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*Technical Specification*

**3rd Generation Partnership Project;
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3GPP Evolved Packet System;
Evolved GPRS Tunnelling Protocol for EPS (GTPv2);
Stage 3
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# Contents

# Foreword

This Technical Specification has been produced by the 3$^{rd}$ Generation Partnership Project (3GPP).

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 the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

    x   the first digit:

        1   presented to TSG for information;

        2   presented to TSG for approval;

        3   or greater 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 document.

# Introduction

*This clause is optional. If it exists, it is always the second unnumbered clause.*

# 1 Scope

The present document specifies the stage 3 of the GPRS Tunnelling Protocol, Version 2 for Evolved Packet System interfaces. GTPv2 has two flavors, a control plane protocol (GTPv2-C) and the user plane protocol (GTPv2-U).

In this document, unless otherwise specified the S5 interface refers always to "GTP-based S5" and S8 interface refers always to "GTP-based S8" interface.

GTPv2-C shall be used across the following signaling interfaces: S3, S4, S5, S8, S10, S11 and S101.

Editor's note: GTP version selection for the user plane (GTPv2-U) interfaces (S1-U, X2, S4, S5, S8 and S12) is FFS.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]     3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]     3GPP TS 23.003: "Numbering, addressing and identification".

[3]     3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[4]     3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[5]     3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[6]     IETF RFC 791 (STD 0005): "Internet Protocol", J. Postel.

[7]     IETF RFC 768 (STD 0006): "User Datagram Protocol", J. Postel.

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

*Definition format*

*<defined term>: <definition>.*

**example:** text used to clarify abstract rules by applying them literally.

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

*Symbol format*

    <symbol>        <Explanation>

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

*Abbreviation format*

    <ACRONYM>  <Explanation>

# 4 General

*To be edited*

## 4.1 GTP Path

*To be edited*

### 4.1.1 GTP Tunnel

GTP tunnels are used between two nodes communicating over a GTP based interface, to separate traffic into different communication flows.

A GTP tunnel is identified in each node with a TEID, an IP address and a UDP port number. The receiving end side of a GTP tunnel locally assigns the TEID value the transmitting side has to use. The TEID values are exchanged between tunnel endpoints using GTP-C or S1-MME messages.

The criteria defining when the same or different GTP tunnels shall be used between to nodes differs between the control and the user plane, and also between interfaces.

For the user plane, for each end-point of a GTP-U tunnel:

- on the X2 interface, the TEID-U is unique per bearer and direction. For bidirectional communication, two different GTP tunnels are used per bearer, one for downlink and one for uplink. On X2, GTP-U tunnels are only used for data forwarding during handover.

- on the S1-U interface, when GTP-U tunnels are used for data forwarding, the same applies as for the X2 interface

Editor's Note: uplink data forwarding for S1-U is still FFS and to be decided at RAN3

- in all other cases, the TEID-U is unique per bearer. The same tunnel is used for downlink and uplink traffic from the same bearer

For the control plane, for each end-point of a GTP-C tunnel:

- The TEID-C is umique per PDN-Connection on GTP based S5 and S8. The same tunnel is shared for the control messages related to all bearers associated to the PDN-Connection

Editor's Note: It is FFS what TEID-C granularity to use on other interfaces.

Editor's Note: It is FFS if GTP-C tunnels per user are required for any interface.

# 4.2 Protocol stack

Protocol stack for GTPv2 is depicted in Figure 4.2.
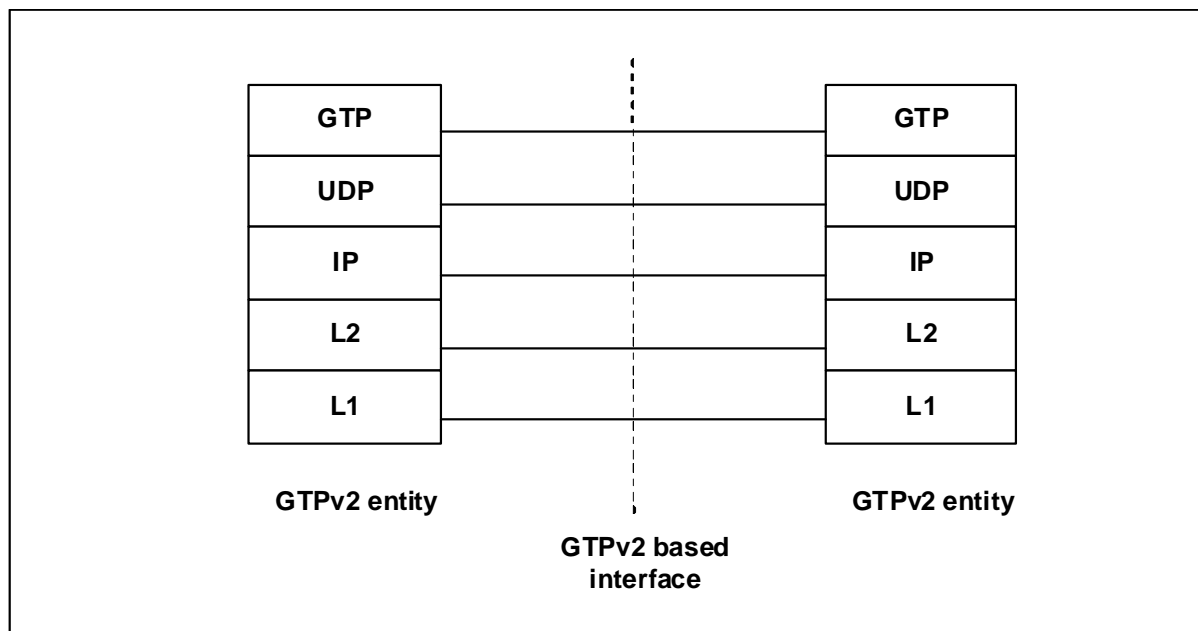


**Figure 4.2: GTPv2 stack**

GTPv2 headers are specified in respective clauses of this specification. A pair of UDP/IP endpoints identify a GTP path.

## 4.2.1 UDP header and port numbers

A User Datagram Protocol (UDP) compliant with RFC 768 [7] shall be used.

### 4.2.1.1 Request Messages

The UDP Destination Port number for GTP-C request messages is 2123. It is the registered port number for GTP-C.

The UDP Destination Port number for GTP-U request messages is 2152. It is the registered port number for GTP-U.

The UDP Source Port is a locally allocated port number at the sending GTP entity.

### 4.2.1.2 Response Messages

The UDP Destination Port value shall be the value of the UDP Source Port of the corresponding request message.

The UDP Source Port shall be the value from the UDP Destination Port of the corresponding request message.

### 4.2.1.3 Encapsulated T-PDUs

The UDP Destination Port number shall be 2152. It is the registered port number for GTP-U.

The UDP Source Port shall be a locally allocated port number at the sending GTP entity.

### 4.2.1.4 Error Indication

The UDP Destination Port number for the Error Indication shall be the UDP source port of the GTP packet that triggered the GTPv2 entity to send this message.

The UDP Source Port number for the Error Indication shall be the UDP destination port of the GTP packet that triggered the GTPv2 entity to send this message.

### 4.2.1.4 Version Not Supported

The UDP Destination Port number for the Version Not Supported shall be the UDP source port of the GTP packet that triggered the GTPv2 entity to send this message.

The UDP Source Port number for the Version Not Supported shall be the UDP destination port of the GTP packet that triggered the GTPv2 entity to send this message.

## 4.2.2 IP header and IP addresses

An Internet Protocol (IP) compliant with RFC 791 [6] shall be used.

### 4.2.2.1 Request Messages

The IP Source Address shall be an IP address of the source GTPv2 entity from which the message is originating.

The IP Destination Address in a GTP request message shall be an IP address of the destination GTPv2 entity.

### 4.2.2.2 Response Messages

The IP Source Address shall be copied from the IP destination address of the GTP request message to which this GTPv2 entity is replying.

The IP Destination Address shall be copied from the IP Source Address of the GTP request message to which this GTPv2 entity is replying.

### 4.2.2.3 Encapsulated T-PDUs

The IP Source Address shall be an IP address of the source GTPv2 entity from which the message is originating.

The IP Destination Address shall be an IP address of the destination GTPv2 entity.

### 4.2.2.4 Error Indication

The IP Source Address for the Error Indication shall be set to the IP destination address of the GTP message that triggered the GTPv2 entity to send this message.

The IP Destination Address for the Error Indication shall be set to the IP source address of the GTP message that triggered the GTPv2 entity to send this message.

### 4.2.2.5 Version Not Supported

The IP Source Address for the Version Not Supported shall be set to the IP destination address of the GTP message that triggered the GTPv2 entity to send this message.

The IP Destination Address for the Version Not Supported shall be set to the IP source address of the GTP message that triggered the GTPv2 entity to send this message.

## 4.2.3 Layer 2

Typically Ethernet will be used as a Layer 2 protocol, but operators may use any other technology.

## 4.2.4 Layer 1

Operators may use any Layer 1 technology.

# 4.3 Transmission Order and Bit Definitions

The messages in this document shall be transmitted in network octet order starting with octet 1.

The most significant bit of an octet in a GTP message is bit 8. If a value in a GTP message spans several octets and nothing else is stated, the most significant bit is bit 8 of the octet with the lowest number.

# 5 GTP Header

## 5.1 General format of GTPv2 header

The GTP header is a variable length header used for both the GTP-C and the GTP-U protocols. The length of GTPv2 header shall be a multiple of 4 octets. The GTP header shall be at least 4 bytes long. Figure 5.1 illustrates the format of the GTPv2 Header.

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Version | | | FFS | T | E | S | FFS |
| 2 | Message Type | | | | | | | |
| 3 | Message Length (1$^{st}$ Octet) | | | | | | | |
| 4 | Message Length (2$^{nd}$ Octet) | | | | | | | |
| 5 - n | These octets are present in the header if either of the T, S or E flags is set to '1'. Therefore, if present the octets contain either a TEID, or a Sequence Number and two spare octets, or an Extension Header(s), or any combination of these. If T flag is set to 1, then TEID shall be placed into octets 5-8. If S flag is set to 1, then SN shall be placed either after the TEID, or if TEID is not present, then into octets 5-6 and shall be followed by two spare octets. An Extension Header shall be placed only after the TEID and/or two spare octets. | | | | | | | |

**Figure 5.1: The format of GTPv2 Header**

Octet 1 of the GTPv2 header shall contain the following fields:

- Bits 6-8 represent the Version field. This field shall be used to determine the version of the GTP protocol. The version number shall be set to binary '010'.

- Bit 2 represents the Sequence number flag (S). S flag shall be used to signal the presence of the GTP Sequence Number field and two spare octets in the GTP header. If S flag is set to 1, then the GTP header is longer than 8 octets and the Sequence Number value shall be inserted into octets 9 and 10 (right after TEID field in octets 4-8). Two spare octets shall follow the Sequence Number field. If S flag is set to 0, then the Sequence Number field and two spare octets shall not be present in the GTP header at all (i.e. the given GTP header could be 8 octets long).

