Ruckus Wireless™
SmartCell Gateway™ 200

Charging Interface Reference Guide for SmartZone 3.4.1

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Contents

About This Guide

This *SmartCell Gateway™ (SCG) 200 Charging Interface Reference Guide* lists all the interface messages used between the SCG and the Charging Gateway Function (CGF) server over a Ga interface. Gateway Function (CGF) server only when the SCG acts a trunk terminating gateway for managing the Ruckus Wireless SmartCell Gateway.

This guide is written for service operators and system administrators who are responsible for managing, configuring, and troubleshooting Ruckus Wireless devices. Consequently, it assumes a basic working knowledge of local area networks, wireless networking, and wireless devices.

NOTE If release notes are shipped with your product and the information there differs from the information in this guide, follow the instructions in the release notes.

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the Ruckus Wireless Support Web site at https://support.ruckuswireless.com/contact-us.

Document Conventions

Table 1 and Table 2 list the text and notice conventions that are used throughout this guide.

Table 1.   Text conventions

Convention	Description	Example
`monospace`	Represents information as it appears on screen	`[Device name]>`
`monospace bold`	Represents information that you enter	`[Device name]> set ipaddr 10.0.0.12`
default font bold	Keyboard keys, software buttons, and field names	On the **Start** menu, click All Programs.
italics	Screen or page names	Click **Advanced Settings**. The *Advanced Settings* page appears.

Table 2.   Notice conventions

Notice Type	Description
NOTE	Information that describes important features or instructions
CAUTION!	Information that alerts you to potential loss of data or potential damage to an application, system, or device
WARNING!	Information that alerts you to potential personal injury

Terminology

Table 3 lists the terms used in this guide.

Table 3.   Terms used in this guide

Terms	Description
AAA	Authentication, Authorization, and Accounting
AVP	Ruckus Vendor specific attribute Pair
BMD	Billing Mediation Device is a network component in a telecommunications network that receives, processes, reformats and sends information to other formats between network elements.
CDF	Charging Data Function
CDR	A formatted collection of information on chargeable events used for accounting and billing. For example, call set-up, call duration and amount of data transferred.
CGF	Charging Gateway Function
CTF	Charging Trigger Function
DRT	Data Record Transfer
Ga	Reference point between a CDF and the CGF for CDR transfer
GGSN	Gateway GPRS Support Node
GTP	GPRS Tunneling Protocol
GTP'	GPRS protocol, used for CDR transport. It is derived from GTP with enhancements to improve transport reliability necessary for CDRs
IMSI	International Mobile Subscriber Identity
IP-CAN	IP Connectivity Access Network
P-GW	Packet Data Network Gateway
PCN	Packet switched Core network Node (SGSN, GGSN, S–GW, P–GW)
PDN	Packet Data Network
S-CDR	SGSN Call Detail Record
SGSN	Serving GPRS Support Node
UI	User Interface
UMTS	Universal Mobile Telecommunications Service
WAG	WiFi Access Gateway
W-CDR	WLAN Call Detail Record

References

Table 4 lists the specifications and standards that are referred to in this guide.

Table 4.   References used in this guide

No.	Title	Description
1	TS 32.295 Release 8	• Charging management • Charging Data Record (CDR) transfer
2	TS 32.252 Release 8	• Charging management • Wireless Local Area Network (WLAN) charging • Description about W-CDR
3	TS 32.251 Release 8	• Charging management • Packet Switched (PS) domain charging. Description about S-CDR
4	TS 32.240 Release 8	• Charging management • Charging architecture and principles
5	TS 32.298 Release 8)	• Charging management • Charging Data Record (CDR) parameter description
6	IETF RFC 768 (1980)	User Datagram Protocol (STD 6)

Legend

Table 5 lists the legend/presence used in this guide.

Table 5.   Legend used

Legend / Presence	Description
M	Mandatory
O	Optional
C	Conditional
O_M	Operator Provisionable - Attributes that operators have provisioned to be included for all conditions
O_C	Operator Provisionable Conditional (OC): Attributes that operators have provisioned to be included in the CDR provided certain conditions are met

Related Documentation

For a complete list of documents that accompany this release, refer to the Release Notes.

