

Presentation of Specification to TSG or WG

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Abstract of document: This is a GTP protocol part for GLR stage3 specifications, which is a delta document to TS 29.060 and includes only description specific to the GLR.

Changes since last presentation to TSG Meeting: This is the first presentation to TSG CN.

Outstanding Issues: No outstanding issue.

Contentious Issues: No contentious issue.

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Technical Specification

3rd Generation Partnership Project; Technical Specification Group Core Network; GPRS Tunnelling Protocol (GTP) specification for GLR

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Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

This TS specifies the signalling requirements and procedures used at network elements related to the Gateway Location Register (GLR) for GPRS Tunnelling Protocol (GTP) within the 3GPP system. (i.e. This TS specifies the delta against TS 29.060.)

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;

- 3 Indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the specification;

1 Scope

This Technical Specification (TS) describes the signalling requirements and procedures used at network elements related to the GLR for GTP within the 3GPP system at the application level.

This TS gives the description of the systems needed only in the network utilising GLR as the delta document against TS 29.060..

2 Normative References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply;
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity);
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] TS 23.060: "General Packet Radio Service (GPRS); Service description Stage2".
- [2] TS 23.abc: "Gateway Location Register (GLR) – stage2".
- [3] TS 24.008: "Mobile radio interface layer 3 specification, Core Network Protocols – Stage 3".
- [4] TS 29.002: "Mobile Application Part (MAP) specification".
- [5] TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp Interface".

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this Technical Specification, the following definitions apply.

Gateway Location Register : This entity handles location management of roaming subscriber in visited network without involving HLR.

Intermediate GSN: This entity is used as serving GSN towards home network and relay some PDU notification messages between serving GSN and Gateway GSN.

MM context: The information sets held in MS and GSNs for a GPRS subscriber related to mobility management (MM).

MM Context ID:	IMSI or equivalent for use in conjunction with Anonymous Access (please refer to section GTP Header).
Path:	The UDP/IP path and TCP/IP path are examples of paths that may be used to multiplex GTP tunnels.
Path Protocol:	The Path Protocol is the protocol(s) used as a bearer of GTP between GSNs.
PDP:	A Packet Data Protocol (PDP) is a network protocol used by an external packet data network interfacing to GPRS.
PDP Context:	The information sets held in MS and GSNs for a PDP address.
Signalling message:	GTP signalling messages are exchanged between GSN pairs in a path. The signalling messages are used to transfer GSN capability information between GSN pairs and to create, update and delete GTP tunnels.
T-PDU:	An original packet, for example an IP datagram, from a MS or a network node in an external packet data network. A T-PDU is the payload that is tunnelled in the GTP tunnel.
TID:	A Tunnel ID (TID) consists of a MM Context ID and a NSAPI.

3.2 Abbreviations

For the purpose of this specification, the following abbreviations apply.

GGSN	Gateway GPRS support node
GLR	Gateway Location Register
GPRS	General Packet Radio Service
GTP	GPRS Tunneling Protocol
IM_GSN	Intermediate GSN
IP	Internet Protocol
GLR	Gateway Location Register
SGSN	Serving GPRS support node
TID	Tunnel Identifier
UDP	User Datagram Protocol

4 General

This section defines the GPRS Tunnelling Protocol (GTP) specific to the network with the GLR, i.e. the protocol between IM_GSN and other nodes (i.e. GGSN, SGSN and GTP-MAP protocol-converting GSN). It includes only the GTP signalling but not data transfer procedures.

The interface between IM_GSM and GGSN is either intra-PLMN interface or inter-PLMN interface.

