sessions.

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.

Important This attribute will not be sent for Direct Tunnel (DT) sessions.

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.

Format

Enumerated integer

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

Format

Integer

Length

1 Byte

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.

Format

Integer

Length

1–5 Bytes

1–3 Bytes for custom11

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).

Format

Boolean

Length

1 Byte

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.

Format

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.

Format

Null

Length

0 Byte

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.

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 ASR 5500 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 to16 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

Enumeration (Integer) (custom41 only)

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.

Format

Octet String

Length

4-17 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 to4 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.



Important This field is customer specific.

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

Length

8 Bytes

Served IMSI

The International Mobile Subscriber Identity (IMS) 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 **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

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.

Format

Boolean

Length

1 Byte

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 tarrif, etc.



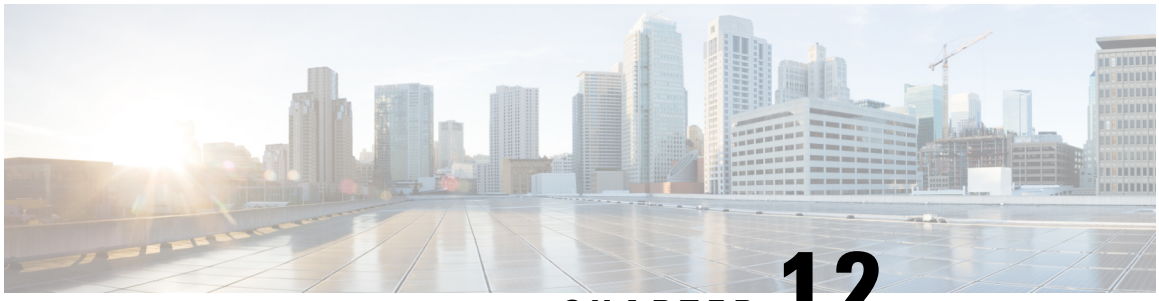
Important This field is introduced only in custom33 GTPP dictionary to address the SGSN and GGSN CDR packet count mismatch issue occurred due to paging failure and queue full in 2G scenario.

Format

Integer

Length

1-5 Bytes



CHAPTER 12

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 16

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be present in a CDR if certain conditions are met.
OM	Operator Provisionable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.

• CDR Fields Supported in SGW-CDRs, on page 471

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.

Field	Category	Description
Record Type	M	S-GW IP CAN bearer record
Served IMSI	M	IMSI of the served party (if Anonymous Access Indicator is FALSE or not supplied)
Served IMEISV	OC	IMEISV of the ME, if available
S-GW Address used	M	The control plane IP address of the S-GW used.
Charging ID	M	IP CAN bearer identifier used to identify this IP CAN bearer in different records created by PCNs
PDN Connection Id	OM	The PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.
Serving Node Address	M	List of serving node control plane IP addresses (e.g. SGSN, MME, etc.) used during this record.
Serving Node Type	M	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.
S-GW Change	OC	Present if this is the first record after S-GW change.
PGW PLMN Identifier	OM	PLMN identifier (MCC MNC) of the P-GW used.
Access Point Name Network Identifier	OM	The logical name of the connected access point to the external packet data network (network identifier part of APN).
PDP/PDN Type	OM	Indicates PDN type (i.e IPv4, IPv6 or IPv4v6).
Served PDP/PDN Address	OC	IP address allocated for the PDP context / PDN connection, i.e. IPv4 or IPv6, if available.

Field	Category	Description
Served PDP/PDN Address Extension	OC	This field holds IPv4 address of the served IMSI, if available, when PDN Type is IPv4v6.
Dynamic Address Flag	OC	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.
List of Traffic Data Volumes	OM	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.
Record Opening Time	M	Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.
MS Time Zone	OC	Contains the MS Time Zone the MS is currently located as defined in TS 29.060, if available.
Duration	M	Duration of this record in the S-GW.
Cause for Record Closing	M	The reason for the release of record from this S-GW.
Diagnostics	OM	A more detailed reason for the release of the connection.
Record Sequence Number	C	Partial record sequence number, only present in case of partial records.
Node ID	OM	Name of the recording entity.

Field	Category	Description
Record Extensions	OC	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.
Local Record Sequence Number	OM	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.
APN Selection Mode	OM	An index indicating how the APN was selected.
Served MSISDN	OM	The primary MSISDN of the subscriber.
User Location Information	OC	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.
Charging Characteristics	M	The Charging Characteristics applied to the IP CAN bearer.
Charging Characteristics Selection Mode	OM	Information about how Charging Characteristics were selected.
IMS Signalling Context	OC	Included if the IM-CN Subsystem Signalling Flag is set. IP CAN bearer is used for IMS signalling.
P-GW Address used	OC	The P-GW IP Address for the Control Plane.
Serving Node PLMN Identifier	OC	Serving node PLMN Identifier (MCC and MNC) used during this record, if available.
RAT Type	OC	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.
Start Time	OC	The time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.

Field	Category	Description
Stop Time	OC	The time when User IP-CAN session is terminated, available in the CDR for the last bearer in an IP-CAN session.
User CSG Information	OC	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.

Notes:

- All IP addresses are in ASCII format.

List of Traffic Data Volumes

Traffic Data Volume	Category	Description
Change Of Charging Condition	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.
Data Volume GPRS Uplink	M	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.

Traffic Data Volume	Category	Description
Data volume GPRS Downlink	M	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.
Change Condition	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.
Change time	M	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.

Traffic Data Volume	Category	Description
User Location Information	OC	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.
EPC Qos Requested	OC	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.

List of Secondary RAT Usage Reports

Traffic Data Volume	Category	Description
List Of RAN Secondary RAT Usage Reports	OC	Includes one or more containers reported from the RAN for a secondary RAT.
RAN Secondary RAT Usage Report	M	Includes one or more containers reported from the RAN for a secondary RAT.
Data Volume Uplink	M	Includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The

Traffic Data Volume	Category	Description
		counting and reporting from RAN of uplink data volumes is optional.
Data Volume Downlink	M	Includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.
RAN Start Time	M	Includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.
Secondary RAT Type	OC	This field contains the RAT type for the secondary RAT.