- Bit 3 represents the Extension Header flag (E). E flag shall be used to signal the presence of the GTP Extension Header field in the GTP header. If E flag is set to 1, then the GTP header is longer than 8 octets and the Extension Header value shall be inserted either right after TEID field (if the S flag is set to 0) or right after two spare octets (if the S flag is set to 1). If E flag is set to 0, then the Extension Header field shall not be present in the GTP header at all (i.e. the given GTP header could be 8 octets long).

- Bit 4 represents the TEID flag (T). T flag shall be used to signal the presence of the TEID field in the GTP header. If T flag is set to 0, then the TEID field is not present in the GTP header at all (i.e. the given GTP header may even be 4 octets long). If T flag is set to 1, then the TEID field immediately follows the Length field in octets 5 – 8.

Editor's note: the exact coding of bits 1 and 5 in the Octet 1 is FFS.

The GTP-C and the GTP-U use some of the fields in the GTP header differently. The detailed use of such fields is described in the sections related to GTP-C and to GTP-U.

Octet 2-8 of the GTPv2 header shall contain the following fields:

- Message Type field. This field shall indicate the type of GTP message.

- Length field. This field shall indicate the length of the message in octets excluding the mandatory part of the GTP header (the first 4 octets). The TEID (if present), Sequence Number and Extension Header(s) shall be included in the length count.

- Tunnel Endpoint Identifier (TEID) field. If present, this field shall unambiguously identify a tunnel endpoint in the receiving GTP-U or GTP-C protocol entity.

## 5.1.1 Extension Header

### 5.1.1.1 General format of the Extension Header

The Extension Header is a variable length header, which may be used by both the GTP-C and the GTP-U protocols. The length of an Extension Header shall be a multiple of 4 octets. The Extension Header shall be at least 4 octets long. Figure 5.1.1.1.1 illustrates the format of the Extension Header.

| | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Extension Header Type | | | CR | Length | | | NEH |
| 2 – 4n | The actual value of the Extension header and a padding, if necessary (n = 1, 2, … m) | | | | | | | |
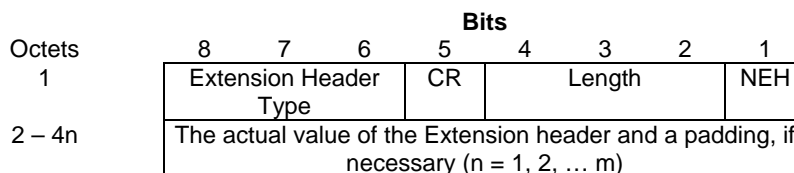
**Figure 5.1.1.1: The format of the Extension Header**

Octet 1 of the Extension Header shall contain the following fields:

- Bits 6-8 shall represent the Extension Header Type field.

- Bit 5 shall represent Comprehension Required (CR) flag. If CR is set to 1, then the comprehension of the given Extension Header is required. If CR flag is set to 0 and the receiving entity does not support the extension header type, then the extension header shall be ignored.

- Bits 2-4 shall represent the overall length of the Extension Header (including Octet 1) in units of 4 octets. This field shall be used to determine the overall length of the Extension Header and provides for the value range of 4 – 28 octets (decimal).

- Bit 1 shall represent the Next Extension Header (NEH) flag. If the NEH flag is set to 1, another Extension Header follows the given one. Otherwise, the given Extension Header is the last field of the GTPv2 header.

Octet 2-4n (n = 1, 2, … m) of the Extension Header shall contain the following fields:

- The actual value of the Extension Header.

- Padding, if necessary

### 5.1.1.2 Extension Header types

The Extension Header Type field provides for the value range of 0 – 7 (decimal).

Editor's note: it is FFS if the receiving entity should notify the sending entity about discarded EH, or not.

# 5.2 GTP-C header

## 5.2.1 GTP-C header for Echo and Version Not Supported messages

GTPv2-C message header for Echo Request, Echo Response and Version Not supported messages shall not contain TEID field, but the Sequence Number fields, followed by two spare octets as depicted in figure 5.2.1.

**Bits**

| Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| 1 | Version | | | FFS | T=0 | E=0 | S=1 | FFS |
| 2 | Message Type | | | | | | | |
| 3 | Message Length (1$^{st}$ Octet) | | | | | | | |
| 4 | Message Length (2$^{nd}$ Octet) | | | | | | | |
| 5 | Sequence Number (1$^{st}$ Octet) | | | | | | | |
| 6 | Sequence Number (2$^{nd}$ Octet) | | | | | | | |
| 7 | Spare | | | | | | | |
| 8 | Spare | | | | | | | |

**Figure 5.2.1: The format of Echo and Version Not Supported message Header**

## 5.2.2 EPC specific GTP-C header

Apart from Echo Request, Echo Response and Version Not supported messages the GTP-C message header shall contain TEID and Sequence Number fields, followed by two spare octets. Typical GTP-C header is depicted in figure 5.2.2.

**Bits**

| Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|
| 1 | Version | | | FFS | T=1 | E | S=1 | FFS |
| 2 | Message Type | | | | | | | |
| 3 | Message Length (1$^{st}$ Octet) | | | | | | | |
| 4 | Message Length (2$^{nd}$ Octet) | | | | | | | |
| 5 | Tunnel Endpoint Identifier (1$^{st}$ Octet) | | | | | | | |
| 6 | Tunnel Endpoint Identifier (2$^{nd}$ Octet) | | | | | | | |
| 7 | Tunnel Endpoint Identifier (3$^{rd}$ Octet) | | | | | | | |
| 8 | Tunnel Endpoint Identifier (4$^{th}$ Octet) | | | | | | | |
| 9 | Sequence Number (1$^{st}$ Octet) | | | | | | | |
| 10 | Sequence Number (2$^{nd}$ Octet) | | | | | | | |
| 11 | Spare | | | | | | | |
| 12 | Spare | | | | | | | |
| 13 - n | These octets are present in the header if E flag is set to '1' and contain one or more Extension Headers. | | | | | | | |

**Figure 5.2.2: The format of EPC specific GTPv2 Control Plane message Header**

## 5.2.3 Usage of the GTP-C Header

*To be edited*

## 5.3 GTP-U header

*To be edited*

## 5.3.1 Usage of the GTP-U Header

*To be edited*

# 6 GTP Messages and Message Formats

*To be edited*

## 6.1 Message Format and Type values

GTP defines a set of messages between two associated EPC network elements. The messages to be used are defined in the Table 6.1.

**Table 6.1: Message types for GTPv2**

| Message Type value (Decimal) | Message | Reference | GTP-C | GTP-U |
|---|---|---|---|---|
| 0 | Reserved | | | |
| 1 | Echo Request | | X | X |
| 2 | Echo Response | | X | X |
| 3 | Version Not Supported | | X | |
| 4-30 | Reserved for other protocols (currently, for S101) | | | |
| 31 | Create Bearer Request (currently only for default bearer activation across S11) | | X | |
| 32 | Create Bearer Response (currently only for default bearer activation across S11) | | X | |
| 33 | Delete Bearer Request | | X | |
| 34 | Delete Bearer Response | | X | |
| 35 | Update Bearer Request (currently only for default bearer activation across S11) | | X | |
| 36 | Update Bearer Response (currently only for default bearer activation across S11) | | X | |
| 37 | Create Forwarding Tunnel Request | | X | |
| 38 | Create Forwarding Tunnel Response | | X | |
| 39-254 | FFS | | X | |
| 255 | User plane data (payload). G-PDU | | | X |

## 6.1.1 Presence requirements of Information Elements

There are three different presence requirements (Mandatory, Conditional, or Optional) for an IE within a given GTP-PDU:

- Mandatory means that the IE shall be included by the sending side, and that the receiver diagnoses a "Mandatory IE missing" error when detecting that the IE is not present. A response including a "Mandatory IE missing" cause, shall include the type of the missing IE.

- Conditional means:

  • that inclusion of the IE by the sender depends on conditions specified in the relevant protocol specification;

Editor's Note: the receiver shall check the conditions as specified in the corresponding message type description, based on the parameter combination in the message and/or on the state of the receiving node, to infer if a conditional IE shall be expected. Only if a conditional IE, which is absolutely necessary for the receiving entity to complete the procedure, is missing, then the receiver shall abort the procedure.

- Optional means that the IE shall be included as a service option. Therefore, the IE may be included or not in a message.

For conditional IEs, the clause describing the GTP-PDU explicitly defines the conditions under which each IE becomes mandatory or optional for that particular GTP-PDU. These conditions shall be defined so that the presence of a conditional IE only becomes mandatory if it is critical for the receiving entity. The definition might reference other protocol specifications for final terms used as part of the condition.

Editor's Note: This definition of conditions shall be done per conditional IE in a dedicated column of the table listing the IEs for that GTP-PDU.

## 6.1.2 Comprehension requirements for Information Elements

For future extensibility of the GTP-C protocol, it shall be possible to add new mandatory and conditional Information Element (IE) types to the existing messages.

Editor's note: It is FFS if these requirements would apply also to GTP-U.

For the legacy GTPv2 entity such IEs will be unexpected, but will be treated as optional IEs. That is, the IEs of known type will be processed and the IEs of unknown type will be silently discarded.

In future updates to the existing procedures it may become required that the sending entity is aware if the new mandatory or conditional IE was comprehended by the receiver, or not.

New IE types that may be defined in future spec releases may belong to one of two classes:

- IEs which can be safely ignored by the receiving entity. As all IEs are TLV encoded, a receiving entity can always continue decoding the rest of the message by ignoring the unknown IE.

- IEs which require support by the receiving entity and which shall cause the rejection of the GTP message if such an IE is unknown or not supported.

Editor's Note: It is for further study if a rejected Response message shall lead to an error notification back to the sender. Rejected Request messages shall always include an appropriate rejection cause value in the corresponding Response, but this can be added to the normative text, here or in clause 9.1, once the handling of Response messages is decided.

In order to support both types of future IEs, a flag "Comprehension Required" (CR) is part of the common header of each IE (see subclause 9.2)

## 6.1.3 Grouped Information Elements

Information elements can contain other IEs. This type of IE is called "Grouped IEs".

Grouped IEs have a length value in the TLV encoding, which includes the added length of all the embedded IEs plus the length of any other value fields. Example:

| Type | Length | | Type | Length | | Type | Length | |
|------|--------|--------------|------|--------|--|------|--------|--|
|      | 9+x+y  | 3 octets field |      | x      |  |      | y      |  |

First embedded IE    Second embedded IE
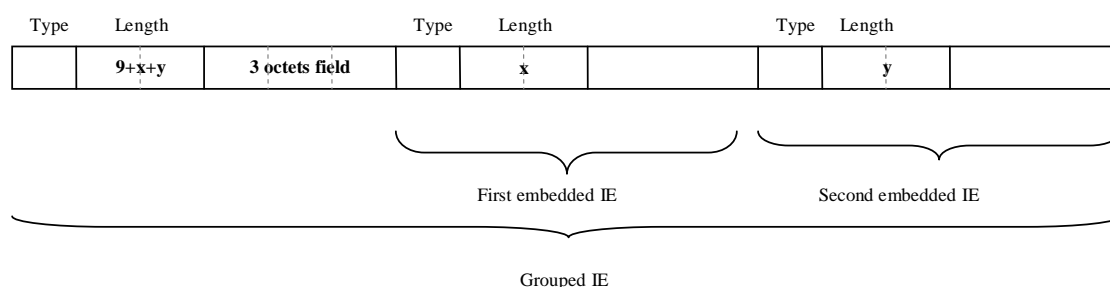
Grouped IE

**Figure 6.1.3: Grouped IE format**

Grouped IEs are not marked by any flag or limited to a specific range of IE type values. The clause describing an IE in this specification shall explicitly state if it is grouped.