Online Training Resources

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- Document title
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- SCG-200 Charging Interface Reference Guide for SmartZone 3.4.1
- Part number: 800-71373-001
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Charging Gateway Function

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This chapter consists:

- Overview
- CGF Interface Description

Overview

This reference guide describe the interface between the SCG-200 and Charging Gateway Function (CGF) server only when the SCG acts as a *trunk terminating gateway*. This guide lists all of the interface messages that are used between the SCG and CGF server (Ga Interface).

NOTE: This guide does not provide design details of the SCG's CDF functionality for the interface requirements.

NOTE: Refer to About This Guide for the conventions used in this guide.

CGF Interface Description

The Ga interface over GTP' (prime) from the SCG to CGF server, delivers the CDR generated at the SCG. The SCG plays the CTF role of collecting the chargeable event information for TTG sessions, i.e., session towards GGSN/PGW. The SCG as Charging Data Function (CDF) constructs the CDR's, builds data transfer request messages and sends it over to the Ga interface (CGF server(s) configured at the SCG) as defined in 3GPP TS 32.295. Generated CDR's are sent to CGF server and or can be stored locally, based on configuration in the SCG user interface. By definition, dealing with CDRs only implies that Ga is solely related to offline charging (as seen in Figure 1).

Figure 1. Offline charging architecture
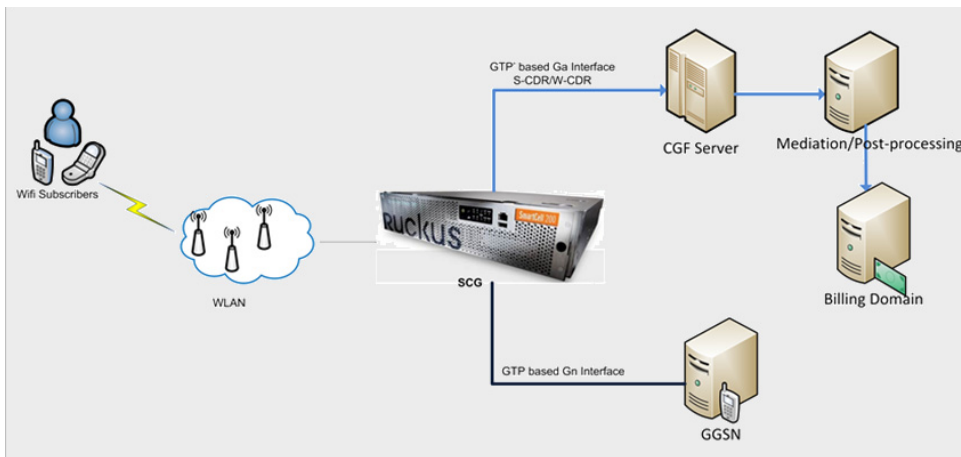
For billing purposes of data services, the SCG together with the hosted AAA server emulates a cellular SGSN. Figure 1 shows the logical deployment of the SCG in a billing domain. The integration enables total reuse of the operator's existing packet billing systems for GPRS/UMTS.

The SCG on the data path measures the user traffic packets (uplink/downlink - per-session). The module in the SCG (TTG control plane) reports these measurements to the SCG hosted AAA server [RAC] using RADIUS accounting messages. The AAA server [RAC] converts the RADIUS accounting records to standard formats of S-CDR (SGSN Call Detail Record) or W-CDR (WLAN Call Detail Record) based on the configuration specified in the user interface.

The SCG can either forward the CDRs directly to CGF(s) and/or store them locally for retrieval by an external system using FTP. On receiving the CDRs from the SCG, the billing domain and BMD determines the layers of charging and charging rules. Charging rules are based on the operator's charging rules, which are logical blocks of offline charging architecture. See Figure 2.