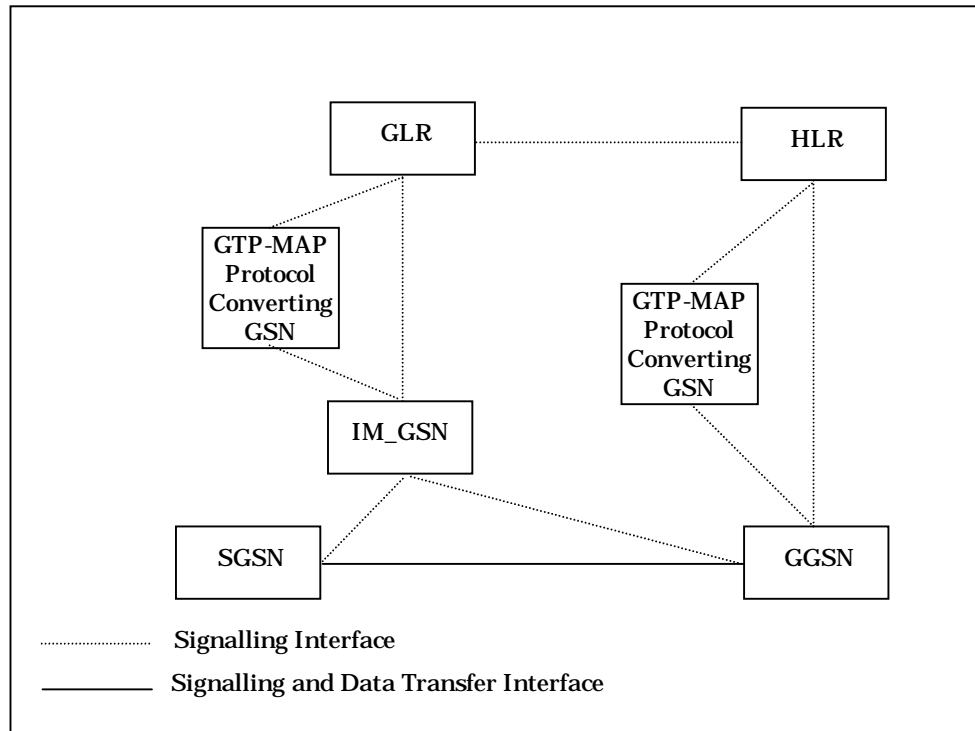


Figure 1: Logical Architecture for PS domain in the network with GLR

The GTP protocol is implemented only by IM_GSNs, SGSNs and GGSNs. No other systems need to be aware of GTP. GPRS MSs are connected to a SGSN without being aware of GTP.

It is assumed that there will be a many-to-many relationship between IM_GSNs, SGSNs and GGSNs. A IM_GSN may provide service to many GGSNs. A SGSN may provide service to many IM_GSNs and GGSNs.

5 Transmission order and bit definitions

Transmission order and bit definitions on the interface between the IM_GSN and other nodes in the network with GLR are the same as that used in the network without the GLR, see TS 29.060.

6 GTP header

The GTP header used on interface between the IM_GSN and other nodes in the network with GLR is the same as that used in the network without the GLR, see TS 29.060.

7 Signalling Plane

The only signalling plane exists between the IM_GSN and other nodes (i.e. GGSN, SGSN and GTP-MAP protocol-converting GSN).

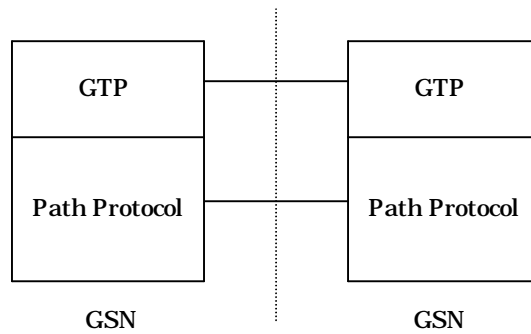


Figure 2: Signalling Plane - Protocol stack

7.1 Signalling protocol

Refer to the corresponding section in TS 29.060.

7.2 Signalling Message Formats

GTP defines a set of signalling messages between two associated GSNs. The signalling messages to be used between the IM_GSN and other nodes are defined in the table below. For the GTP signalling messages to be used on other interfaces see TS 29.060.

Table 1: Signalling messages

Message Type value (Decimal)	Signalling message	Reference
3	Version Not Supported	7.4.3 in TS 29.060
27	PDU Notification Request	7.5.12 in TS 29.060
28	PDU Notification Response	7.5.13 in TS 29.060
29	PDU Notification Reject Request	7.5.14 in TS 29.060
30	PDU Notification Reject Response	7.5.15 in TS 29.060
32	Send Routeing Information for GPRS Request	7.6.1 in TS 29.060
33	Send Routeing Information for GPRS Response	7.6.2 in TS 29.060
34	Failure Report Request	7.6.3 in TS 29.060
35	Failure Report Response	7.6.4 in TS 29.060

7.3 Usage of the GTP Header

For signalling messages the GTP header used in the network with the GLR is the same as that used in the network without the GLR see TS 29.060.

7.4 Path Management messages

The messages, which are listed in following table, are used on the interface between the IM_GSN and other nodes. For the definitions of these messages and other messages used on the other interfaces refer to the corresponding sections in TS 29.060.

Messages	Sending node	Receiving node
Version Not Supported	IM_GSN	GGSN, SGSN

	GGSN, SGSN	IM_GSN
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7.5 Tunnel Management messages

The Tunnel Management messages are the control and management messages, defined in TS 23.060, used to create, update and delete tunnels to be able to route T-PDUs between a MS and an external packet data network via SGSN and GGSN. The GMM/SM messages that may trigger the sending of the Tunnel Management messages are defined in TS 24.008. In following table, only the messages used between the IM_GSN and GGSN and between the IM_GSN and SGSN are listed. For the definitions of these messages and other messages used on the other interfaces refer to the corresponding sections in TS 29.060.