# 7 GTP-C messages

*To be edited*

# 7.1 Path Management Messages

Three path management messages are specified for GTP-C: Echo Request, Echo Response and Version Not Supported.

## 7.1.1 Echo Request

A GTP-C entity may send an Echo Request to find out if the peer entity is alive. When and how often an Echo Request message may be sent is implementation specific but an Echo Request shall not be sent more often than every 60 s on each path. Table 7.1.1 specifies the information elements included in the Echo Request message.

Editor's note: This is an implementation issue, but it is recommended that Echo Request should be sent only when a GTP-C entity has not received any GTP message on the GTP-C path for a specific time.

The optional Private Extension contains vendor or operator specific information.

**Table 7.1.1: Information Element in Echo Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Private Extension | O | None | 0 | Private Extension |

## 7.1.2 Echo Response

A GTP-C shall be prepared to receive an Echo Request at any time and it shall reply with an Echo Response. Table 7.1.2 specifies the information elements included in the Echo Response message.

The Recovery information element contains the local Restart Counter (see section Restoration and Recovery) value for the node that sends the Echo Response message.

The GTPv2 entity that receives an Echo Response from a peer shall compare the Restart Counter value received with the previous Restart Counter value stored for that peer entity. If no previous value was stored, the Restart Counter value received in the Echo Response shall be stored for the peer.

The value of a Restart Counter previously stored for a peer may differ from the Restart Counter value received in the Echo Response from that peer. In this case, the entity that sent the Echo Response shall be considered as restarted. The new Restart Counter value received shall be stored by the receiving entity, replacing the value previously stored for the peer.

The optional Private Extension contains vendor or operator specific information.

**Table 7.1.2: Information Element in Echo Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Recovery | M | None | 1 | |
| Private Extension | O | None | 0 | Private Extension |

## 7.1.3 Version Not Supported

This message contains only the GTPv2 header and indicates the latest GTP version that the sending entity supports.

## 7.2 Tunnel Management Messages

## 7.2.1 Create Bearer Request

### 7.2.1.1 Requesting Default Bearer creation across S11 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Request message across S11 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a MME to a SGW as a part of the bearer establishment procedure.

The MME shall include IMSI IE in Create Bearer Request message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Table 7.2.1.1 specifies the presence of the IEs in the message.

MME S11 Address for Control Plane IE and MME S11 TEID for Control Plane IE specify the downlink tunnel for control plane messages which is chosen by the MME. The SGW shall include this Tunnel Endpoint Identifier in the GTP header of all downlink control plane messages which are related to the requested bearer.

The SGW needs the selected PGW S5/S8 Address for Control Plane IE for sending Create Bearer Request message to PGW.

Editor's notes: It is FFS whether static PDN address for UE will be supported in EPS.

The APN may or may not contain APN-OI. APN-OI may contain either HPLMN MCC and MNC, or VPLMN MCC and MNC.

Editor's note: APN matter is still not completely clear at stage 2.

The Bearer Level Quality of Service (Bearer QoS) IE includes the QoS derived from subscription data of UE. It is FFS what parameters are included in the IE.

PGW may use RAT Type IE for PCC decision.

Editor's note: IF MME is unaware of the actual RAT type, then MME either sets the RAT type value to 'unknown' or does not send the IE altogether.

**Table 7.2.1.1: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| MSISDN | C | The MME shall include MSISDN IE, if available. | ? | MSISDN |
| EPS Bearer ID (EBI) | M | None | 1 | EBI |
| MME S11 Address for Control Plane | M | None | 1 | IP Address |
| MME S11 TEID for Control Plane | M | None | 1 | TEID-C |
| PGW S5/S8 Address for Control Plane | M | None | 1 | IP Address |
| Access Point Name (APN) | M | None | 1 | APN |
| Bearer Level Quality of Service (Bearer QoS) | | None | ? | QoS |
| RAT Type | M | None | 1 | RAT Type |
| PDN Address Allocation (PAA) | C | | | PAA |
| Aggregate Maximum Bit Rate (AMBR) | M | None | 1 | AMBR |
| Protocol Configuration Options (PCO) | C | The MME shall include Protocol Configuration Options (PCO) IE, if available. | ? | PCO |
| ME Identity (MEI) | C | The MME shall include ME Identity (MEI) IE, if available. | ? | MEI |
| User Location Info (ULI) | C | | ? | ULI |
| Serving Network | M | None | 1 | Serving Network |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.1.2 Requesting Default Bearer creation across S11 interface within the UE Requested PDN Connectivity procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Request message across S11 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a MME to a SGW as a part of the UE Requested PDN Connectivity procedure.

The MME shall include IMSI IE in Create Bearer Request message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Table 7.2.1.2 specifies the presence of the IEs in the message.

MME S11 Address for Control Plane IE and MME S11 TEID for Control Plane specify the downlink tunnel for control plane messages which is chosen by the MME. If this Tunnel Endpoint Identifier is transmitted, the SGW shall include it in the GTP header of all downlink control plane messages which are related to the requested bearer.

The SGW needs the selected PGW S5/S8 Address for Control Plane for sending Create Bearer Request message to PGW.

Editor's notes: It is FFS whether static PDN address for UE will be supported in EPS.

The Access Point Name (APN) may or may not contain APN-OI. APN-OI may contain either HPLMN MCC and MNC, or VPLMN MCC and MNC.

Editor's note: APN matter is still not completely clear at stage 2.

Bearer Level Quality of Service (Bearer QoS) Profile IE contains the Bearer QoS derived from subscription data of UE. It is FFS what parameters are included in the IE.

PGW may use RAT Type IE for PCC decision.

Editor's note: IF MME is unaware of the actual RAT type, then MME either sets the RAT type value to 'unknown' or does not send the IE altogether.

**Table 7.2.1.2: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| MSISDN | C | The MME shall include MSISDN IE, if available. | ? | MSISDN |
| EPS Bearer ID (EBI) | M | None | 1 | EBI |
| MME S11 Address for Control Plane | O | None | 0 | IP Address |
| MME S11 TEID for Control Plane | O | None | 0 | TEID-C |
| PGW S5/S8 Address for Control Plane | M | None | 1 | IP Address |
| Access Point Name (APN) | M | None | 1 | APN |
| Bearer Level Quality of Service (Bearer QoS) | M | None | 1 | Bearer QoS |
| RAT Type | M | None | 1 | RAT Type |
| PDN Address Allocation (PAA) | C | The MME shall include PDN Address Allocation (PAA) IE, if available. | ? | PAA |
| Aggregate Maximum Bit Rate (AMBR) | M | None | 1 | AMBR |
| Protocol Configuration Options (PCO) | C | The MME shall include Protocol Configuration Options (PCO) IE, if available. | ? | PCO |
| User Location Info (ULI) | C | Conditional | ? | ULI |
| Serving Network | M | None | 1 | Serving Network |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.1.3 Requesting Dedicated Bearer creation across S11 interface within the Dedicated Bearer Activation procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Dedicated Bearer Request message across S11 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a SGW to a MME as a part of the Dedicated Bearer Activation procedure.

The SGW shall include IMSI IE in Create Bearer Request message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Table 7.2.1.3 specifies the presence of the IEs in the message.

The MME forwards SGW S1-U Tunnel Endpoint Identifier for User Plane IE to eNB. The eNB uses this IE when sending uplink data to this GTP-U tunnel. The eNB shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer.

**Table 7.2.1.3: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| Linked EPS Bearer ID (LBI) | M | None | 1 | LBI |
| SGW S1-U TEID for User Plane | M | None | 1 | TEID-U |
| Bearer Level Quality of Service (Bearer QoS) | M | None | 1 | Bearer QoS |
| Procedure Transaction Id (PTI) | C | SGW shall include Procedure Transaction Id (PTI) IE, if available | ? | PTI |
| Protocol Configuration Options (PCO) | C | SGW shall include Protocol Configuration Options (PCO) IE, if available. | ? | PCO |
| Uplink Bearer Level TFT (Bearer TFT) | M | None | 1 | Bearer TFT |
| Downlink Bearer Level TFT (Bearer TFT) | C | The SGW shall include the Downlink Bearer Level TFT IE (Bearer TFT), when PMIP-based S5/S8 is used. | ? | Bearer TFT |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.1.4 Create Bearer Request across S11 interface during E-UTRAN Tracking Area Update with MME and SGW Change procedure

A Create Bearer Request shall be sent from a MME to a SGW as part of E-UTRAN Tracking Area Update(TAU) with MME and SGW Change procedure.

Table 7.2.1.4 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

**Table 7.2.1.4: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| MME S11 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane message which is chosen by the MME. The SGW shall include this TEID in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| MME S11 Address for Control Plane | M | This IE specifies the downlink address for control plane message which is chosen by the MME | 1 | IP Address |
| Bearer Context | M | None | 1 | FFS |
| Protocol Type across S5/S8 Interface | M | This IE is provided to the SGW which protocol should be used across S5/S8 interface. | 1 | Protocol Type |
| Indication | M | This IE indicates the SGW to send the Update Bearer Request to the PGW | 1 | Indication |
| GRE Key | C | The MME shall include this IE if PMIP is used across S5/S8 interface. | 1 | GRE Key |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element (ex. GRE Key) for this message.

## 7.2.1.5 Create Bearer Request across S4 interface during Routing Area Update with MME interaction and with SGW Change procedure

A Create Bearer Request message shall be sent from a SGSN to a SGW as a part of Routing Area Update with MME interaction and with SGW change procedure.

Table 7.2.1.5 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

**Table 7.2.1.5: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| SGSN S4 Address for Control Plane | M | This IE specifies the downlink address for control plane message which is chosen by the SGSN | 1 | IP Address |
| SGSN S4 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane message which is chosen by the SGSN. The SGW shall include this TEID in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| Bearer Context | M | None | 1 | FFS |
| Protocol Type across S5/S8 Interface | M | This IE is provided to the SGW which protocol should be used across S5/S8 interface. | 1 | Protocol Type |
| Indication | M | This IE indicates the SGW to send the Update Bearer Request to the PGW. | 1 | Indication |
| RAT Type | M | PGW may use this IE for PCC decision. | 1 | RAT Type |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.1.6 Requesting Dedicate Bearer creation across S5/S8 interface within the Dedicated Bearer Activation procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Dedicated Bearer Request message across S5/S8 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a PGW to a SGW as a part of the Dedicated Bearer Activation procedure.

Table 7.2.1.6 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

**Table 7.2.1.6: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | | 1 | IMSI |
| Linked EPS Bearer ID (LBI) | M | | 1 | EBI |
| PGW S5/S8 TEID for User Plane | M | The SGW uses this IE when sending uplink data to this GTP-U tunnel. The SGW shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| Bearer Level Quality of Service (Bearer QoS) | M | | 1 | Bearer QoS |
| Procedure Transaction Id (PTI) | C | If PGW receives a Request Bearer Resource Allocation message with PTI included, PGW shall include the Procedure Transaction Id (PTI) IE with the same value set. | 1 | PTI |
| Uplink Bearer Level TFT (Bearer TFT) | M | | 1 | Bearer TFT |
| Private Extension | O | The PGW may include Private Extension IE in Create Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

Editor's notes: It is FFS whether PCO is needed for this message.