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

-------------------------------------------------------------------------------
--
--    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
{
    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,
    servedPDPPDNAddress                    [9] PDPAddress OPTIONAL,
    dynamicAddressFlag                       [11] DynamicAddressFlag OPTIONAL,
```

```
    listOfTrafficVolumes                    [12] SEQUENCE OF ChangeOfCharCondition OPTIONAL,

    recordOpeningTime                           [13] TimeStamp,
    duration                                              [14] CallDuration,
    causeForRecClosing                          [15] CauseForRecClosing,
    diagnostics                                       [16] Diagnostics OPTIONAL,
    recordSequenceNumber                      [17] INTEGER OPTIONAL,
    nodeID                                             [18] NodeID OPTIONAL,
    recordExtensions                             [19] ManagementExtensions OPTIONAL,
    localSequenceNumber                       [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode                             [21] APNSelectionMode OPTIONAL,
    servedMSISDN                                    [22] MSISDN OPTIONAL,
    chargingCharacteristics               [23] ChargingCharacteristics,
    chChSelectionMode                           [24] ChChSelectionMode OPTIONAL,
    iMSsignalingContext                       [25] NULL OPTIONAL,
    servingNodePLMNIdentifier           [27] PLMN-Id OPTIONAL,
    servedIMEISV                                    [29] IMEI OPTIONAL,
    rATType                                            [30] RATType OPTIONAL,
    mSTimeZone                                       [31] MSTimeZone OPTIONAL,
    userLocationInformation               [32] OCTET STRING OPTIONAL,
    sGWChange                                       [34] SGWChange OPTIONAL,
    servingNodeType                               [35] SEQUENCE OF ServingNodeType,
    p-GWAddressUsed                               [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier                          [37] PLMN-Id OPTIONAL,
    startTime                                       [38] TimeStamp OPTIONAL,
    stopTime                                          [39] TimeStamp OPTIONAL,
    pDNConnectionID                               [40] ChargingID OPTIONAL,
    servedPDPPDNAddressExt                  [43] PDPAddress OPTIONAL
listOfRANSecondaryRATUsageReports [64] SEQUENCE OF RANSecondaryRATUsageReport OPTIONAL

}
RANSecondaryRATUsageReport ::= SEQUENCE
                --]
{
                dataVolumeUplink               [1] DataVolumeGPRS,
                dataVolumeDownlink             [2] DataVolumeGPRS,
                rANStartTime                   [3] TimeStamp,
                rANEndTime                     [4] TimeStamp,
                secondaryRATType               [5] SecondaryRATType OPTIONAL
}

SecondaryRATType ::= INTEGER
{
                reserved (0),
                nR (1) -- New Radio 5G
}

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 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
     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
        apnAmbrUplink       [7] INTEGER OPTIONAL,
        apnAmbrDownlink       [8] INTEGER OPTIONAL
extendedMaxRequestedBWUL    [9] INTEGER OPTIONAL,
extendedMaxRequestedBWDL    [10] INTEGER OPTIONAL,
extendedGBRUL               [11] INTEGER OPTIONAL,
extendedGBRDL               [12] INTEGER OPTIONAL,
extendedAPNAMBRUL           [13] INTEGER OPTIONAL,
extendedAPNAMBRDL           [14] INTEGER OPTIONAL
}

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))

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
 --

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
{
     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. 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)
}
```

