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

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