### 7.2.1.7 Requesting Default Bearer creation across S5/S8 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Request message across S5/S8 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a SGW to a PGW as a part of the EUTRAN Initial Attach procedure.

Table 7.2.1.7 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Editor's note: APN matter is still not completely clear at stage 2.

**Table 7.2.1.7: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | | 1 | IMSI |
| MSISDN | C | The SGW shall include MSISDN IE, if receiving from MME. | 1 | MSISDN |
| EPS Bearer ID (EBI) | M | | 1 | EBI |
| SGW S5/S8 Address for Control Plane | M | This IE specifies the downlink address for control plane messages which is chosen by the SGW. The PGW shall send all downlink control plane messages which are related to the requested bearer to this address. | 1 | IP Address |
| SGW S5/S8 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane messages which is chosen by the SGW. The PGW shall include this Tunnel Endpoint Identifier in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| SGW S5/S8 Address for User Plane | M | The PGW uses this IE when sending downlink data to this GTP-U tunnel. The PGW shall send all downlink G-PDUs which are related to the bearer to this address. | 1 | IP Address |
| SGW S5/S8 TEID for User Plane | M | The PGW uses this IE when sending downlink data to this GTP-U tunnel. The PGW shall include this TEID-U into the GTP-U header of all downlink G-PDUs which are related to the bearer. | 1 | TEID-C |
| Access Point Name (APN) | M | The APN may or may not contain APN-OI. APN-OI may contain either HPLMN MCC and MNC, or VPLMN MCC and MNC. | 1 | APN |
| Bearer Level Quality of Service (Bearer QoS) | M | The QoS Profile IE is included in Create Bearer Request message to contain the Bearer QoS derived from subscription data of UE. | 1 | QoS |
| RAT Type | M | | 1 | RAT Type |
| PDN Address Allocation (PAA) | M | | | PAA |
| Aggregate Maximum Bit Rate (AMBR) | M | | 1 | AMBR |
| Protocol Configuration Options (PCO) | C | The SGW shall include Protocol Configuration Options (PCO) IE, if receiving from MME. | 1 | PCO |
| ME Identity (MEI) | C | The SGW shall include ME Identity (MEI) IE, if receiving from MME. | 1 | MEI |
| User Location Info (ULI) | C | The SGW shall include User Location Info (ULI) IE, if receiving from MME. | 1 | ULI |
| Serving Network | M | | 1 | Serving Network |
| Private Extension | O | The SGW may include Private Extension IE in Create Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.1.8 Requesting Default Bearer creation across S5/S8 interface within the UE Requested PDN Connectivity procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Request message across S5/S8 interface, or if it will be generalized for all Create request messages.

A Create Bearer Request message shall be sent from a SGW to a PGW as a part of the UE Requested PDN Connection procedure.

Table 7.2.1.8 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Editor's note: APN matter is still not completely clear at stage 2.

**Table 7.2.1.8: Information Elements in a Create Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | | 1 | IMSI |
| MSISDN | C | The SGW shall include MSISDN IE, if receiving from MME. | 1 | MSISDN |
| EPS Bearer ID (EBI) | M | | 1 | EBI |
| SGW S5/S8 Address for Control Plane | M | This IE specifies the downlink address for control plane messages which is chosen by the SGW. The PGW shall send all downlink control plane messages which are related to the requested bearer to this address. | 1 | IP Address |
| SGW S5/S8 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane messages which is chosen by the SGW. The PGW shall include this Tunnel Endpoint Identifier in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| SGW S5/S8 Address for User Plane | M | The PGW uses this IE when sending downlink data to this GTP-U tunnel. The PGW shall send all downlink G-PDUs which are related to the bearer to this address. | 1 | IP Address |
| SGW S5/S8 TEID for User Plane | M | The PGW uses this IE when sending downlink data to this GTP-U tunnel. The PGW shall include this TEID-U into the GTP-U header of all downlink G-PDUs which are related to the bearer. | 1 | TEID-C |
| Access Point Name (APN) | M | The APN may or may not contain APN-OI. APN-OI may contain either HPLMN MCC and MNC, or VPLMN MCC and MNC. | 1 | APN |
| Bearer Level Quality of Service (Bearer QoS) | M | The QoS Profile IE is included in Create Bearer Request message to contain the Bearer QoS derived from subscription data of UE. | 1 | Bearer QoS |
| RAT Type | M | | 1 | RAT Type |
| PDN Address Allocation (PAA) | M | | 1 | PAA |
| Aggregate Maximum Bit Rate (AMBR) | M | | 1 | AMBR |
| Protocol Configuration Options (PCO) | C | The SGW shall include Protocol Configuration Options (PCO) IE, if receiving from MME. | 1 | PCO |
| User Location Info (ULI) | C | The SGW shall include User Location Info (ULI) IE, if receiving from MME. | 1 | ULI |
| Serving Network | M | | 1 | Serving Network |
| Private Extension | O | The SGW may include Private Extension IE in Create Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.2 Create Bearer Response

### 7.2.2.1 Responding to Default Bearer request across S11 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Response message across S11 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a SGW to a MME as a response to a Create Bearer Request message during EUTRAN initial Attach procedure.

Table 7.2.2.1 specifies the presence requirements and the conditions of the IEs in the message.

Cause IE indicates if an EPS bearer hass been created in the SGW and the PGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE, optionally Protocol Configuration Options IE, shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

**Table 7.2.2.1: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| EPS Bearer ID (EBI) | O | If the Cause IE contains the value "Request accepted", the SGW may include EBI IE received from the MME in the Create Bearer Request message, in order to facilitate error handling in the MME.<br>Note: If an MME receives a Create Bearer Response with EBI IE included for which there is no corresponding outstanding request, the MME may send a Delete Bearer Request towards the SGW that sent the Create Bearer Response with EBI IE included. | 1 | EBI |
| SGW S11 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include SGW S11 Address for Control Plane IE in Create Bearer Response message if the SGW decides to use different IP address for the subsequent communication. The MME shall replace the old SGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| SGW S11 TEID for Control Plane | C | The SGW shall include SGW S11 TEID-C IE if the Cause IE contains the value "Request accepted". The MME shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| SGW S1-U Address for User Plane | C | The SGW shall include SGW S1-U Address IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall use it as destination IP address when sending uplink data through this GTP-U tunnel. | 1 | IP Address |
| SGW S1-U TEID for User Plane | C | The SGW shall include SGW S1-U TEID-U IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| PGW S5/S8 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include PGW S5/S8 Address for Control Plane IE in Create Bearer Response message, if the PGW returns different IP address to the SGW. The MME shall replace the old PGW S5/S8 Address for Control Plane with the new value. The MME needs to forward PGW S5/S8 Address for Control Plane IE to the new MME/SGSN during a subsequent TAU or handover procedure. | 1 | IP Address |
| PGW S5/S8 TEID for Control Plane | C | The SGW shall include PGW S5/S8 TEID-C IE if GTP-based S5/S8 is used and the Cause IE contains the value "Request accepted". The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | TEID-C |
| PGW S5/S8 Address for User Plane | C | The SGW shall include PGW S5/S8 Address for User Plane IE if the Cause IE contains the value "Request accepted".<br>Editor's note: It is FFS whether an IPv4/IPv6 capable SGW should include both IPv4 and IPv6 addresses for control plane and user plane in this message.<br>The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | IP Address |
| PGW S5/S8 TEID for User Plane | C | The SGW shall include PGW S5/S8 TEID for User Plane IE if GTP-based S5/S8 is used and the Cause IE contains the value "Request accepted". The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | TEID-U |
| End User (UE) Address | C | It shall be included if the Cause IE contains the value "Request accepted".<br>Editors's note: PGW may return both IPv4 address and IPv6 prefix. It is FFS how these two | 1 | IP Address |

| | | End User addresses are supported in the message. | | |
|---|---|---|---|---|
| Uplink Bearer Level TFT (Bearer TFT) | C | The SGW shall include the Uplink Bearer Level TFT IE if such information was received from the PGW.   This IE shall be included if the Cause IE contains the value "Request accepted". | 1 | TFT |
| GRE Key | C | The SGW shall include the GRE Key IE for uplink traffic if PMIP-based S5/S8 is used and the Cause IE contains the value "Request accepted". | 1 | GRE Key |
| Protocol Configuration Options (PCO) | C | SGW shall include the PCO IE if such information was received from the PGW. This IE shall be included if the Cause IE contains the value "Request accepted". | 1 | PCO |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.2.2 Responding to Default Bearer request across S11 interface within the UE Requested PDN Connectivity procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Response message across S11 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a SGW to a MME as a response to a Create Bearer Request message during a UE requested PDN connectivity procedure.

Table 7.2.2.2 specifies the presence requirements and the conditions of the IEs in the message.

Cause IE indicates if an EPS bearer has been created in the SGW and the PGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted".   Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE, and optionally Protocol Configuration Options IE, shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note:   It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

**Table 7.2.2.2: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| EPS Bearer ID (EBI) | O | If the Cause IE contains the value "Request accepted", the SGW may include EBI IE received from the MME in the Create Bearer Request message, in order to facilitate error handling in the MME.<br>Note: If an MME receives a Create Bearer Response with EBI IE included for which there is no corresponding outstanding request, the MME may send a Delete Bearer Request towards the SGW that sent the Create Bearer Response with EBI IE included. | 1 | EBI |
| SGW S11 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include SGW S11 Address for Control Plane IE in Create Bearer Response message if the SGW decides to use different IP address for the subsequent communication. The MME shall replace the old SGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| SGW S11 TEID for Control Plane | C | The SGW shall include SGW S11 TEID-C IE if the Cause IE contains the value "Request accepted". The MME shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| SGW S1-U Address for User Plane | C | The SGW shall include SGW S1-U Address IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall use it as destination IP address when sending uplink data through this GTP-U tunnel. | 1 | IP Address |
| SGW S1-U TEID for User Plane | C | The SGW shall include SGW S1-U TEID-U IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| PGW S5/S8 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include PGW S5/S8 Address for Control Plane IE in Create Bearer Response message, if the PGW returns different IP address to the SGW. The MME shall replace the old PGW S5/S8 Address for Control Plane with the new value. The MME needs to forward PGW S5/S8 Address for Control Plane IE to the new MME/SGSN during a subsequent TAU or handover procedure. | 1 | IP Address |
| PGW S5/S8 TEID for Control Plane | C | The SGW shall include PGW S5/S8 TEID-C IE if GTP-based S5/S8 is used and the Cause IE contains the value "Request accepted". The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | TEID-C |
| PGW S5/S8 Address for User Plane | C | The SGW shall include PGW S5/S8 Address for User Plane IE if the Cause IE contains the value "Request accepted".<br>Editor's note: It is FFS whether an IPv4/IPv6 capable SGW should include both IPv4 and IPv6 addresses for control plane and user plane in this message.<br>The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | IP Address |
| PGW S5/S8 TEID for User Plane | C | The SGW shall include PGW S5/S8 TEID for User Plane IE if GTP-based S5/S8 is used and the Cause IE contains the value "Request accepted". The MME shall store this IE to be forwarded to a new MME/SGSN in case of a subsequent TAU or handover procedure. | 1 | TEID-U |
| End User (UE) Address | C | It shall be included if the Cause IE contains the value "Request accepted".<br>Editors's note: PGW may return both IPv4 address and IPv6 prefix. It is FFS how these two End User addresses | 1 | IP Address |

| | | | | |
|---|---|---|---|---|
| | | are supported in the message. | | |
| Uplink Bearer Level TFT (Bearer TFT) | C | The SGW shall include the Uplink Bearer Level TFT IE if such information was received from the PGW. This IE shall be included if the Cause IE contains the value "Request accepted". | 1 | Bearer TFT |
| GRE Key | C | The SGW shall include the GRE Key IE for uplink traffic if PMIP-based S5/S8 is used and the Cause IE contains the value "Request accepted". | 1 | GRE Key |
| Protocol Configuration Options (PCO) | C | SGW shall include the PCO IE if such information was received from the PGW. This IE shall be included if the Cause IE contains the value "Request accepted". | 1 | PCO |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.2.3 Responding to Dedicated Bearer request across S11 interface within the Dedicated Bearer Activation procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Dedicated Bearer Response message across S11 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a MME to a SGW as a response to a Create Bearer Request message during a dedicated bearer activation procedure.

