Ruckus Wireless™
SmartCell Gateway™ 200

Gn Interface Reference Guide for SmartZone 3.4

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Contents

About This Guide

This *SmartCell Gateway™ (SCG) 200 Gn Interface Reference Guide* lists the interface messages used between the SCG and the Gateway GPRS Serving Node (GGSN).

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

Term	Description
AAA	Authentication, Authorization, and Accounting
EPS	Evolved Packet System
GGSN	Gateway GPRS Support Node
GSN	GPRS Support Node
HLR	Home Location Register
LCS	Location Services

Table 3.   Terms used in this guide

Term	Description
MAP	Mobile Application Part
MSISDN	Mobile Subscriber Integrated Services Digital Network Number
MWSG	Metro Wireless Security Gateway
PDP	Packet Data Protocol
RAC	Radio Access Controller
SCG	Ruckus Wireless Smart Cell Gateway
TEID	Tunnel End Point Identifier
UDP	User Datagram Protocol
UE	User Equipment

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	3GPP TS 23.234	3GPP system to WLAN inter-working
2	3GPP TS 33.234	Wireless Local Area Network (WLAN) inter-working security
3	3GPP TS 29.002	3rd Generation Partnership Project: Mobile Application Part (MAP) specification
4	3GPP TS 29.060	General Packet Radio Service (GPRS): GPRS Tunneling Protocol (GTP) across the Gn and Gp interfaces
5	IETF RFC 791 (1981)	Internet Protocol (STD 5)
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 in this guide

Legend / Presence	Description
M	Mandatory
O	Optional
C	Conditional

Related Documentation

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

Online Training Resources

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When contacting us, please include the following information:

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

For example:

- Ruckus Wireless Administrator Guide for SmartZone 3.4
- Part number: 800-71105-001
- Page 88

Tunnel Management Message

1

This chapter consists of:

- Overview
- Tunnel Management Messages

Overview

The Gn interface is used to control the signal between SCG-200 and GGSN (Gateway GPRS Support Node) as well as for tunneling end user data payload within the backbone network between both the nodes.

GPRS Tunneling Protocol (GTP) transmits user data packets and signaling between SCG and GGSN. GTP encapsulates traffic and creates GTP tunnels, which act as virtual data channels for transmission of packet data between SCG and GGSN. A GTP tunnel is established between SCG and GGSN through a *create PDP context* procedure for a data session initiated from UE.

A GTP tunnel is identified by a pair of IP addresses and a pair of GTP Tunnel End Point Identifiers (TEIDs), where one IP address and TEID is for the SGSN and the other is for the GGSN. TEID is a session identifier used by GTP protocol entities in the SGSN and in the GGSN.

The two TEID are defined each for GTP-C and GTP-U. GTP-U is a tunneling mechanism that provides a service for carrying user data packets. On both planes, a GTP header encapsulates the data package, called GTP Packet Data Unit (G-PDU), and a path implemented by UDP/IP is used as bearer of the GTP traffic. GTP-C is a tunnel control and management protocol and is used to create, modify and delete tunnels.

The SCG supports the following categories of GTP signaling traffic:

- Path management messages - The main purpose of these messages is to supervise an UDP/IP path to ensure that connectivity failure can be detected on time. This is managed by frequently sending GTP echo or echo response packets between the SCG and the GGSN.

- Tunnel management messages - These contain messages that establish, modify and release GTP tunnels.

Figure 1 shows the message flow between the SCG and GGSN for establishing a GTP tunnel.
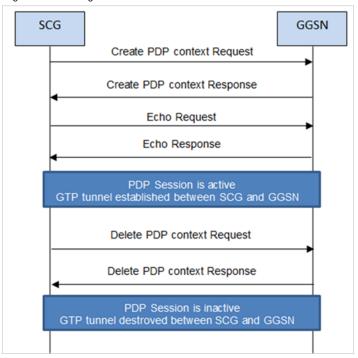
Figure 1. Message flow between SCG and GGSN

Tunnel Management Messages

This section covers the following topics:

- Create PDP Context Request
- Create PDP Context Response
- Update PDP Context Request
- Update PDP Context Response
- Delete PDP Context Request
- Delete PDP Context Response

Create PDP Context Request

These messages are sent from the SCG to the GGSN. Table 6 lists the message attributes.