Figure 2. Logical blocks of offline charging architecture
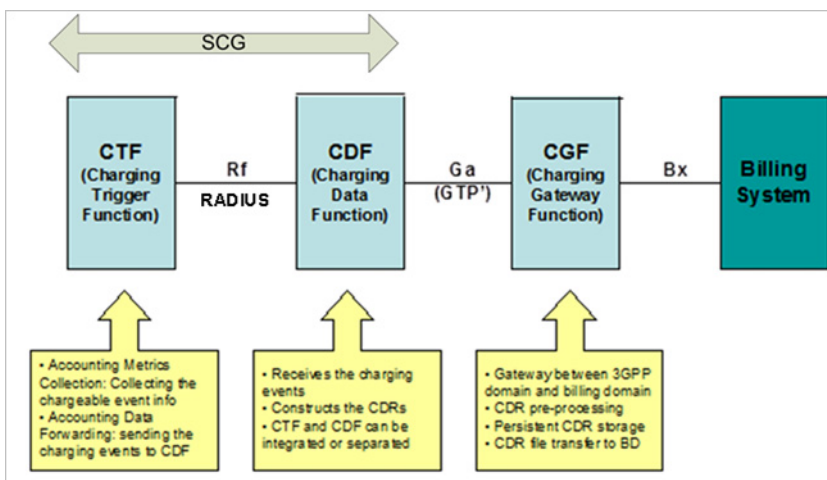
In the data offload solution, SCG plays the CTF (Charging Trigger Function) and CDF (Charging Data Function) in a combined role. As CTF, it collects the chargeable event information including the connecting time and transferred packets and as CDF, it converts the RADIUS accounting information into CDRs. The SCG supports the standard Ga interface based on GTP' for transferring the CDRs to CGF.

The SCG also generates CDR's for accounting messages initiated by AP. For direct IP access session (PDG sessions), the SCG generates W-AN-CDR's for accounting messages initiated from AP, which acts as CDF module.

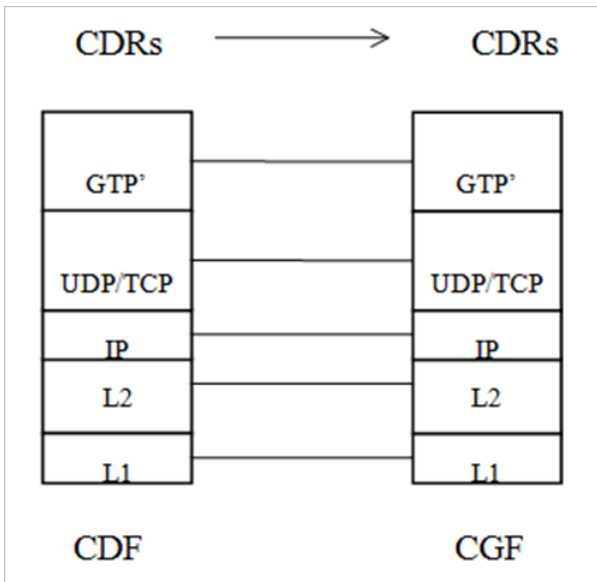# CDR Packet Transfer and Formats

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This chapter contains:

- CDR Transport by GTP'
- Normal CDR Packet Transfer
- CDR Formats

CDR Transport by GTP'

The transport protocol associated to the Ga reference point, provides the function for transferring CDRs from the SCG (CDF) to CGF, which is known as GTP' (TS 29.060). See Figure 3.

Standard UDP port 3386 is used for delivering CDR's to the CGF server. GTP message DRT (Data Record Transfer) request is used for delivering data records to the CGF server.

Figure 3. Stack layer between CDF and CGF

Normal CDR Packet Transfer

CDR generated at the SCG is packed in DRT messages with the packet transfer command having the value - s*end data record packet*. Based on the accounting interim message configuration, the SCG sends CDR's as a DRT message to the CGF server for a given user session. If the accounting interim message interval is not configured, the SCG sends the DRT message after the data session ends, which is an *accounting stop message*.

The CDR receiving entity (CGF) sends a confirmation of receiving the packet to the CDF. The confirmation is sent by using the data record transfer response message, with the cause value *request accepted*.

Figure 4 shows the sequence of successful CDR transfers between the SCG and CGF server.