Table 7.2.2.3 specifies the presence requirements and the conditions of the IEs in the message.

Cause IE indicates if an EPS bearer has been created in the MME or not. The EPS Bearer has not been created in the MME if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

**Table 7.2.2.3: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| EPS Bearer ID (EBI) | C | The MME shall include EPS Bearer ID (EBI) IE if the Cause IE contains the value "Request accepted". | 1 | EBI |
| eNodeB S1-U TEID for User Plane | C | The MME shall include eNodeB S1-U TEID-U IE if the Cause IE contains the value "Request accepted". The SGW shall include this TEID-U into the GTP-U header of all downlink G-PDUs which are related to the bearer. | 1 | TEID-U |
| Protocol Configuration Options (PCO) | C | MME shall include PCO IE if such information was received from the PGW. This IE shall be included if the Cause IE contains the value "Request accepted". Editor's note: In TS 23.401 v8.1.0, PCO is not listed as an IE for the Create Dedicated Bearer Request/Response signalling. | 1 | PCO |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.2.4 Create Bearer Response across S11 interface during E-UTRAN Tracking Area Update with MME and SGW Change procedure

A Create Bearer Response shall be sent as a response to a Create Bearer Request message during E-UTRAN Tracking Area Update with MME and SGW Change procedure.

Table 7.2.2.4 specifies the presence requirements and the conditions of the IEs in the message.

Cause IE indicates if an bearer context has been created in the SGW and the PGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted".    Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.2.4: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| SGW S11 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include SGW S11 Address for Control Plane IE in Create Bearer Response message if the SGW decides to use different IP address for the subsequent communication. The MME shall replace the old SGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP-Address |
| SGW S11 TEID for Control Plane | C | T The SGW shall include SGW S11 TEID-C IE if the Cause IE contains the value "Request accepted". The MME shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| SGW S1-U Address for User Plane | C | The SGW shall include SGW S1-U Address IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall use it as destination IP address when sending uplink data through this GTP-U tunnel. | 1 | IP Address |
| SGW S1-U TEID for User Plane | C | The SGW shall include SGW S1-U TEID-U IE if the Cause IE contains the value "Request accepted". The MME shall forward this IE to eNodeB so that the eNodeB shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.2.5 Create Bearer Response across S4 interface during Routing Area Update with MME interaction and with SGW Change procedure

A Create Bearer Response shall be sent as a response to a Create Bearer Request message during Routing Area Update with MME interaction and with SGW Change procedure.

Table 7.2.2.5 specifies the presence requirements and the conditions of the IEs in the message.

Cause IE indicates if an bearer context has been created in the SGW and the PGW or not. The bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted".    Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.2.5: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| SGW S4 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the SGW may include SGW S4 Address for Control Plane IE in Create Bearer Response message if the SGW decides to use different IP address for the subsequent communication. The SGSN shall replace the old SGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| SGW S4 TEID for Control Plane | C | The SGW shall include SGW S4 TEID-C IE if the Cause IE contains the value "Request accepted". The SGSN shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| SGW S4-U Address for User Plane | C | The SGW shall include SGW S4-U Address IE if the Cause IE contains the value "Request accepted". The SGSN shall use it as destination IP address when sending uplink data through this GTP-U tunnel. | 1 | IP Adress |
| SGW S4-U TEID for User Plane | C | The SGW shall include SGW S4-U TEID-U IE if the Cause IE contains the value "Request accepted". The SGSN shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.2.6 Responding to Dedicate Bearer request across S5/S8 interface within the Dedicated Bearer Activation procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Dedicated Bearer Response message across S5/S8 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a SGW to a PGW as a response to a Create Bearer Request message as a part of the Dedicated Bearer Activation procedure.

Table 7.2.2.6 specifies the presence requirements and the conditions of the IEs in the message.

The SGW shall include Cause IE in the Create Bearer Response message. This IE indicates if an EPS bearer has been created in the SGW and the PGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

**Table 7.2.2.6: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| EPS Bearer ID (EBI) | C | If the Cause IE contains the value "Request accepted", SGW shall include EPS Bearer ID (EBI) IE. | 1 | EBI |
| SGW S5/S8 TEID for User Plane | C | If the Cause IE contains the value "Request accepted", the SGW shall include SGW S5/S8 Tunnel Endpoint Identifier for User Plane IE in Create Bearer Response message. The PGW uses this IE when sending downlink data to this GTP-U tunnel. The PGW shall include this TEID-U into the GTP-U header of all downlink G-PDUs which are related to the bearer. | 1 | TEID-U |
| Private Extension | O | The SGW may include the Private Extension IE in Create Bearer Response message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

Editor's notes: It is FFS whether PCO is needed for this message.

## 7.2.2.7 Responding to Default Bearer request across S5/S8 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Response message across S5/S8 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a PGW to a SGW as a response to a Create Bearer Request message as a part of the EUTRAN Initial Attach procedure.

Table 7.2.2.7 specifies the presence requirements and the conditions of the IEs in the message.

The PGW shall include Cause IE in the Create Bearer Response message. This IE indicates if an EPS bearer has been created in the PGW and the SGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

Editor's notes: It is FFS whether an IPv4/IPv6 capable PGW should include both IPv4 and IPv6 addresses for control plane and user plane in this message.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

Editor's note: It is FFS whether the Create Default Bearer Response message is piggybacked with the Create Dedicated Bearer Request, or alternatively other ways are used to tie those messages together such that the SGW can recognize that a Create Default Bearer Response message is combined with a Create Dedicated Bearer Request message.

**Table 7.2.2.7: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| EPS Bearer ID (EBI) | O | If the Cause IE contains the value "Request accepted", the PGW may include the EPS Bearer ID received from the SGW in the Create Bearer Request message, in order to facilitate error handling in SGW.<br>NOTE: If an SGW receives a Create Bearer Response with an EPS Bearer ID IE included for which there is no corresponding outstanding request, an SGW may send a Delete Bearer Request towards the PGW that sent the Create Bearer Response with the EPS Bearer ID included. | 1 | EBI |
| PGW S5/S8 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the PGW may include PGW S5/S8 Address for Control Plane IE in Create Bearer Response message if the PGW decides to use different IP address for the subsequent communication. The SGW shall replace the old PGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| PGW S5/S8 TEID for Control Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Tunnel Endpoint Identifier for Control Plane IE in Create Bearer Response message. The SGW shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| PGW S5/S8 Address for User Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Address for User Plane IE in Create Bearer Response message. The SGW uses this IE when sending uplink data to this GTP-U tunnel. The SGW shall send all uplink G-PDUs which are related to the bearer to this address. | 1 | IP Address |
| PGW S5/S8 TEID for User Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Tunnel Endpoint Identifier for User Plane IE in Create Bearer Response message. The SGW uses this IE when sending uplink data to this GTP-U tunnel. The SGW shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| End User (UE) Address | C | If the Cause IE contains the value "Request accepted", the PGW shall include the End User (UE) Address IE in Create Bearer Response message. | 1 | IP Address |
| Uplink Bearer Level TFT (Bearer TFT) | C | If the Cause IE contains the value "Request accepted", the PGW shall include the Uplink Bearer Level TFT IE. | 1 | TFT |
| Protocol Configuration Options (PCO) | C | If the Cause IE contains the value "Request accepted" and the PGW receives some information, e.g. IP address, from external network entity, the PGW shall include the Protocol Configuration Options (PCO) IE which covers this information. | 1 | PCO |
| Private Extension | O | The PGW may include the Private Extension IE in Create Bearer Response message. | 1 | Private Extension |

Editors's note: PGW may return both IPv4 address and IPv6 prefix. It is FFS how these two End User addresses are supported in the message.

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.2.8 Responding to Default Bearer request across S5/S8 interface within the UE Requested PDN Connectivity procedure

Editor's note: It is FFS if the content of this subclause stays confined to Create Default Bearer Response message across S5/S8 interface, or if it will be generalized for all Create response messages.

A Create Bearer Response shall be sent from a PGW to a SGW as a response to a Create Bearer Request message as a part of the UE Requested PDN Connection procedure.

Table 7.2.2.8 specifies the presence requirements and the conditions of the IEs in the message.

The PGW shall include Cause IE in the Create Bearer Response message. This IE indicates if an EPS bearer has been created in the PGW and the SGW or not. The EPS Bearer has not been created in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

   Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

   Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

   Editor's notes: It is FFS whether an IPv4/IPv6 capable PGW should include both IPv4 and IPv6 addresses for control plane and user plane in this message.

The network does not support PPP bearer type in this version of the specification. Pre-Release 8 PPP functionality of a GGSN may be implemented in the PGW.

**Table 7.2.2.8: Information Elements in a Create Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| EPS Bearer ID (EBI) | O | If the Cause IE contains the value "Request accepted", the PGW may include the EPS Bearer ID received from the SGW in the Create Bearer Request message, in order to facilitate error handling in SGW.<br>NOTE: If an SGW receives a Create Bearer Response with an EPS Bearer ID IE included for which there is no corresponding outstanding request, an SGW may send a Delete Bearer Request towards the PGW that sent the Create Bearer Response with the EPS Bearer ID included. | 1 | EBI |
| PGW S5/S8 Address for Control Plane | O | If the Cause IE contains the value "Request accepted", the PGW may include PGW S5/S8 Address for Control Plane IE in Create Bearer Response message if the PGW decides to use different IP address for the subsequent communication. The SGW shall replace the old PGW address and use the new address when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| PGW S5/S8 TEID for Control Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Tunnel Endpoint Identifier for Control Plane IE in Create Bearer Response message. The SGW shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages which are related to the bearer. | 1 | TEID-C |
| PGW S5/S8 Address for User Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Address for User Plane IE in Create Bearer Response message. The SGW uses this IE when sending uplink data to this GTP-U tunnel. The SGW shall send all uplink G-PDUs which are related to the bearer to this address. | 1 | IP Address |
| PGW S5/S8 TEID for User Plane | C | If the Cause IE contains the value "Request accepted", the PGW shall include PGW S5/S8 Tunnel Endpoint Identifier for User Plane IE in Create Bearer Response message. The SGW uses this IE when sending uplink data to this GTP-U tunnel. The SGW shall include this TEID-U into the GTP-U header of all uplink G-PDUs which are related to the bearer. | 1 | TEID-U |
| End User (UE) Address | C | If the Cause IE contains the value "Request accepted", the PGW shall include the End User (UE) Address IE in Create Bearer Response message. | 1 | IP Address |
| Uplink Bearer Level TFT (Bearer TFT) | C | If the Cause IE contains the value "Request accepted", the PGW shall include the Uplink Bearer Level TFT IE. | 1 | Bearer TFT |
| Protocol Configuration Options (PCO) | C | If the Cause IE contains the value "Request accepted" and the PGW receives some information, e.g. IP address, from external network entity, the PGW shall include the Protocol Configuration Options (PCO) IE, which covers this information. | 1 | PCO |
| Private Extension | O | The PGW may include the Private Extension IE in Create Bearer Response message. | 1 | Private Extension |

Editor's note: PGW may return both IPv4 address and IPv6 prefix. It is FFS how these two End User addresses are supported in the message.