Table 6.   Create PDP context request attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Common Flags	O	Octet	The common flags information element holds values for multiple bit flags. The SCG sets bit 7 (Upgrade QoS Supported). All other bits are set to zero.
Message Type	M	Integer	Message type value is 16.
Length	M	Integer	Indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. In response, GGSN assigns the TEID value received in TEID-C of the request message. The SCG sends the TEID value as zero in *Create PDP Request.*
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value, which is copied from the request to the response message header.

Table 6.   Create PDP context request attributes (Continued)

Attribute	Presence	Type	Description
N-PDU number	O	Integer	This attribute is used at the inter SGSN routing area update procedure and in the inter-system handover procedures. The SCG sets the value to zero.
IMSI	C	Integer	This attribute is the subscriber identity of the mobile subscriber.
TEID Data I	M	Integer	This indicates the tunnel endpoint identifier for data transmission, which is requested by the receiver of the message flow. The SCG generates TEID for the data plane.
TEID Control Plane	C	Integer	This indicates the tunnel endpoint identifier for the control plane. The SCG generates TEID for the control plane.
NSAPI	M	Integer	For the SCG initiated message, this attribute is a configurable value in flat file. The value ranges from 5-15.
Charging Characteristics	O	Integer	These values are received from the external AAA server or from HLR, based on the configuration specified in the SCG web interface. The default value is set as normal charging, if values are not received.
End User Address	C	Integer	This attribute displays the protocol specific information about the external packet data network accessed by the GPRS subscriber. This attribute is included if it is a primary PDP context activation procedure. In order to get GGSN assigned IP address for the UE, the SCG sets the PDP type organization to IETF(1) and PDP type number to IPv4(0x21). The length is 2 without the PDP address.
Access Point Name	C	DNS format/string	This attribute is included for the primary activation procedure but not for the secondary activation procedure.

Table 6.   Create PDP context request attributes (Continued)

Attribute	Presence	Type	Description
Protocol Configuration	O	Integer	This attribute is used with IP PDP type.
GSN Address	M	Integer	This attribute is the SGSN address used for signaling.
GSN Address	M	Integer	This attribute is the SGSN address use for user traffic.
MSISDN	C	Integer	MS international ISDN numbers (CC + NDC + SN). This attribute is included in the primary PDP context activation procedure but not in the secondary PDP context activation procedure. The SCG receives this value from the external AAA server or from HLR, based on the SCG configuration
Quality of service profile	M	Integer	This attribute specifies the quality of service (QoS) parameters for a PDP context. The SCG receives this value from an external AAA server or from HLR, based on the SCG configuration on the web interface.
RAT Type	O	Integer	This attribute value is always set to 3(IWLAN) in case the messages are initiated by the SCG.
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Create PDP Context Response

These messages are sent by the GGSN to the SCG. Table 7 lists the message attributes.

Table 7.   Create PDP context response attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Message Type	M	Integer	Message type value is 17.
Length	M	Integer	This attribute indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. TEID of control plane is received as a response in the *create PDP context request* message from the SCG.
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value which is copied from the request to the response message header.
N-PDU number	O	Integer	This attribute is used at the inter SGSN routing area update procedure and in the inter-system handover procedures.