```
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
```

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.

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Record Type	0	M	S-GW IP CAN bearer record.	Integer	1	0x80
Served IMSI	3	M	IMSI of the served party.	BCD encoded octet string	3-8	0x83
S-GW Address	4	M	The control plane IP address of the S-GW used.	Choice	6 (IPv4) or 18 (IPv6)	0xa4
S-GW BINARY IPV4 ADDRESS	4-0	M	The octet string includes the Gn address of the GGSN service in binary coding.	Octet string	4	0x80
S-GW BINARY IPV6 ADDRESS	4-0	M	The octet string included in the field described includes the Gn address of the GGSN service in binary coding.	Octet string	16	0x81

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Charging ID	5	M	IP CAN bearer identifier used to identify IP CAN bearer in different records created by PCNs.	Integer	1-5	0x85
List of Serving Node Address	6	M	List of serving node control plane IP addresses (e.g. SGSN, MME) used during this record.	Sequence	6 to 90	0xa6
Serving Node BINARY IPV4 ADDRESS	6-0	M	The octet string included in the field described above includes the IPv4 address of the MME.	Octet string	4	0x80
Serving Node BINARY IPV6 ADDRESS	6-0	M	The octet string included in the field described above includes the IPV6 address of the MME.	Octet string	16	0x81
Access Point Name Network Identifier	7	M	The logical name of the connected access point to the external packet data network (network identifier part of APN).	IA5 string	1-63	0x87

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDP/PDN Type	8	M	This field indicates PDN type (i.e IPv4, IPv6 or IPv4v6).	Octet string (SIZE(2))	2	0x88
Served PDP/PDN Address	9	M	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.	Choice	8 (IPv4) or 20 (IPv6)	0xa9
PDP IP Address	9-0	M	This field contains the IP address for the PDP context.	Choice	6 (IPv4) or 18 (IPv6)	0xa0
PDP IPV4 Address	9-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by the S-GW in binary coding.	Octet string	4	0x80

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDP IPV6 Address	9-0-0	M	The octet string included in the field described above includes the IPv6 address assigned to the subscriber by the S-GW in binary coding.	Octet string	16	0x81
Dynamic Address Flag	11	O	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.	Boolean	1	0x8b

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
List of Traffic Data Volumes	12	M	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.	Sequence		0xac
Change of charging condition	12-0	M	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.	Sequence		0x30

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Data Volume GPRS Uplink	12-0-3	M	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.	Integer	1-5	0x83

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Data Volume GPRS Downlink	12-0-4	M	The Data Volume GPRS Downlink field is a part of the ChangeOfChaCondition 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.	Integer	1-5	0x84
Change Condition	12-0-5	M	The Change Condition field is part of the ChangeOfChaCondition element in the List of Traffic Volumes. It defines the change in user plane to UE.	Enumerated	1	85 01

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Change Time	12-0-6	M	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.	BCD encoded octet string	9	0x86
User Location Information	12-0-8	O	This field contains the User Location Information.	Octet string	8-33	0x88

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
EPC QoS Information	12-0-9	O	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.	Octet string	18-42	0xa9

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
CP CIoT EPS Optimisation Indicator	12-0-19	O	The CP CIoT EPS Optimisation Indicator field indicates whether Control Plane CIoT EPS optimisation is used for the transfer of the data volume captured by the container. This is included in the Traffic data container only if previous container's change condition is "change in user plane to UE". Note, the CP CIoT EPS Optimisation indicator field in SGW-CDR main level contains the CP CIoT EPS optimisation indicator value when SGW-CDR was opened.	Boolean	1	93 01
QCI	12-9-1	M		Integer	1-5	0x81
Uplink MBR	12-9-2	O		Integer	1-5	0x82
Down link MBR	12-9-3	O		Integer	1-5	0x83
Uplink GBR	12-9-4	O		Integer	1-5	0x84
Down link GBR	12-9-5	O		Integer	1-5	0x85

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
arp	12-9-6	O		Integer	1-5	0x86
APN AMBR Uplink	12-9-7	O		Integer	1-5	0x87
APN AMBR Downlink	12-9-8	O		Integer	1-5	0x88
Extended Maximum Requested BW UL	12-9-9	O		Integer	1-5	0x89
Extended Maximum Requested BW DL	12-9-10	O		Integer	1-5	0x8a
Extended GBR UL	12-9-11	O		Integer	1-5	0x8b
extendedGBRDL	12-9-12	0		Integer	1-5	0x8c
Extended APN AMBR UL	12-9-13	O		Integer	1-5	0x8d
Extended APN AMBR DL	12-9-14	O		Integer	1-5	0x8e
Record Opening Time	13	M	Time stamp when IP CAN bearer is activated in this S-GW or record opening time on subsequent partial records.	BCD encoded octet string	9	0x8d
Duration	14	M	This field contains the duration in seconds for the record.	Integer	1-5	0x8e

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Cause for Record Closing	15	M	This field contains a reason for the closure of the CDR.	Integer	1	0x8f
Diagnostics	16	O	This field is included in the CDR when the bearer context is released and when the option **gtpp attribute diagnostics** is configured.	Choice	3	0xb0
gsm408cause	16-0	M		Integer	1	0x80
Record Sequence Number	17	O	Partial record sequence number, only present in case of partial records.	Integer	1-5	0x91
Node ID	18	O	Name of the recording entity.	IA5 string	5-20	0x92
Record Extensions	19	O	A set of network operator/manufacturer specific extensions to the record. Conditioned upon the existence of an extension.	Sequence	N/A	0xb3

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Local Record Sequence Number	20	O	Consecutive record number created by this node. The number is allocated sequentially including all CDR types.	Integer	1-5	0x94
APN Selection Mode	21	M	An index indicating how the APN was selected.	Enumerated	1	0x95
Served MSISDN	22	M	The primary MSISDN of the subscriber.	Integer	1-9	0x96
Charging Characteristics	23	M	The Charging Characteristics applied to the IP CAN bearer.	Hex Value Octet string	2	0x97
Charging Characteristics Selection Mode	24	O	Holds information about how Charging Characteristics were selected.	Enumerated	1	0x98
IMS Signaling Context	25	O	Included if the IM-CN Subsystem Signalling Flag is set, see [201] IP CAN bearer is used for IMS signalling.	Null	0	0x99

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Serving Node PLMN Identifier	27	O	Serving node PLMN Identifier (MCC and MNC) used during this record, if available.	Octet string	3	0x9b
Served IMEISV	29	O	IMEISV of the ME, if available.	BCD encoded octet string	8	0x9d
RAT Type	30	O	This field indicates the Radio Access Technology (RAT) type currently used by the Mobile Station, when available.	Integer	1	9e