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.3 Request Bearer Resource Allocation

### 7.2.3.1 Request Bearer Resource Allocation across S11 interface within the UE Requested Bearer Resource Allocation procedure

A Request Bearer Resource Allocation message shall be sent from a MME to a SGW as a part of the UE Requested Bearer Resource Allocation procedure.

The MME shall include IMSI IE in Request Bearer Resource Allocation message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

Table 7.2.3.1 specifies the presence of the IEs in the message.

**Table 7.2.3.1: Information Elements in a Request Bearer Resource Allocation**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| Linked EPS Bearer ID (LBI) | M | None | 1 | LBI |
| Procedure Transaction Id (PTI) | M | None | 1 | PTI |
| SDF Level Quality of Service (SDF QoS) | M | None | 1 | SDF QoS |
| Uplink SDF Level TFT (SDF TFT) | M | None | 1 | SDF TFT |
| Downlink SDF Level TFT (SDF TFT) | M | None | 1 | SDF TFT |
| Protocol Configuration Options (PCO) | C | MME shall include Protocol Configuration Options (PCO) IE, if available. | ? | PCO |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.4 Request Bearer Resource Release

### 7.2.4.1 Request Bearer Resource Release across S11 interface within the UE Requested Bearer Resource Release procedure

A Request Bearer Resource Release message shall be sent from a MME to a SGW as a part of the UE Requested Bearer Resource Release procedure.

The MME shall include IMSI IE in Request Bearer Resource Release message.

Editor's note: Emergency call related matters (e.g. availability of IMSI) are FFS.

The MME shall include Linked EPS Bearer ID (LBI) IE in Request Bearer Resource Release message.

Editor's notes: It is FFS whether LBI is needed in this message.

Table 7.2.4.1 specifies the presence of the IEs in the message.

The MME shall include the Uplink SDF Level TFT (SDF TFT) IE and Downlink SDF Level TFT (SDF TFT) in Request Bearer Resource Release message.

Editor's notes: It is FFS whether Uplink SDF Level TFT and Downlink SDF Level TFT are both needed.

**Table 7.2.4.1: Information Elements in a Request Bearer Resource Release**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| Linked EPS Bearer ID (LBI) | FFS | FFS | ? | LBI |
| Procedure Transaction Id (PTI) | M | None | 1 | PTI |
| Uplink SDF Level TFT (SDF TFT) | FFS | FFS | ? | SDF TFT |
| Downlink SDF Level TFT (SDF TFT) | FFS | FFS | ? | SDF TFT |
| Protocol Configuration Options (PCO) | C | MME shall include Protocol Configuration Options (PCO) IE, if available. | ? | PCO |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.5 Update Bearer Request

### 7.2.5.1 Requesting Default Bearer modification across S11 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to default bearer modification across S11 interface, or if it will be generalized for all bearer modification messages.

An Update Bearer Request message shall be sent by MME to a SGW as a part of an attach procedure.

Table 7.2.5.1 specifies the presence of the IEs in the message.

The MME shall include one eNB S1-U Address for User Plane IE and eNB S1-U TEID for User Plane IE pair in Update Bearer Request message.

Editor's note: The case of shared eNB is FFS.

The MME may include Operation indication IE in Update Bearer Request message. The IE is used to inform SGW whether the SGW should continue forwarding the message to the PGW or not.

Editor's note: Usage of the Operation Indication is FFS.

**Table 7.2.5.1: Information Elements in a Update Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | O | None | 1 | EBI |
| MME S11 Address for Control Plane | C | The new MME includes these IEs after the TAU procedure. The MME does not include these IE in Update Bearer Request message, which immediately follows Create Default Bearer Request / Response messages. | ? | IP Address |
| MME S11 TEID for Control Plane | C | Conditional | ? | TEID-C |
| eNB S1-U Address for User Plane | M | None | 1 | IP Address |
| eNB S1-U TEID for User Plane | M | None | 1 | TEID-U |
| Operation indication | FFS | FFS | ? | Operation indication |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.5.2 Requesting Bearer modification across S11 interface within the S1 release procedure

Editor's note: It is FFS if the content of this subclause stays confined to bearer modification across S11 interface, or if it will be generalized for all bearer modification messages.

An Update Bearer Request message shall be sent by MME to a SGW as a part of an S1 release procedure.

Table 7.2.5.2 specifies the presence of the IEs in the message.

**Table 7.2.5.2: Information Elements in an Update Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Scope Indicator | M | This IE is used to inform SGW to release all the GTP-U tunnels and eNodeB related informations of the PDN connection of the UE. | 1 | Scope Indicator |
| Operation Indication | FFS | FFS<br>The MME may include Operation indication IE in Update Bearer Request message. The IE is used to inform SGW whether the SGW should continue forwarding the message to the PGW or not. | 1 | Operation Indication |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.5.3 Update Bearer Request across S11 interface during E-UTRAN Tracking Area Update without SGW Change procedure

An Update Bearer Request message shall be sent from a MME to a SGW as a part of E-UTRAN Tracking Area Update without SGW change procedure.

Table 7.2.5.3 specifies the presence requirements and conditions of the IEs in the message.

**Table 7.2.5.3: Information Elements in an Update Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| MME S11 Address for Control Plane | M | This IE specifies the downlink address for control plane messages which is chosen by the MME | 1 | IP Address |
| MME S11 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane messages which is chosen by the MME. The SGW shall include this TEID in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| Serving Network | M | None | 1 | Serving Network |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.5.4 Update Bearer Request across S4 interface during Routing Area Update with MME interaction and without SGW Change procedure

An Update Bearer Request message shall be sent from a SGSN to a SGW as a part of Routing Area Update with MME interaction and without SGW change procedure.

Table 7.2.5.4 specifies the presence requirements and conditions of the IEs in the message.

**Table 7.2.5.4: Information Elements in an Update Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| SGSN S4 Address for Control Plane | M | This IE specifies the downlink address for control plane messages which is chosen by the SGSN. | 1 | IP Address |
| SGSN S4 TEID for Control Plane | M | This IE specifies the downlink tunnel for control plane messages which is chosen by the SGSN. The SGW shall include this TEID in the GTP header of all downlink control plane messages which are related to the requested bearer. | 1 | TEID-C |
| QoS Negotiated | M | None | 1 | Legacy QoS |
| Serving Network | M | None | 1 | Serving Network |
| RAT Type | M | PGW may use this IE for PCC decision. | 1 | RAT Type |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.6 Update Bearer Response

### 7.2.6.1 Responding to the Default Bearer modification across S11 interface within the EUTRAN Initial Attach procedure

Editor's note: It is FFS if the content of this subclause stays confined to default bearer modification across S11 interface, or if it will be generalized for all bearer modification messages.

An Update Bearer Response message shall be sent by SGW to a MME as part of an attach procedure.

Table 7.2.6.1 specifies the presence of the IEs in the message.

The SGW shall include Cause IE in Update Bearer Response message.

The SGW may include EPS Bearer ID (EBI) IE in Update Bearer Response message.

**Table 7.2.6.1: Information Elements in a Update Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| EPS Bearer ID (EBI) | O | None | 0 | EBI |
| Private Extension | O | None | 0 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.6.2 Responding to the Bearer modification across S11 interface within the S1 release procedure

Editor's note: It is FFS if the content of this subclause stays confined to default bearer modification across S11 interface, or if it will be generalized for all bearer modification messages.

An Update Bearer Response message shall be sent by SGW to a MME as part of an S1 release procedure.

Table 7.2.6x specifies the presence of the IEs in the message.

**Table 7.2.6.2: Information Elements in an Update Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.6.3 Update Bearer Response across S11 interface during E-UTRAN Tracking Area Update without SGW Change procedure

An Update Bearer Response shall be sent as a response to an Update Bearer Request message during E-UTRAN Tracking Area Update without SGW change procedure.

Table 7.2.6.3 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if an bearer context has been updated in the SGW and PGW or not. The EPS bearer has not been updated in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.6.3: Information Elements in an Update Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.6.4 Update Bearer Response across S4 interface during Routing Area Update with MME interaction and without SGW Change procedure

An Update Bearer Response shall be sent as a response to an Update Bearer Request message during Routing Area Update with MME interaction and without SGW change procedure.

Table 7.2.6.4 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if an bearer context has been updated in the SGW and PGW or not. Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.6.4: Information Elements in an Update Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.7 Delete Bearer Request

### 7.2.7.1 Delete Default Bearer Request

A Delete Bearer Request message shall be sent as a part of the UE detach procedure.

Table 7.2.7.1 specifies the presence of the IEs in the message.

Editor's note: If handovers without optimization occurs from 3GPP to non-3GPP, the PDN GW sends Delete Bearer Request message to the Serving GW involved to delete all bearers with the PDN address. The Serving GW sends Delete Bearer Request message to the MME involved to delete all bearers with the PDN address. If there are active bearer contexts in MME for a particular UE at attach procedure, the MME deletes all these bearer contexts by sending Delete Bearer Request messages to the Serving GW involved.

Editor's note: If all bearers for a UE are deleted, the MME shall detach the UE.

Editor's note: Specifying the conditions for EBI is FFS.

Editor's note: Usage of Teardown Indicator is FFS.

A Delete Bearer Request message may include an operation indication which is used to inform SGW whether the SGW should continue forwarding the message to the PGW or not when it receives this message.

Editor's note: Usage of Teardown Indicator is FFS.

**Table 7.2.7.1: Information Elements in a Delete Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | C | Conditional | ? | EBI |
| Operation indication | FFS | FFS | ? | Operation indication |
| Private Extension | O | None | 0 | Private Extension |

### 7.2.7.2 Delete Bearer Request over S11 interface during the UE Requested PDN Disconnection procedure

The Delete Bearer Request shall be sent from a MME to a Serving GW as part of the UE Requested PDN Disconnection procedure.

The Linked Bearer ID IE shall be included to indicate the default bearer associated with the PDN being disconnected.

Editor's note: Usage of Teardown Indicator is FFS.