Table 7.   Create PDP context response attributes (Continued)

Attribute	Presence	Type	Description
Cause	M	Integer	This attribute indicates the acceptance or the rejection of the corresponding request.
Reordering required	C	Integer	This attribute is ignored by the SCG.
Recovery	O	Integer	This attribute indicates if the peer GSN has restarted.
TEID Data I	M	Integer	This attribute indicates the tunnel endpoint identifier for data transmission, which is requested by the receiver of the message flow.
TEID Control Plane	C	Integer	This attribute indicates the tunnel endpoint identifier for the control plane. This attribute should be present, if the SGSN has not confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer GGSN.
Charging ID	O	Integer	Charging ID value 0 is reserved and will not be assigned by the GGSN. This attribute is used to identify all charging records produced in SGSN(s) and the GGSN for this PDP context. This attribute is generated by the GGSN and is unique within the GGSN. This value is used by SCG in accounting messages towards AAA server.
End User Address	C	Integer	This is address assigned by the GGSN for the user, UE.
Protocol Configuration	O	Integer	This is the primary and secondary DNS server IP address.
GSN Address	M	Integer	This attribute is the GGSN address used for signaling.
GSN Address	M	Integer	This attribute is the GGSN address use for user traffic.
Quality of Service	M	Integer	Quality of Service assigned by the GGSN for the user.

Table 7.   Create PDP context response attributes (Continued)

Attribute	Presence	Type	Description
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Update PDP Context Request

These messages are sent from the GGSN to the SCG or vice versa. In case of a GGSN initiated request, the change in data plane IP address at GGSN handled by the SCG. In case of an SCG initiated request, the change in data plane IP address at the SCG is sent to the GGSN. Table 8 lists the message attributes.

Table 8.   Update PDP context request attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Common Flags	O	Octet	The common flags information element holds values for multiple bit flags. The SCG sets only bit 7 (Upgrade QoS Supported). All other bits are set to zero.
Message Type	M	Integer	Message type value is 18.
Length	M	Integer	This attribute indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity.

Table 8.   Update PDP context request attributes (Continued)

Attribute	Presence	Type	Description
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value, which is copied from the request to the response message header.
N-PDU number	O	Integer	This attribute is used at the inter SGSN routing area update procedure and in the inter-system handover procedures.
IMSI	C	Integer	This attribute is the subscriber identity of the user equipment.
Recovery	O	Integer	This attribute indicates if the peer GSN restarts. The value should be same as the values in the messages received from GGSN. This value is incremented and sent by the SCG when restarted.
TEID Data I	M	Integer	This indicates the tunnel endpoint Identifier for data transmission, which is requested by the receiver of the message flow.
TEID Control Plane	C	Integer	This indicates the tunnel endpoint identifier for the control plane. This attribute should be present, if the SGSN has not confirmed successful assignment of its Tunnel Endpoint Identifier control plane to the peer GGSN.
NSAPI	M	Integer	For the SCG initiated message, this attribute is a configurable value in flat file. The value ranges from 5-15.
Protocol Configuration	O	Integer	This attribute is used with IP PDP type.
GSN Address	M	Integer	This attribute is the SCG address used for signaling.
GSN Address	M	Integer	This attribute is the SCG address use for user traffic.

Table 8.   Update PDP context request attributes (Continued)

Attribute	Presence	Type	Description
Quality of Service	M	Integer	The purpose of the quality of service information element is to specify the QoS parameters for a PDP context.
RAT Type	O	Integer	This attribute value is always set to 3(IWLAN) in case the messages are initiated by the SCG.
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Update PDP Context Response

These messages are sent from the GGSN to the SCG or vice versa. Table 9 lists the message attributes.

Table 9.   Update PDP context response attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Message Type	M	Integer	Message type value is 19
Length	M	Integer	This attribute indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity

Table 9.   Update PDP context response attributes (Continued)

Attribute	Presence	Type	Description
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value, which is copied from the request to the response message header.
N-PDU number	O	Integer	This attribute is used at the inter SGSN routing area update procedure and in the inter-system handover procedures. The SCG sets this value to zero.
IMSI	C	Integer	This attribute is the subscriber identity of the mobile subscriber. The value is set in this attribute for messages sent from SCG to GGSN.
Recovery	O	Integer	This attribute indicates if the peer GSN restarts. The value should equal to the value from the messages received from GGSN. This value is incremented and sent by the SCG in case of a restart.
TEID Data I	M	Integer	This attribute indicates the tunnel endpoint Identifier for data transmission, which is requested by the receiver of the message flow.
TEID Control Plane	C	Integer	This indicates the tunnel endpoint identifier for the control plane. This attribute should be present, if the SGSN has not confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer GGSN.
GSN Address	M	Integer	This attribute is the SCG address used for signaling.
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Delete PDP Context Request

These messages are sent from the SCG to the GGSN or vice versa. Table 10 lists the message attributes.