Figure 4. CDR transfer between the SCG and CGF server
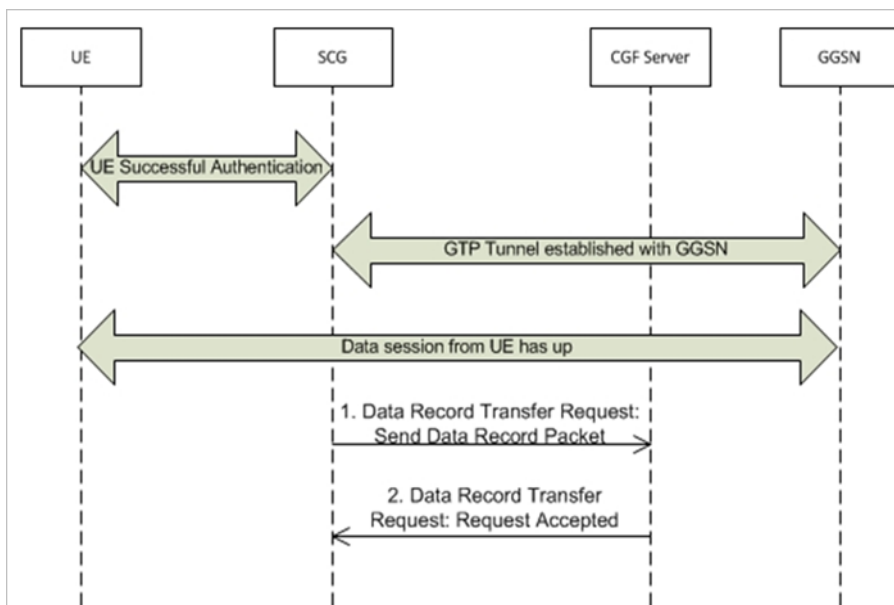
This section covers:

- Data Transfer Request Message
- Data Record Packet IE
- Data Transfer Response Message
- Node Alive Request Message
- Node Alive Response Message
- Redirection Request Message
- Redirection Response Message

NOTE: Reference for the below messages is TS 32.295 Release 8.

Data Transfer Request Message

This message is sent from the SCG to CGF server. This message is used for transmitting CDR(s) to CGF, where CDRs are placed in the data record packet information element. Table 6 lists the message attributes.
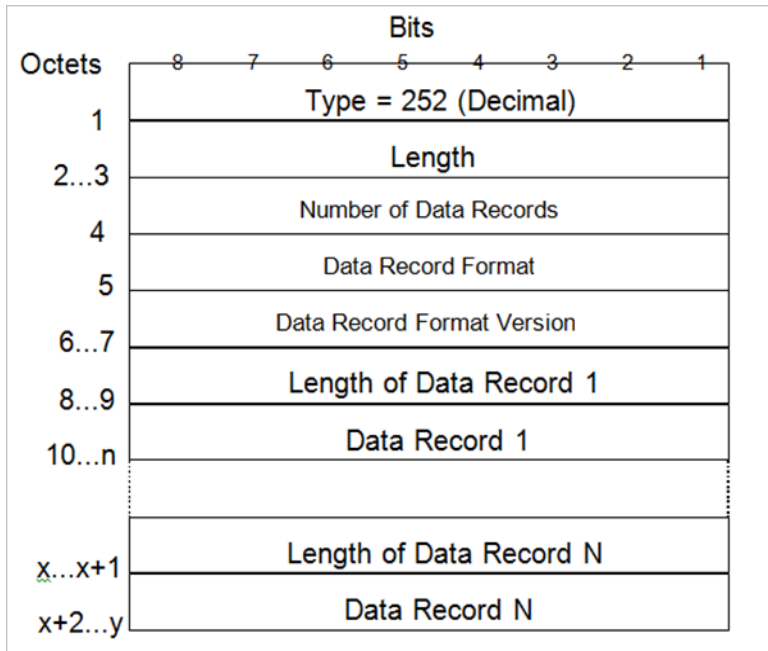
Table 6.   Data transfer request attributes

Attribute	Presence	Type	Description
Packet Transfer Command	M	Variable	This attribute is present in the DTR message sent from the SCG. The value is set to 1 in normal DTR message with CD (*send data record packet*).
Data Record Packet	C	Variable	This attribute is present in the DTR message sent from the SCG. It contains one or more CDR's.
Sequence Numbers of Released Packets	C	NA	Not part of the DTR message sent from the SCG.
Sequence Numbers of Canceled Packets	C	NA	Not part of the DTR message sent from the SCG.
Private Extension	C	NA	Not part of the DTR message sent from the SCG.

Data Record Packet IE

The data record packet IE contains the CDR's generated at the SCG. It can have single or multiple CDR's, based on the user interface configuration specified in the SCG. Figure 5, shows the format of the data record packet.