MS Time Zone	31	O	The "Time Zone" IE that the MME may provide to the S-GW during the PDN context activation/modification procedure.	Octet string (SIZE (2))	2	9f1f

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
User Location Information	32	O	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.	Octet string	8-33	9f20
S-GW Change	34	O	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").	Boolean	1	9f22

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
Serving Node Type	35	M	These fields contain one or several serving node types in control plane of S-GW or P-GW, which have been connected during the record. The serving node types listed here map to the serving node addresses listed in the field "Serving node Address" in sequence.	Sequence		bf23
Serving Node Type enum	35-1	M		Sequence: Enumerated		0x0a
P-GW Address Used	36	M	This field is the P-GW IP Address for the Control Plane.	Choice	6 (IPv4) or 18 (IPv6)	bf24
P-GW Binary IPV4 Address	36-0	M	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.	Octet String	4	0x80

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
P-GW Binary IPV6 Address	36-0	M	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.	Octet String	16	0x81
P-GW PLMN Identifier	37	O		Octet string	3	9f25
Start Time	38	O	This field holds the time when User IP-CAN session starts, available in the CDR for the first bearer in an IP-CAN session.	BCD encoded octet string	9	9f26
Stop Time	39	O	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.	BCD encoded octet string	9	9f27

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDN Connection ID	40	O	This field holds the PDN connection (IP-CAN session) identifier to identify different records belonging to same PDN connection.	Integer	1-5	9f28
IMSIUnauthenticatedFlag	41	O	This field indicates the provided served IMSI is not authenticated (emergency bearer service situation).	Null	0	9f29
userCSGInformation	42	O	This field contains the "User CSG Information" status of the user accessing a CSG cell. It comprises CSG ID within the PLMN, Access mode and indication on CSG membership for the user when hybrid access applies, as defined in TS 29.060 for GPRS case, and in TS 29.274 for EPC case.	Sequence		bf2a

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
cSGId	42-0	O	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.	Octet string	4	80
cSGAccessMode	42-1	O	cSGAccessMode will be either CLOSED or HYBRID.	Enumerated	1	81
cSGMembershipIndication	42-2	O	This field provides an indication on CSG membership for the user.	Null	0	82
Served PDP PDN Address Extension	43	O	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.	Choice	8 (IPv4)	bf2b

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
PDP IP Address	43-0	M	This field contains the IP address for the PDP context.	Choice	6 (IPv4)	0xa0
PDP IPV4 Address	43-0-0	M	The octet string included in the field described above includes the IPv4 address assigned to the subscriber by S-GW in binary coding.	Octet String	4 (IPv4)	0x80
lowAccessPriorityIndicator	44	O	This field indicates if the PDN connection has a low priority, i.e. for Machine Type Communication.	Null	0	9f2c

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
dynamicAddressFlagExt	47	O	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.	Boolean	1	9f2f
s-GWIPv6Address	48	O	The control plane IPv6 address, in case of IPv4v6 dual stack, of the S-GW.	Choice	18(IPv6)	bf 30
SGW BINARY IPV6 ADDRESS	48-0	O	The octet string in this field includes the Gn address of the GGSN service in binary coding.	Octet string	16(IPv6)	0x81

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
List of Serving Node IPv6Address	49	O	List of serving node control plane IPv6 addresses, in case of IPv4v6 dual stack, (e.g. S4-SGSN, MME) used during this record.	Sequence	18 to 270	bf31
Serving Node BINARY IPV6 ADDRESS	49-0	M	The octet string in this field includes the IPV6 address of the MME.	Octet string	16(ipv6)	0x81
pGWPv6AddressUsed	50	O	This field is the P-GW IPv6 Address, in case of IPv4v6 dual stack, for the Control Plane.	Choice	18(IPv6)	bf32
PGW BINARY IPV6 ADDRESS	50-0	O	The octet string in this field includes the IPV6 address assigned to the subscriber by of the P-GW in binary coding.	Octet string	16(IPv6)	0x81
lastUserLocation Information	55	O	Indicates the UE's last user location information during bearer deactivation or session release.	Octet string	13	9f39

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
lastMSTimeZone	56	O	Indicates the Latest timezone of UE while bearer deactivation or session release.	Octet string	2	9f3a
CP CIoT EPS Optimisation Indicator	59	O	The dCIoTEPSOptimisationIndicator field indicates whether Control Plane CIoT EPS optimisation is used by the PDN connection during data transfer with the UE (that is, Control Plane NAS PDU viaS11-U between S-GW and MME) or not (that is, User Plane via S1-U between S-GW and eNB).	Boolean	1	9f3b

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
UNI PDU CP Only Flag	60	O	The uNIPDUCPOnlyFlag field indicates whether this PDN connection is applied with "Control Plane Only flag", that is, transferred using Control Plane NAS PDUs only, when Control Plane CIoT EPS Optimisation is enabled. This field is not flagged when both user plane and control plane UNI for PDU transfer (that is, S1-U and S11-U from S-GW) are allowed, when Control Plane CIoT EPS Optimisation is enabled.	Boolean	1	9f3c
List of RAN Secondary RAT Usage Reports	64	OC	This field includes one or more containers reported from the RAN for a secondary RAT.	Sequence of RAN Secondary RAT Usage Report	Variable	0xbf40

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
RAN Secondary RAT Usage Report	64-0	M	This field includes one or more containers reported from the RAN for a secondary RAT.	Sequence	Variable	0x30
Data Volume Uplink	64-0-1	M	This field includes the number of octets transmitted during the use of the packet data services in the uplink direction reported from RAN. The counting and reporting from RAN of uplink data volumes is optional.	Integer	9	0x81
Data Volume Downlink	64-0-2	M	This field includes the number of octets transmitted during the use of the packet data services in the downlink direction reported from RAN. The counting and reporting from RAN of downlink data volumes is optional.	Integer	9	0x82

Field Name	Tag Number	Category	Description	Format	Size (in bytes)	ASN1 code
RAN Start Time	64-0-3	M	This field is a time stamp, which defines the moment when the volume container is opened by the RAN.	Timestamp	9	0x83
RAN End Time	64-0-4	M	This field is a time stamp, which defines the moment when the volume container is closed by the RAN.	Timestamp	9	0x84
Secondary RAT Type	64-0-5	OC	This field contains the RAT type for the secondary RAT.	Integer	1	0x85
UE Local IP Port Info	253	O	This field includes the S2b user local IP port information.	Sequence	34	0xbf817d
UE Local IP Address	253-0	O	This field includes the UWAN user IP address.	IP Address	32	0xa0
UDP Source Port	253-1	O	This field includes the UWAN user source port.	Integer	2	0x81

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.