Messages	Sending node	Receiving node
PDU Notification Request	GGSN	IM_GSN
	IM_GSN	SGSN
PDU Notification Response	SGSN	IM_GSN
	IM_GSN	GGSN
PDU Notification Reject	SGSN	IM_GSN
	IM_GSN	GGSN
PDU Notification Reject Response	GGSN	IM_GSN
	IM_GSN	SGSN

7.6 Location Management message

In the network with the GLR, The optional Location Management messages are defined to support the case when Network-Requested PDP Context Activation procedures are used and an IM_GSN does not have a SS7 MAP interface. GTP is then used to transfer signalling messages between the IM_GSN and a GTP-MAP protocol-converting GSN in the GPRS backbone network. The GTP-MAP protocol-converting GSN converts the signalling messages described in this section between GTP and MAP. The MAP messages are sent to and received from the GLR. The GTP-MAP protocol-converting function is described in TS 23.060. The MAP protocol describing the corresponding procedures and messages is described in TS 29.002. This alternative method is illustrated in Figure 3.

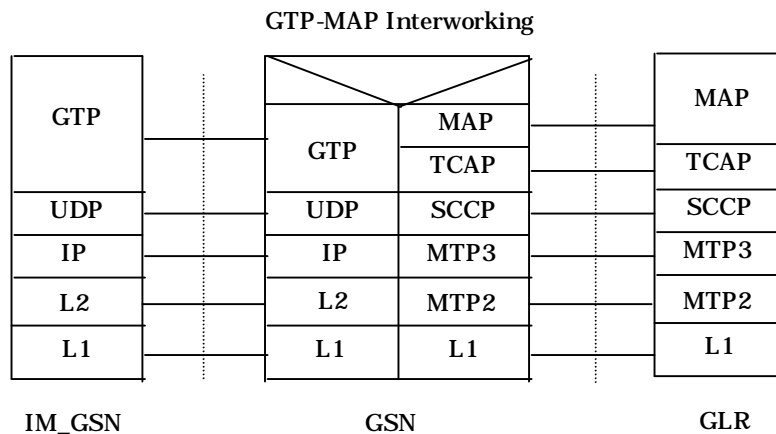


Figure 3: IM_GSN - GLR Signalling via a GTP-MAP protocol-converter in a GSN

In following table, only the messages used between the IM_GSN and The GTP-MAP protocol-converting GSN are listed. For the definitions of these messages and other messages used on the other interfaces refer to the corresponding sections in TS 29.060.

Messages	Sending node	Receiving node
Send Routeing Information for GPRS Request	IM_GSN	GTP-MAP protocol-converting
Send Routeing Information for GPRS Response	GTP-MAP protocol-converting	IM_GSN
Failure Report Request	IM_GSN	GTP-MAP protocol-converting
Failure Report Response	GTP-MAP protocol-converting	IM_GSN

7.7 Mobility Management messages

The messages belonging to the mobility management messages are not used on the interface between the IM_GSN and other nodes in the network with the GLR.

7.8 Reliabe delivery of signalling meessages

For the Reliability mechanism in the IM_GSN, see section 7.8 in TS 29.060.

7.9 Information element

The format of information elements in the message used on the interface between the IM_GSN and other nodes in the network with GLR is the same as that in the network without the GLR. See TS 29.060.

8 Transmission Plane

The definition of transmission plane used in the network with the GLR is the same as that used in the network without the GLR, see in TS 29.060.

9 Path Protocol

The Path Protocol on the interface between the IM_GSN and other nodes in the network with the GLR is the same as that used in the network without the GLR. See TS 29.060.

10 Error handling

The error handling on the interface between the IM_GSN and other nodes is the same as that in the network without the GLR. See TS 29.060. One exception is that the IM_GSN doesn't have a Restart Counter because the IM_GSM stores no PDP and MM context and therefore the synchronization of the status of these with other GSNs isn't needed.

11 Inter-PLMN GTP communication over the Gp Interface

Refer to the corresponding section in TS 29.060.

12 IP, the networking technology used by GTP

Refer to the corresponding section in TS 29.060.

13 GTP parameters

The definitions and directions for use of the parameters in GTP (inc. timer values or counter values and so on) on the interface between the IM_GSN and other nodes is the same as that used in the network without the GLR. See TS 29.060.

History

Document history		
V0.0.1	Oct 1999	The GTP protocol part is separated from MAP protocol part, and new specification related to GTP issue is generated.
V0.1.0	Nov 1999	For approval by N2