**Table 7.2.7.2: Information Elements in Delete Bearer Request during the UE Requested PDN Disconnection procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Linked Bearer ID (LBI) | M | None | 1 | EBI |
| Private Extension | O | None | 0 | Private Extension |

### 7.2.7.3 Delete Bearer Request across S11 interface during E-UTRAN Tracking Area Update with MME and SGW change procedure

The Delete Bearer Request shall be sent from an old MME to a Serving GW as part of the E-UTRAN Tracking Area Update with MME and SGW change procedure.

Table 7.2.7.3 specifies the presence requirements and conditions of the IEs in the message.

Editor's note: Specifying the conditions for EBI is FFS.

Editor's note: Usage of Teardown Indicator is FFS.

**Table 7.2.7.3: Information Elements in a Delete Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | C | FFS | 1 | EBI |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.7.4 Delete Bearer Request across S11 interface during Routing Area Update with MME interaction and with SGW change procedure

The Delete Bearer Request shall be sent from an old MME to a Serving GW as part of the Routing Area Update with MME interaction and with SGW change procedure.

Table 7.2.7.4 specifies the presence requirements and conditions of the IEs in the message.

Editor's note: Specifying the conditions for EBI is FFS.

Editor's note: Usage of Teardown Indicator is FFS.

**Table 7.2.7.4: Information Elements in a Delete Bearer Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | C | FFS | 1 | EBI |
| Private Extension | O | None | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.7.5 Delete Bearer Request over S5/S8 interface during the EUTRAN Initial Attach procedure

The Delete Bearer Request may be sent from a SGW to a PGW as part of the EUTRAN Initial Attach procedure as defined in 3GPP TS 23.401 [3].

Table 7.2.7.5 specifies the presence requirements and the conditions of the IEs in the message.

**Table 7.2.7.5: Information Elements in Delete Bearer Request during the EUTRAN Initial Attach procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | M | | 1 | EBI |
| Private Extension | O | The SGW may include Private Extension IE in Delete Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.7.6 Delete Bearer Request over S5/S8 interface during the UE Requested PDN Disconnection procedure

The Delete Bearer Request shall be sent from a SGW to a PGW as part of the UE Requested PDN Disconnection procedure.

Table 7.2.7.6 specifies the presence requirements and the conditions of the IEs in the message.

Editor's note: Usage of Teardown Indicator is FFS.

**Table 7.2.7.6: Information Elements in Delete Bearer Request during the UE Requested PDN Disconnection procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Linked Bearer ID (LBI) | M | The Linked Bearer ID IE shall be included to indicate the default bearer associated with the PDN being disconnected. | 1 | EBI |
| Private Extension | O | The SGW may include Private Extension IE in Delete Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.7.7 Delete Bearer Request over S11 interface during the EUTRAN Initial Attach procedure

The Delete Bearer Request may be sent from a MME to a SGW as part of the EUTRAN Initial Attach procedure as defined in 3GPP TS 23.401 [3].

Table 7.2.7.7 specifies the presence requirements and the conditions of the IEs in the message.

**Table 7.2.7.7: Information Elements in Delete Bearer Request during the EUTRAN Initial Attach procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| EPS Bearer ID (EBI) | M | | 1 | EBI |
| Private Extension | O | The MME may include Private Extension IE in Delete Bearer Request message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.8 Delete Bearer Response

### 7.2.8.1 Delete Default Bearer Response

A Delete Bearer Response message shall be sent as a response to a Delete Bearer Request message.

Table 7.2.8.1 specifies the presence of the IEs in the message.

The sending entity shall include Cause IE in the Delete Bearer Response message. The IE indicates if the peer has deleted the bearer, or not.

**Table 7.2.8.1: Information Elements in a Delete Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| Private Extension | O | None | 0 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

### 7.2.8.2 Delete Bearer Response over S11 interface during the UE Requested PDN Disconnection procedure

The Delete Bearer Response shall be sent from Serving GW to MME as a reponse of Delete Bearer Request.

The sending entity shall include Cause IE in the Delete Bearer Response message. The IE indicates if the entity has disconnected the PDN, or not.

**Table 7.2.8.2: Information Elements in Delete Bearer Response during the UE Requested PDN Disconnection procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| Private Extension | O | None | 0 | Private Extension |

Editor's note: It is FFS whether the Linked Bearer Id is included in this message.

## 7.2.8.3 Delete Bearer Response across S11 interface during E-UTRAN Tracking Area Update with MME and SGW change procedure

The Delete Bearer Response shall be sent from a SGW to the old MME as a response to Delete Bearer Request during E-UTRAN Tracking Area Update with MME and SGW change procedure

Table 7.2.8.3 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if the peer has deleted the bearer, or not. The bearer has not been deleted in the SGW and PGW if the Cause IE value differs from "Request accepted".    Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.8.3: Information Elements in a Delete Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

## 7.2.8.4 Delete Bearer Response across S11 interface during Routing Area Update with MME interaction and with SGW change procedure

The Delete Bearer Response shall be sent from a SGW to the old MME as a response to Delete Bearer Request during Routing Area Update with MME interaction and with SGW change procedure

Table 7.2.8.4 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if the peer has deleted the bearer, or not. The bearer has not been deleted in the SGW and PGW if the Cause IE value differs from "Request accepted".    Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.2.8.4: Information Elements in a Delete Bearer Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.7.2.8.5 Delete Bearer Response over S5/S8 interface during the EUTRAN Initial Attach procedure

The Delete Bearer Response shall be sent from PGW to SGW as a reponse of Delete Bearer Request as part of the EUTRAN Initial Attach procedure.

Table 7.2.8.5 specifies the presence requirements and the conditions of the IEs in the message.

The sending entity shall include Cause IE in the Delete Bearer Response message. The IE indicates if an EPS bearer has been deleted by the PGW and the SGW or not. The EPS Bearer has not been deleted in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

    Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

    Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

**Table 7.2.8.5: Information Elements in Delete Bearer Response during the EUTRAN Initial Attach procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | The PGW may include the Private Extension IE in Delete Bearer Response message. | 1 | Private Extension |

    Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.8.6 Delete Bearer Response over S5/S8 interface during the UE Requested PDN Disconnection procedure

The Delete Bearer Response shall be sent from PGW to SGW as a reponse of Delete Bearer Request as part of the UE Requested PDN Disconnection procedure.

Table 7.2.8.6 specifies the presence requirements and the conditions of the IEs in the message.

The sending entity shall include Cause IE in the Delete Bearer Response message. The IE indicates if a PDN connection has been deleted in the PGW and the SGW or not. The PDN connection has not been deleted in the SGW and PGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

    Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

    Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

**Table 7.2.8.6: Information Elements in Delete Bearer Response during the UE Requested PDN Disconnection procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | The PGW may include the Private Extension IE in Delete Bearer Response message. | 1 | Private Extension |

    Editor's note: It is FFS whether the Linked Bearer Id is included in this message.

Editor's notes: It is FFS whether there is more Information Element for this message.

### 7.2.8.7 Delete Bearer Response over S11 interface during the EUTRAN Initial Attach procedure

The Delete Bearer Response shall be sent from SGW to MME as a reponse of Delete Bearer Request as part of the EUTRAN Initial Attach procedure.

Table 7.2.8.7 specifies the presence requirements and the conditions of the IEs in the message.

The sending entity shall include Cause IE in the Delete Bearer Response message. The IE indicates if an EPS bearer has been deleted by the MME and the SGW or not. The EPS Bearer has not been deleted in the MME and SGW if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

Editor's note: It is FFS whether any other existing IEs or new IEs that can be added in later versions of the specification need to be included in negative responses.

**Table 7.2.8.7: Information Elements in Delete Bearer Response during the EUTRAN Initial Attach procedure**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| Private Extension | O | The SGW may include the Private Extension IE in Delete Bearer Response message. | 1 | Private Extension |

Editor's notes: It is FFS whether there is more Information Element for this message.

## 7.2.9 Create Forwarding Tunnel Request

Editor's Note: It is FFS if this request message and corresponding response message will be sent per PDN connection basis.

A Create Forwarding Tunnel Request message shall be sent by a MME to a Serving GW as a part of the MME configures resources for indirect data forwarding during active handover procedure from E-UTRAN to CDMA 2000 HRPD access.

Table 7.2.9 specifies the presence requirements and the conditions of the IEs in the message.

**Table 7.2.9: Information Elements in a Create Forwarding Tunnel Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| S103 PDN Data Forwarding Info | M | The MME shall include the forwarding Infomation for all PDN connections of the UE requesting data forwarding towards the PDSN in the message as S103 PDN Data Forwarding Info information elements. The Serving GW shall forward downlink data to the PDSN via the GRE tunnel identified by the PDSN Address and PDSN GRE Key included in this information element when it receives downlink data forwarded from the eNodeB belonging to the corresponding EPS bearers of the PDN connection. | 1 | S103PDF |

## 7.2.10 Create Forwarding Tunnel Response

A Create Forwarding Tunnel Response message shall be sent by a Serving GW to a MME as a response to a Create Forwarding Tunnel Request message.

Table 7.2.10 specifies the presence requirements and the conditions of the IEs in the message.

The Cause value indicates if Data Forwarding Resources has been created in the Serving GW or not. Data Forwarding Resources have not been created in the Serving GW if the Cause differs from 'Request accepted'. Possible Cause values are:

- "Request Accepted".

- "No resources available".

- "System failure".

- "Mandatory IE incorrect".

- "Mandatory IE missing".

- "Optional IE incorrect".

- "Invalid message format".

Only the Cause IE shall be included in the response if the Cause IE contains another value than 'Request accepted'.

**Table 7.2.10: Information Elements in a Create Forwarding Tunnel Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| S1-U Data Forwarding Info | C | S1-U Data Forwarding Info shall be included in the message if the Cause contains the value 'Request accepted'. For each EPS bearer requesting data forwarding which is included in the S103 PDN Data Forwarding Info fields of corresponding Create Forwarding Tunnel Request message, the Serving GW shall assign a Serving GW S1-U Address and Serving GW S1-U TEID pair and included it in the response message as S1-U Data Forwarding Info information element. The eNodeB shall forward downlink data of the EPS bearer to the Serving GW via the GTP-U tunnel identified by the Serving GW S1-U Address and Serving GW S1-U TEID. | 1 | S1UDF |

# 7.3 Mobility Management Messages

## 7.3.1 Forward Relocation Request

### 7.3.1.1 Forward Relocation Request across S10 interface during Inter eNodeB Handover with MME Relocation procedure

A Forward Relocation Request message shall be sent from the source MME to the target MME as part of inter eNodeB handover with MME relocation procedure.

Table 7.3.1.1 specifies the presence requirements and conditions of the IEs in the message.

**Table 7.3.1.1: Information Elements in a Forward Relocation Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| IMSI | M | None | 1 | IMSI |
| MME S10 Address for Control Plane | M | This IE specifies the address for control plane message which is chosen by the source MME | 1 | IP-Address |
| MME S10 TEID for Control Plane | M | This IE specifies the tunnel for control plane message which is chosen by the source MME. The target MM shall include this TEID in the GTP header of all related control plane messages which are related to the requested bearer. | 1 | TEID-C |
| MME UE Context | M | None | 1 | FFS |
| Indication | C | This IE is included if direct forwarding is applied from the source eNodeB to the target eNodeB | 1 | Indication |
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

## 7.3.2 Forward Relocation Response

### 7.3.2.1 Forward Relocation Response across S10 interface during Inter eNodeB Handover with MME Relocation procedure

A Forward Relocation Response message shall be sent as a response to Forward Relocation Request during inter eNodeB handover with MME relocation procedure.