```
GPRS-SGW-Charging-DataTypes-REL8 DEFINITIONS IMPLICIT TAGS ::=
BEGIN

-------------------------------------------------------------------------------
--
--    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
{
    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,
    servedPDPPDNAddress                         [9] PDPAddress OPTIONAL,
    dynamicAddressFlag                          [11] DynamicAddressFlag OPTIONAL,
    listOfTrafficVolumes                        [12] SEQUENCE OF ChangeOfCharCondition
OPTIONAL,
    recordOpeningTime                           [13] TimeStamp,
    duration                                    [14] CallDuration,
    causeForRecClosing                          [15] CauseForRecClosing,
    diagnostics                                 [16] Diagnostics OPTIONAL,
    recordSequenceNumber                        [17] INTEGER OPTIONAL,
    nodeID                                      [18] NodeID OPTIONAL,
    recordExtensions                            [19] ManagementExtensions OPTIONAL,
    localSequenceNumber                         [20] LocalSequenceNumber OPTIONAL,
    apnSelectionMode                            [21] APNSelectionMode OPTIONAL,
    servedMSISDN                                [22] MSISDN OPTIONAL,
    chargingCharacteristics                     [23] ChargingCharacteristics,
    chChSelectionMode                           [24] ChChSelectionMode OPTIONAL,
    iMSsignalingContext                         [25] NULL OPTIONAL,
    servingNodePLMNIdentifier                   [27] PLMN-Id OPTIONAL,
    servedIMEISV                                [29] IMEI OPTIONAL,
    rATType                                     [30] RATType OPTIONAL,
    mSTimeZone                                  [31] MSTimeZone OPTIONAL,
    userLocationInformation                     [32] OCTET STRING OPTIONAL,
    sGWChange                                   [34] SGWChange OPTIONAL,
    servingNodeType                             [35] SEQUENCE OF ServingNodeType,
    p-GWAddressUsed                             [36] GSNAddress OPTIONAL,
    p-GWPLMNIdentifier                          [37] PLMN-Id OPTIONAL,
    startTime                                   [38] TimeStamp OPTIONAL,
    stopTime                                    [39] TimeStamp OPTIONAL,
    pDNConnectionID                             [40] ChargingID OPTIONAL,
    servedPDPPDNAddressExt                      [43] PDPAddress OPTIONAL,
    lowAccessPriorityIndicator                  [44] NULL OPTIONAL,
    dynamicAddressFlagExt                       [47] DynamicAddressFlag OPTIONAL,
    s-GWiPv6Address                             [48] GSNAddress OPTIONAL,
    servingNodeiPv6Address                      [49] SEQUENCE OF GSNAddress OPTIONAL,
    p-GWiPv6AddressUsed                         [50] GSNAddress OPTIONAL,
    lastUserLocationInformation                 [55] OCTET STRING OPTIONAL,
    lastMSTimeZone                              [56] MSTimeZone OPTIONAL,
```