Figure 5. Data record packet

Data Transfer Response Message

This message is sent from CGF server to the SCG as a response for data record transfer request from the SCG. Table 7 lists the message attributes.

Table 7.   Data transfer response attributes

Attribute	Presence	Type	Description
Cause	M	Variable	This attribute is present in the response messages sent from the CGF. The value is set to 1 for successful responses.
Request Responded	M	Variable	This attribute is present in the response messages sent from the CGF. The value is set to 5 for successful responses.
Private Extension	C	NA	This attribute is not part of the response message sent from CGF.

Node Alive Request Message

This message is sent from CGF server to the SCG or from the SCG to CGF server during a SCG restart. This request message informs that a node in the network has started its service. For example, a node could start its service due to a break down because of software or hardware maintenance or because of an error. Table 8 lists the message attributes.

Table 8.   Node alive request attributes

Attribute	Presence	Type	Description
Node Address	M	IP Address	IP address of the CGF server for CGF initiated messages. IP address of the SCG for SCG initiated messages.
Alternative Node Address	O	IP Address	This attribute is not present in the response message sent from the CGF server.
Private Extension	O	NA	This attribute is not present in the response message sent from the CGF server.

Node Alive Response Message

This message is sent from the SCG to CFG server in response to the received node alive request. Table 9 lists the message attributes.

Table 9.   Node alive response attributes

Attribute	Presence	Type	Description
Private Extension	O	NA	This attribute is not present in the response message sent from the SCG to the CGF server.

Redirection Request Message

This message is sent from the CGF server to the SCG. The CGF server sends this message when it is unable to handle the CDR's from the SCG. Reasons could be maintenance or overload at the CGF server or the next node in the chain (such as the mediator device or a billing computer) has lost its connection to the CGF server. Table 10 lists the message attributes.

Table 10.   Redirection request attributes

Attribute	Presence	Type	Description
Cause	M	Variable	This attribute results in the SCG stops sending CDR's to the CGF server until it receives the CGF server sends an indication of a node alive request. Value ranges from 1-5.
Address of Recommended Node	O	IP address (IPv4)	IP address of the recommended CGF server. A new DRT is sent to this server.
Alternative Address of the Recommended Node	O	IP address (IPv6)	This is an alternate IP address of the recommended CGF server. The SCG does not consider this address.
Private Extension	O	N/A	This attribute may not be present in the received message.

Redirection Response Message

This message is sent from the SCG to the CGF server as a response for redirection request from the CGF server. Table 11 lists the message attributes.

Table 11.   Redirection response attributes

Attribute	Presence	Type	Description
Cause	M	Variable	The SCG sets the cause value to 1 - "*Request Accepted*", provided the IP address of the CGF server is configured in the SCG and is seen in the active state.
Private Extension	O	N/A	This attribute may not be present in the received message.

CDR Formats

3GPP specification defines the WLAN-CDR (TS 32.252 Release 8) and S-CDR (TS 32.251 Release 8), which mentions the optional fields defined by the operator. To support these, the SCG user interface provides these options for generating the CDRs. The operator can select the CDR type to be generated by configuring the SCG UI. Based on the configuration, the SCG includes or excludes these fields when generating W-CDR/S-CDR. This section defines the following types of formats generated by the SCG:

- S-CDR Type
- W-CDR Type
- W-AN-CDR Type

S-CDR Type

Table 12 lists the attributes of S-CDR type generated by the SCG based on 3GPP specification (*TS 32.251*).

Table 12.   S-CDR attributes

Attribute	Presence	Description
Record Type	O_M	SGSN IP-CAN bearer identity.
Served IMSI	O_M	IMSI of the served party.
SGSN Address	O_M	IP address of the current SGSN.
Charging ID	O_M	IP-CAN bearer identifier used in identifying the IP CAN bearer present in various records, created by PCNs.
GGSN Address Used	O_M	The control plane IP address of the P-GW currently used. The P-GW address is always the same for an activated IP CAN bearer.
Access Point Name Network Identifier	O_M	The logical name of the connected access point for external packet data network identifier (part of APN).
PDP Type	O_M	PDP type, which could be: - IP - PPP - IHOSS - OSP

Table 12.   S-CDR attributes (Continued)