Table 10. Delete PDP context request attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Message Type	M	Integer	Message type value is 20.
Length	M	Integer	This attribute indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity. It terminates the session of the TEID control plane end point. In case the request messages are initiated by the SCG, the GGSN assigns the TEID value for a given session.
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value, which is copied from the request to the response message header.
Tear down Indicator	C	Integer	This attribute is either: • 0 - No • 1 - Yes

Table 10.   Delete PDP context request attributes (Continued)

Attribute	Presence	Type	Description
NSAPI	M	Integer	For the SCG initiated message, this attribute is a configurable value in the flat file. The value ranges from 5-15 and is included in the create PDP request message.
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Delete PDP Context Response

These messages are sent from the GGSN to the SCG or vice versa. Table 11 lists the message attributes.

Table 11.   Delete PDP context response attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number • N-PDU Number - Value of the N-PDU number
Message Type	M	Integer	Message type value is 21.
Length	M	Integer	This attribute indicates the payload length in octets.
TEID	M	Integer	This attribute identifies a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity.

Table 11.   Delete PDP context response attributes (Continued)

Attribute	Presence	Type	Description
Sequence number	O	Integer	This attribute is used as a transaction identity for signaling messages having a response message defined for a request message. This is the sequence number value, which is copied from the request to the response message header.
Cause	M	Integer	This attribute indicates the acceptance or rejection of the corresponding request.
Error Indication	O	Integer	These messages are sent from the GGSN to the SCG. Table 12 lists the message attribute.

Error Indication

Error indication message is supported by the SCG when it is received at the data path. When an error indication is received for a particular PDP, then the session is cleared on the SCG. Table 12 lists the message attribute.

Table 12.   Error indication

Attribute	Presence	Type	Description
GSN Address	M	Integer	This attribute is the SGSN address used for signaling.

Path Management Messages

2

This chapter consists of:

- Echo Request
- Echo Response

Path management messages supervise an UDP/IP path to ensure connectivity failures are detected on time. This is managed by frequently sending GTP echo or echo response packets between the SCG and the GGSN. This section covers the following topics:

- Echo Request
- Echo Response

Echo Request

These messages are sent from the SCG to GGSN server or from GGSN server to the SCG. Table 13 lists the message attributes.

Table 13. Echo request attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of GTP protocol • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0") • Extension header - Indicates the presence of a meaningful value of the next extension header • Sequence number - Value of the sequence number is set to zero (0). • N-PDU Number - Value of the N-PDU number is set to zero (0).
Message Type	M	Integer	Message type value is 1.
TEID	M	Integer	This attribute value is set to zero (0).

Echo Response

These messages are sent from the SCG to the GGSN server or vice versa. Table 14 lists the message attributes.

Table 14.   Echo response attributes

Attribute	Presence	Type	Description
Flags: • Version • Protocol type • Spare bit • Extension header • Sequence number • N-PDU flag	M	• Version - 1 • PT - GTP (1) • Spare bit- 0 • E - 0 • S - 1 • PN - 0	• Version - Determines the version of the GTP protocol. • Protocol type - Protocol discriminator between GTP (when PT is "1") and GTP' (when PT is "0"). • Extension header - Indicates the presence of a meaningful value of the next extension header. • Sequence number - Value of the sequence number is set to zero (0). • N-PDU Number - Value of the N-PDU number is set to zero (0).
Message Type	M	Integer	Message type value is 2.
Recovery	O	Integer	Indicates if the peer GSN restarts. The value matches the values of the messages received from GGSN.
TEID	M	Integer	This attribute value is set to zero (0).

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