```
    cPCIoTEPSOptimisationIndicator             [59] BOOLEAN OPTIONAL,
    uNIPDUCPOnlyFlag                           [60] BOOLEAN OPTIONAL,
    listOfRANSecondaryRATUsageReports          [64] SEQUENCE OF RANSecondaryRATUsageReport
 OPTIONAL,
    uELocalIPAddressPort                      [253] SEQUENCE OF UELocalIPPortInfo 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 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
     apnAmbrChange                          (50)     -- apn-ambr change

}


ChangeOfCharCondition ::= SEQUENCE
{
        --
        -- qosRequested and qosNegotiated are used in S-CDR only
        -- ePCQoSInformation used in SGW-CDR,PGW-CDR, IPE-CDR, TWAG-CDR and ePDG-CDR only
        -- userLocationInformation is used only in S-CDR, SGW-CDR and PGW-CDR
        -- chargingID used in PGW-CDR only when Charging per IP-CAN session is active
        -- accessAvailabilityChangeReason and relatedChangeOfCharCondition applicable only
 in PGW-CDR
        -- cPCIoTOptimisationIndicator is used in SGW-CDR only
        --
        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,
        userCSGInformation              [12] UserCSGInformation OPTIONAL,
        diagnostics                     [13] Diagnostics OPTIONAL,
        rATType                         [15] RATType OPTIONAL,
        uWANUserLocationInformation     [17] UWANUserLocationInfo OPTIONAL,
        cPCIoTEPSOptimisationIndicator [19] CPCIoTEPSOptimisationIndicator 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,
     apnAmbrUplink                 [7] INTEGER OPTIONAL,
     apnAmbrDownlink               [8] INTEGER OPTIONAL,
     extendedMaxRequestedBWUL      [9] INTEGER OPTIONAL,
     extendedMaxRequestedBWDL      [10] INTEGER OPTIONAL,
     extendedGBRUL                 [11] INTEGER OPTIONAL,
     extendedGBRDL                 [12] INTEGER OPTIONAL,
     extendedAPNAMBRUL             [13] INTEGER OPTIONAL ,
     extendedAPNAMBRDL             [14] INTEGER OPTIONAL
}

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


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
 --

RANSecondaryRATUsageReport ::= SEQUENCE
                -- ]
{
                dataVolumeUplink               [1] DataVolumeGPRS,
                dataVolumeDownlink             [2] DataVolumeGPRS,
                rANStartTime                   [3] TimeStamp,
                rANEndTime                     [4] TimeStamp,
                secondaryRATType               [5] SecondaryRATType OPTIONAL
}

SecondaryRATType ::= INTEGER
{
                reserved (0),
                nR (1) -- New Radio 5G
}

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.
 --

UWANUserLocationInfo ::= SEQUENCE
{
     uELocalIPAddress    [0] IPAddress,
     uDPSourcePort       [1] OCTET STRING (SIZE(2)) OPTIONAL,
     sSID               [2] OCTET STRING OPTIONAL,     -- see format in IEEE Std 802.11-2012
 [408]
     bSSID              [3] OCTET STRING OPTIONAL      -- see format in IEEE Std 802.11-2012
 [408]
}

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
}

CPCIoTEPSOptimisationIndicator ::= BOOLEAN

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

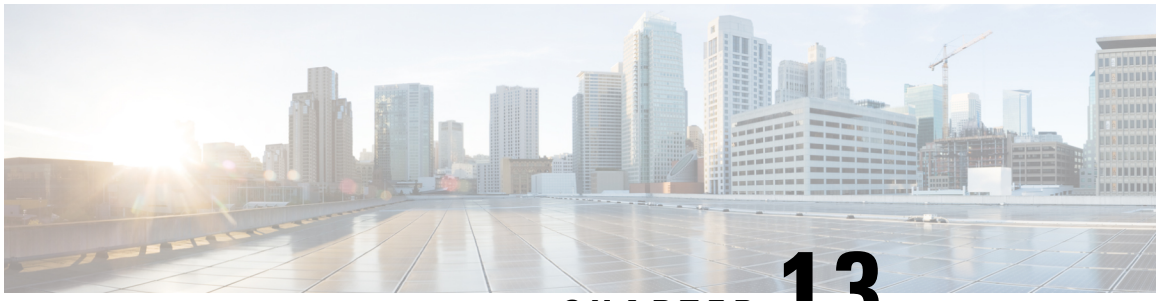

TimeStamp::= OCTET STRING (SIZE(9))
                --
                -- The contents of this field are a compact form of the UTCTime format
                -- containing local time plus an offset to universal time. Binary coded
                -- decimal encoding is employed for the digits to reduce 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
                --

UELocalIPPortInfo   ::= SEQUENCE
{
    --
    -- The S2b user Local IP Port Information
    --
    uELocalIPAddress                          [0] IPAddress OPTIONAL,
    uDPSourcePort                              [1] INTEGER OPTIONAL
}

UELocalIPAddress::= IPAddress
UDPSourcePort           ::= INTEGER
```

```
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 13

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, on page 519

CDR Fields

Access Point Name Network Identifier

This field contain 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)
- LTEServingNodeChange (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 and custom35 dictionaries)

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 (only for GTPP custom34 and custom35 Dictionaries)

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 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:
   a. CGI-SAI Change
   b. RAI Change
   c. TAI Change
   d. 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. 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 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.