Attribute	Presence	Description
Served PDP Address	O_C	PDP address of the served IMSI - IPv4 address or IPv6 prefix. This parameter is present except when the PDP type is PPP and if the dynamic PDP address assignment is used.
List of Traffic Data Volumes	O_M	A list of: • Changes in charging conditions for the IP CAN bearer, where each change is time stamped. • Charging conditions is categorized as per traffic volumes. For example, per tariff period - initial and subsequent changes. • QoS and its corresponding data volumes.
Record Opening Time	O_M	Time stamp when IP CAN bearer is activated in the current SGSN or it is the record opening time of subsequent partial records.
Duration	O_M	Duration of the current record in SGSN.
Cause for Record Closing	O_M	The reason for record closures from the current SGSN.
Diagnostics	O_M	Detailed reason for releasing the connection.
Record Sequence Number	C	Partial record sequence number in the current SGSN. It is present only in case of partial records.
Node ID	O_M	Name of the recording entity.
Local Record Sequence Number	O_M	Consecutive record number created by the current node. The number is allocated sequentially, including all CDR types.
APN Selection Mode	O_M	Index indicating the APN selection.
Access Point Name Operator Identifier	O_M	Operator identifier of the APN.
Served MSISDN	O_M	Primary MSISDN of the subscriber.
Charging Characteristics	O_M	Charging characteristics applied to the IP CAN bearer.

W-CDR Type

Table 13 lists the attributes of W-CDR type generated by the SCG based on 3GPP specifications (TS 32.252 Release 8).

Table 13.   W-CDR attributes

Attribute	Presence	Description
Record Type	M	WLAN PDG record.
Served IMSI	M	IMSI of the served party.
Served MSISDN	O_M	Primary MSISDN of the subscriber.
PDG Address	M	IP address of the PDG used.
Node ID	O_M	Name of the recording entity, which is configured in the user interface of the SCG.
Serving WAG Address	M	Serving WAG address used in the current record.
WAG PLMN ID	O_M	WAG PLMN identifier (MCC and MNC) used in the current record.
Serving AAA/Server/Proxy Address	M	Serving AAA server /proxy address. It is the SCG IP address, which acts as the AAA server.
Charging ID	M	PDG charging identifier for correlating WLAN
WLAN Session ID	M	WLAN session identifier for correlating WLAN generated information to the PDG.
Access Point Name Network ID	O_M	Logical name of the connected access point to the external packet data network identifier, which is part of APN.
Charging Characteristics	M	This attribute is applied to the PDP context.
Charging Characteristics Selection Mode	O_M	This attribute contains information on selection of charging characteristics.
Record Opening Time	M	Time stamp when end-to-end tunnel is activated in the current PDG or it is the record opening time of subsequent partial records.
Duration	M	Duration of the current record in PDG.
Cause for Record Closing	M	The reason for record closure from the current PDG.
Local Record Sequence Number	O_M	Consecutive record number created by the current node. The number is allocated sequentially and includes all CDR types.
Diagnostics	O_M	Detailed reason for releasing the connection.

W-AN-CDR Type

Table 14 lists the attributes of W-AN-CDR type generated by the SCG for PDG sessions. This is based on 3GPP specifications (TS 32.252 V8.1.0 (2011-09).

Table 14.   W-AN_CDR attributes

Attribute	Presence	Description
Record Type	M	WLAN direct IP access CDR.
Served IMSI	M	IMSI to be retrieved from the username.
Operator Name	M	Hotspot operator name as defined in the SCG (accounting profile name).
Charging ID	M	Accounting Session-ID received from AP for AP initiated messages.
NAS Port	C	Attribute value as received in accounting message from AP.
NAS Port ID	C	Attribute value as received in accounting message from AP.
NAS Port Type	C	Attribute value as received in accounting message from AP.
NAS IP Address	C	Attribute value as received in accounting message from AP.
Data Volume Downlink	C	Attribute value as received in accounting message from AP.
Data Volume Uplink	C	Attribute value as received in accounting message from AP.
Record Opening Time	M	Time stamp as received in accounting message from AP.
Duration	M	Duration of the record.
Cause for Record Closing	M	The reason for record closures.
Node ID	O_M	Name of the recording entity.
Local Record Sequence Number	O_M	Consecutive record number created by the current node. The number is allocated sequentially, including all CDR types.

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