QoS Negotiated = QoS1 Data Volume Uplink = 1 Data Volume Downlink = 2 Change Condition = QoS change Time Stamp = TIME1	QoS Negotiated = QoS2 Data Volume Uplink = 5 Data Volume Downlink = 6 Change Condition = Tariff change Time Stamp = TIME2	Data Volume Uplink = 10 Data Volume Downlink = 3 Change Condition = CGI/SAI Change Time Stamp = TIME3	Data Volume Uplink = 3 Data Volume Downlink = 4 User Location Info = CGI2 Change Condition = Tariff Time Change Time Stamp = TIME4	Change Condition = Record closed Time Stamp = TIME5

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 (only for GTPP custom34 and custom35 Dictionaries)

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 (only for custom24 Dictionary)

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
{
        --
        -- 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
        aPNAggregateMaxBitrateUL      [7] INTEGER OPTIONAL
        aPNAggregateMaxBitrateDL      [8] INTEGER OPTIONAL
     extendedMaxRequestedBWUL                [9] INTEGER OPTIONAL,
     extendedMaxRequestedBWDL                [10] INTEGER OPTIONAL,
     extendedGBRUL                           [11] INTEGER OPTIONAL,
     extendedGBRDL                           [12] INTEGER OPTIONAL,
     extendedAPNAMBRUL                       [13] INTEGER OPTIONAL,
     extendedAPNAMBRDL                       [14] INTEGER OPTIONAL

}
```

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.

Format

Octet String

Length

16 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 SGW-CDRs, this field is included only when the command **gtpp attribute local-record-sequence-number** is configured.

Format

Octet String

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 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.

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

This field indicates PDN type (i.e. IPv4, IPv6 or IPv4v6).

For custom24 Dictionary:

-- OCTET 1: PDP Type Organization

```
Spare '1111'          PDP Type Organization Value
```

PDP Type Organization	Value
ETSI	0
IETF	1

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.
```

For custom34 and custom35 Dictionaries:

-- OCTET 1: PDP Type Organization

```
Always 0x01
```

-- OCTET 2: PDP/PDN Type Number

```
IPV4 0x21
IPV6 0x57
IPV4/IPV6 0x8D
```

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.

RAT Types	Values (Decimal)
<reserved>	0
UTRAN	1
GERAN	2
WLAN	3
GAN	4
HSPA Evolution	5
EUTRAN	6
<spare>	7-255

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. 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

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 SV 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: 00H' 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

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 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:

```
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

Length

9 bytes

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.

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

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 is 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.

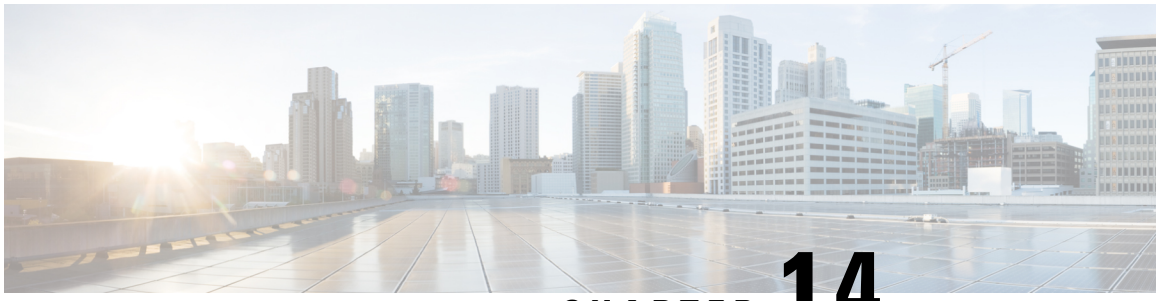
Format

Octet string

Length

6 -34 bytes

Note that the length varies depending on the type of identity.



CHAPTER 14

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 32: Dictionary Table Key 20

Abbreviation	Meaning	Description
M	Mandatory	A field that must be present in the CDR.
C	Conditional	A field that must be in a CDR if certain conditions are met.
OM	Operator Provisonable: Mandatory	A field that an operator has provisioned and must be included in the CDR for all conditions.
OC	Operator Provisionable: Conditional	A field that an operator has provisioned and must be included in the CDR if certain conditions are met.

• CDR Fields Supported in WLAN-CDRs, on page 546

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

Field	Category	Description
Record Type	M	This field identifies the type of record. The 3GPP 32298 does not define any values for record type.
Network Initiated PDP Context	O	This field indicates that the PDP context was network-initiated. This field is missing in case of UE-activated PDP context.
Served IMSI	M	This field contains the International Mobile Subscriber Identity (IMSI) of the served party. The IMSI is formatted in accordance with 3GPP TS 23.003.
PDG Address	M	This field provides the current service PDG IP address for the control plane.
PDG IPv4 Binary Address	M	The octet string in this field includes the IPv4 address of the PDG service in binary coding.
PDG IPv6 Binary Address	M	The octet string in this field includes the IPv6 address of the PDG service in binary coding.
Charging ID	M	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.
Access Point Name Network Identifier	M	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.

Field	Category	Description
PDP Type	O	This field defines the PDG type, IP or PPP.
Served WLAN PDP Address	M	This field contains the PDP address of the served IMSI. The standard 3GPP TS 32.298 allows a choice of either IPAddress or ETSIAddress.
WLAN UE Remote Address	M	This field contains the PDP address of the served IMSI, which is supported only in IPAddress by the PDG.
WLAN UE Remote IPv4 Binary Address	M	The octet string in this field contains the IPv4 address assigned to the subscriber by the PDG/TTG in binary coding.
WLAN UE Remote IPv6 Binary Address	M	The octet string in this field contains the IPv6 address assigned to the subscriber by the PDG/TTG in binary coding.
Dynamic Address Flag	O	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.
List of Traffic Data Volumes	M	This list includes one or more Traffic Data Volume containers. The number of containers is configurable with a maximum of 4 for WLAN-CDRs.

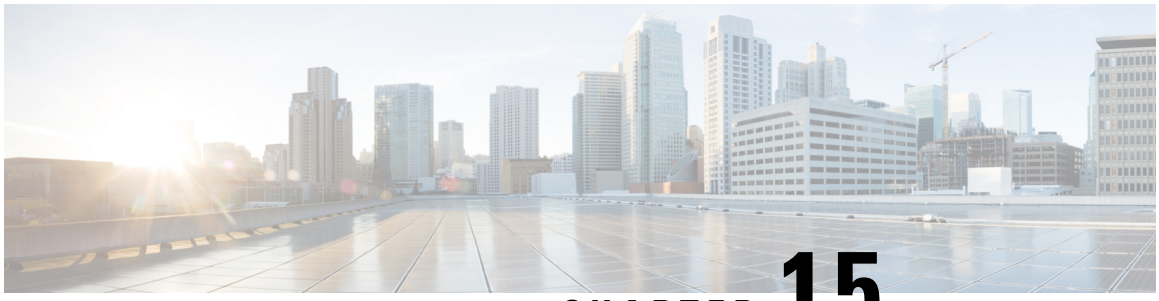
Field	Category	Description
Change of Charging Condition	M	One traffic data volume container contains a list of change of charging conditions: • Data Volume Uplink • Data Volume Downlink • Change Condition • Change Time • Failurehandling Continue The QoS values may only be included in the first container. 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.

Field	Category	Description
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

Field	Category	Description
Diagnostics	O	This field is included in the CDR when the PDP context is released and when the option **gtpp-attribute diagnostics** is configured.
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 sessmgr restart counter having a value between 0 and 7. • ddd: The number of the sessmgr 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	

Field	Category	Description
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
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.

Field	Category	Description
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 15

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, on page 553

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 8503008000-85037FFFFF

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 **gtpp 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 to16 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

Choice

Length

6 bytes

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

Format

Integer

Length

1 byte

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

Format

BCD encoded octet string

Length

9 bytes

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.

Format

Integer

Length

1–5 bytes

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.

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.

Example for Coding: (Set by PDG)

```
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:

```
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

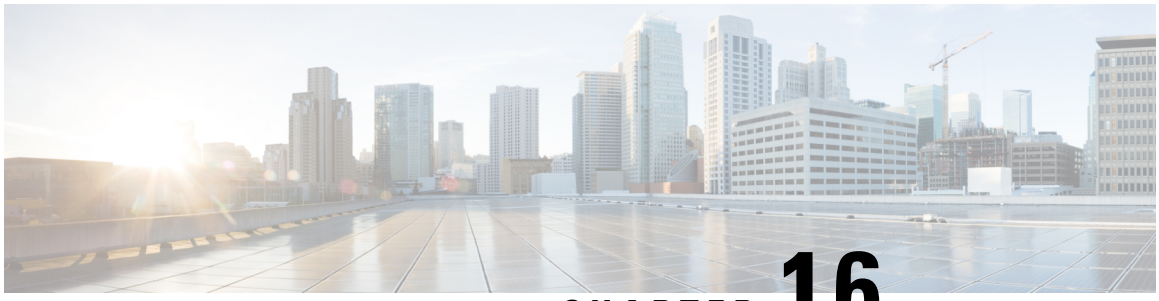
The octet string in this field contains the IPv6 address assigned to the subscriber by the PDG/TTG in binary coding.

Format

Octet string

Length

16 bytes



CHAPTER 16

HDD Storage

This chapter describes the mechanism implemented in the ASR 5500 platform for short term storage of charging records (CDRs) in the event of loss of communication with an external Charging Gateway Function (CGF).

- Overview, on page 567
- Hardware Overview, on page 572
- How HDD Works, on page 572
- Deployment Scenarios, on page 574
- HDD Configuration, on page 575

Overview

The hard disk was introduced in the ASR 5500 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 5500 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 external storage from the chassis, or the chassis can push the xDR files to the external storage using SFTP protocol. In the Push mode, the external storage 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 external storage, and the billing system collects the xDRs form the external storage 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 5500 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 3GPP2 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 5500. 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 5500 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 5500 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), on page 568
- Charging Data Records (CDR), on page 569
- Diameter Records, on page 570
- Event Data Records (EDR), on page 570
- Event Records, on page 570
- Reporting Event Data Records (REDR), on page 571
- Usage Data Records (UDR), on page 571

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 un-configure 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, on page 577 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:

- 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

Diameter Records

The Diameter Records contain CCR messages generated by the Diameter Gy interface. In cases where the Assume-Positive interim-quota is allocated, and CCR-T is not reported/answered, the CCR-T message is written to a local file, and saved in the HDD. This local file and directory information can be fetched and parsed to account for the lost bytes/usage. The retrieval of the file can be done with the PULL mechanism.



Important This feature requires a valid license to be installed prior to configuring this feature. Contact your Cisco account representative for more information on the licensing requirements.



Important Diameter records are supported in 19 and later releases.

When the **diameter hdd** CLI command is configured in the Credit Control Group Configuration mode, the Gy application sends the failed CCR-T messages to the CDR module for storing in the HDD. For more information, see the *Command Line Interface Reference* guide.

Directory Structure: By default, the Diameter records are placed in the following directory path:

- RAM-disk: */records/diameter/*
- HDD: */hd-raid/data/records/diameter/*

Supported Products: HA, P-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 5500.

The HDD functionality takes advantage of the Hard Disk available in the System Management Card (SMC) of the ASR 5500. 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 5500.

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 5500 streams CDRs to the CGF. If the CGF becomes unreachable, the ASR 5500 starts temporarily storing CDRs into the internal hard disk. Once the CGF is up again, the ASR 5500 streams those records stored in its hard disk to the external CGF via GTP protocol. This is called the **streaming** mode of operation.

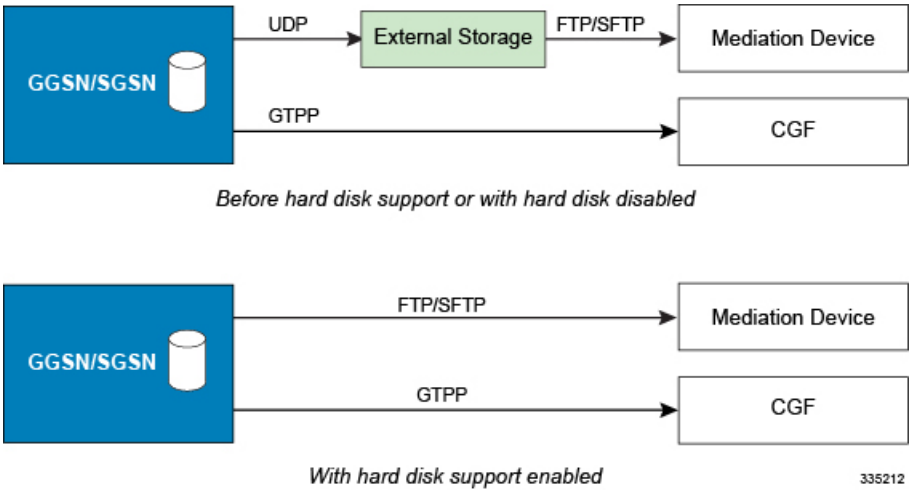
When CDR Internal Storage and Retransmission is configured, the ASR 5500 continuously checks for reachability of configured CGFs. When there is no reply to Echo Requests or responses to signaling messages from the CGF, the ASR 5500 assumes that the CGF is down and starts storing the CDRs into its internal hard disk.



Important Only one CGF server per GTPP group is supported.

This function in the ASR 5500 incorporates partial external storage functionality inside the ASR 5500 gateway. The following diagram depicts the mechanism using external storage (no hard disk configured in the ASR 5500) and using the hard disk.

Figure 5: HDD Mechanism



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 5500 gateway in the following deployment scenarios:

- **CGF configured but not reachable:** The ASR 5500 attempts to stream the CDRs to the configured CGF. If the CGF does not respond to queries from ASR 5500 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 5500 was sending CDRs to CGF (via GTPP) normally. Upon loss of reachability of the CGF, the ASR 5500 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 5500 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, on page 575
- Configuring EDR/UDR Parameters, on page 575
- Configuring CDR Push, on page 577

Configuring HDD

This section describes how to configure the HDD feature.



Important This feature is disabled by default in the ASR 5500.

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 5500:

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

Notes:

- **default**: Returns the GTPP group configuration to the default 'remote' value (the ASR 5500 streams CDRs to the configured external CGF) for the GTPP.
- If **remote** is configured, the ASR 5500 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 5500'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 5500, 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 5500.
- For the **storage-limit** parameter, on the ST16 platform, the total storage limit is 256 MB (268435456 bytes).

  On the ASR 5500, the total storage limit is 512 MB (536870912 bytes). This limit is for both UDR and EDR files combined.
- 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 5500, transfer modes, transfer interval, and so on.



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-namepattern name_pattern |
purge-interval purge_interval ] | push { encrypted-url encrypted_url | url url
 } [ encrypted-secondary-url encrypted_url | secondary-url url ] [
via-local-context ] | rotation { cdr-count count | time-interval time [
force-filerotation ] | volume mb size } | start-file-seq-num seq_num [
recover-file-seq-num ]
  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.

Important After you configure the **gtpp storage-server local file push** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

- 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*.

Important After you configure **gtpp storage-server local file { compression { gzip | none } }** CLI command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

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.

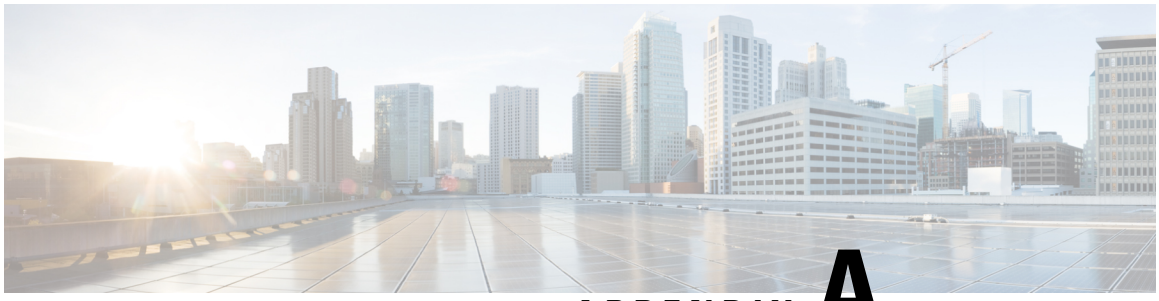
Retrieving CDR Files

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:

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, on page 581
- Switching CDRs from GSS to HDD, on page 584

Switching CDRs from HDD to GSS

This section describes how to switch CDRs from HDD to GSS with:

- LRSN Enabled, on page 581
- LRSN Disabled, on page 582

LRSN Enabled

To switch CDRs from HDD to GSS with LRSN enabled:

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
     gtpp single-source centralized-lrsn-creation
     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
```

Important After you configure the **gtpp single-source centralized-lrsn-creation** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

- If configuring to a specific GTPP group:

```
configure
     gtpp single-source centralized-lrsn-creation
     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
```

Important After you configure the **gtpp single-source centralized-lrsn-creation** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

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, on page 584
- LRSN Disabled, on page 585

LRSN Enabled

To switch CDRs from GSS to HDD with LRSN enabled:



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 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.

Important After you configure the **gtpp single-source centralized-lrsn-creation** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

- If configuring to a specific 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.

Important After you configure the **gtpp single-source centralized-lrsn-creation** command, you must save the configuration and then reload the chassis for the command to take effect. For information on saving the configuration file and reloading the chassis, refer to the *System Administration Guide* for your deployment.

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 *default* GTPP group:

```
configure
     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
     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.