Table 7.3.2.1 specifies the presence requirements and conditions of the IEs in the message.

Cause IE indicates if the relocation has been accepted, or not. The relocation has not been accepted by the target MME if the Cause IE value differs from "Request accepted". Possible Cause values are:

- "Request accepted".

Editor's note: Other potential Cause values are FFS.

**Table 7.3.2.1: Information Elements in a Forward Relocation Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | | 1 | Cause |
| MME S10 Address for Control Plane | O | If the Cause IE contains the value" Request accepted", the target MME may include MME S10 Address for Control Plane IE in Forward Relocation Response message if target MME decides to use different IP address for the subsequent communication. The source MME shall store this MME address and use it when sending subsequent control plane messages to this GTP-C tunnel. | 1 | IP Address |
| MME S10 TEID for Control Plane | C | The target MME shall includeMME S10 Tunnel Endpoint Identifier for Control Plane IE in Forward Relocation Response message if the Cause IE contains the value "Request accepted". The source MME shall include this TEID-C in the GTP-C header of all subsequent uplink control plane messages from the source MME to the target MME. | 1 | TEID-C |
| Indication | C | If the Cause IE contains the value "Request accepted ", this IE is included if the target MME has selected a new SGW | 1 | Indication |
| SGW S1-U Address for user plane | C | If the Cause IE contains the value "Request accepted", this IE is included if indirect forwarding is used | 1 | IP Address |
| SGW S1-U TEID for user plane | C | If the Cause IE contains the value "Request accepted", this IE is included if indirect forwarding is used | 1 | TEID-U |
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

## 7.3.3 Forward Relocation Complete

### 7.3.3.1 Forward Relocation Complete across S10 interface during Inter eNodeB Handover with MME Relocation procedure

A Forward Relocation Complete message shall be sent to the source MME to indicate the inter eNodeB handover with MME relocation has been successfully finished during inter eNodeB handover with MME relocation procedure.

Table 7.3.3.1 specifies the presence requirements and conditions of the IEs in the message.

**Table 7.3.3.1: Information Elements in a Forward Relocation Complete**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

## 7.3.4 Forward Relocation Complete Acknowledge

### 7.3.4.1 Forward Relocation Complete Acknowledge across S10 interface during Inter eNodeB Handover with MME Relocation procedure

A Forward Relocation Complete Acknowledge message shall be sent as a response to Forward Relocation Complete during inter eNodeB handover with MME relocation procedure.

Table 7.3.4.1 specifies the presence requirements and conditions of the IEs in the message.

**Table 7.3.4.1: Information Elements in a Forward Relocation Complete Acknowledge**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Cause | M | None | 1 | Cause |
| Private Extension | O | None | 1 | Private Extension |

Editor's note: It is FFS whether there is more Information Element for this message.

# 7.4 Reliable Delivery of Signaling Messages

Each path maintains a queue with signaling messages to be sent to the peer. The message at the front of the queue, if it is a request for which a response has been defined, shall be sent with a Sequence Number, and shall be held in a path list until a response is received. Each path has its own list. The Sequence Number shall be unique for each outstanding request message sourced from the same IP/UDP endpoint. A node running GTP may have several outstanding requests while waiting for responses. A single request shall be answered with a single response, regardless whether it is per UE, per APN, or per bearer. A single message shall only have one sequence number.

A timer shall be started when a signaling request message (for which a response has been defined) is sent. A signaling message request or response has probably been lost if a response has not been received before the timer expires.

Editor's Note: it is FFS how many response timers are needed and how the timers shall be handled.

Once a timer expires, the request is then retransmitted if the total number of request attempts is less than N3-REQUESTS times. The timer shall be implemented in the control plane application as well as user plane application for Echo Request / Echo Response. The timers and the number of retries (N3-REQUESTS) shall be configurable per procedure.

All received request messages shall be responded to and all response messages associated with a certain request shall always include the same information. Duplicated response messages shall be discarded. A response message without a matching outstanding request should be considered as a duplicate.

If a GTPv2 node is not successful with the transfer of a signaling message, e.g. a Create Bearer Context Request message, it shall inform the upper layer of the unsuccessful transfer so that the controlling upper entity may take the necessary measures.

# 7.5 Error Handling

*To be edited*

## 7.5.1 Protocol Errors

A protocol error is defined as a message or Information Element received from a peer entity with unknown, unforeseen or erroneous content. The term silently discarded is used in the following subclauses to mean that the receiving GTP entity's implementation shall discard the message without further processing, or if possible discard the optional IE and continue processing. The receiving entity should however log the event including the erroneous message and should include the error in a statistical counter. Silently Discarding a message or IE(s) within a message should only be used for messages or IE(s) that can be safely ignored.

Editor's Note: It is FFS how this principle is specified.

A receiving node may deviate from the required error handling requirements, in the case of sending back messages with cause values, in order to limit traffic load or mitigate against a denial-of-service attack.

An information element with 'Mandatory' in the 'Presence requirement' column of a message definition shall always be present in that message.

Editor's note: The semantic conditions for presence of Information Element i.e. whether an IE is: mandatorily present, conditionally present, optionally present or mandatorily absent, needs consideration.

The Error Indication and Version Not Supported messages shall be considered as Responses for the purpose of this subclause.

The subclauses 7.5.2 to 7.5.14 shall be applied in decreasing priority.

Editor's note: It needs to be determined whether we keep this type of decreasing priority order of errors.

## 7.5.2 Different GTP Versions

If a receiving peer node receives a GTP message of an unsupported version, that node shall return a GTP Version Not Supported message indicating in the Version field of the GTP header the latest GTP version that that node supports. The received GTP-PDU shall then be discarded.

Editor's note: We may want to send all Versions that are supported in the same way as the CER/CEA interchange of Diameter. As S101 etc. will use GTP so this version is considered as another application of GTPv2 so if GTPv2 is supported must we also support S101? Or can they be supported independently?

## 7.5.3 GTP Message Too Short

When a GTP message is received, and it is too short to contain the GTP header for the GTP version that the sender claims to use, the GTP-PDU message shall be silently discarded.

Editor's note: Do we want to keep it this way?

## 7.5.4 Unknown GTP Signalling Message

When a message using a Message Type value defining an Unknown GTP signalling message is received, it shall be silently discarded.

## Editor's note: Do we want to keep it this way?7.5.5 Unexpected GTP Signalling Message

When an unexpected GTP control plane message is received, e.g. a Response message for which there is no corresponding outstanding Request it shall be silently discarded but only when it is safe to do this.

Editor's note: We may want to reconsider this handling for all scenarios.

## 7.5.6 Missing Mandatory Information Elements

The receiver of a GTP signalling Request message with a missing mandatory information element shall discard the request, it should log the error, and shall send a Response with Cause set to 'Mandatory IE missing' together with a value of the missing mandatory IE.

The receiver of a Response with a missing mandatory information element shall notify the upper layer and should log the error.

## 7.5.7 Invalid Length

TLV format information element shall have a variable length. In a received GTP signalling message Request, a mandatory TLV format information element may have a Length different from the Length defined in the version that this message claims to use. In this case, this information element shall be discarded, the error should be logged, and a Response shall be sent with Cause set to 'Mandatory IE incorrect' together with a copy of the offending mandatory IE.

In a received GTP signalling Response message, if a mandatory TLV format information element has a Length different from the Length defined in the version that this message claims to use, then the requesting entity shall treat the GTP signalling procedure as having failed. A message shall be sent with Cause set to 'Mandatory IE incorrect' together with a copy of the offending mandatory IE.

## 7.5.8     Invalid Mandatory Information Element

The receiver of a GTP signalling message Request including a mandatory information element with a Value that is not in the range defined for this information element value shall discard the request, should log the error, and shall send a response with Cause set to 'Mandatory IE incorrect' together with a copy of the offending mandatory IE.

The receiver of a GTP signalling message Response including a mandatory information element with a Value that is not in the range defined for this information element shall notify the upper layer that a message with this sequence number has been received and should log the error. It shall send a response with Cause set to 'Mandatory IE incorrect' together with a copy of the offending mandatory IE.

If a GSN receives an information element with a value which is shown as reserved, it shall treat that information element as invalid and should log the error. It shall send a response with Cause set to 'Reserved Message Value Received' together with a copy of the offending message.

The principle is: the use of reserved values invokes error handling; the use of spare values can be silently discarded and so in the case of IEs with spare values used, processing shall be continued ignoring the spare values.

## 7.5.9     Invalid Optional Information Element

The receiver of a GTP signalling message including an optional information element with a Value that is not in the range defined for this information element value shall discard this IE, should log the error, send a Cause value back with the offending IE but shall treat the rest of the message as if this IE was absent and continue processing.

If a GTP entity receives an information element with a value which is shown as reserved, it shall treat that information element as not being in the range defined for the information element.

Editor's note: The action taken depends if the value is Spare or Reserved. If reserved value is used in an optional IE then a cause shall be sent back with the offending IE. Processing can still continue if the optional IE is not required to achieve a successful outcome.

The receiver shall not check the content of an information element field that is defined as 'spare'.

Editor's note: It silently discards this but if this value is required to continue operation i.e. a conditional IE then this may not be true.

## 7.5.10    Unknown Information Element

An information element with an unknown Type value shall be ignored by the receiver of the message. Tthis information element shall be skipped using its Length value.

If the receiving node cannot interpret the rest of the message because of the ignored information element, the receiving node shall discard the message, it should log the error and shall send a Cause value set to 'Invalid message format' together with the offending IE. If the message was a Request, it shall return a response with Cause set to 'Invalid message format' together with the offending IE.

## 7.5.11    Out of Sequence Information Elements

If two or more information elements are out of sequence in a message, the receiving node shall discard the message and should log the error. In addition, if the message was a Request, the receiving node shall return a Response with Cause set to 'Invalid message format'.

Editor's note: Do we want to keep it this way or can we send IEs in any order?

## 7.5.12    Unexpected Information Element

An information element with a Type value which is defined in section x.x of the present specification but is not expected in the received GTP signalling message shall be ignored (skipped) and the rest of the message processed as if this information element was not present.

### 7.5.13 Repeated Information Elements

If an information element is repeated in a GTP signalling message in which repetition of the information element is not specified, only the contents of the information element appearing first shall be handled and all subsequent repetitions of the information element shall be ignored. When repetition of information elements is specified, only the contents of specified repeated information elements shall be handled.

> Editor's note: Processing shall be continued but a Cause value shall be sent back a value set to "unexpected repeated IE" together with the repeated IE. When repetition of information elements is specified, only the contents of specified repeated information elements shall be handled.

### 7.5.14 Incorrect Optional Information Elements

All optional information elements that are incorrect in a GTP signalling message shall be treated as not present in the message. However, if the receiving node cannot handle the message correctly because of the incorrect information element, the receiving node should log the error and shall return a response with Cause set to 'Optional IE incorrect' together with the offending IE.

## 7.6 Path Failure

*To be edited*

> Editor's note: This should be considered separately

> MMEa Editor's note: When an MS detaches, all ongoing GTP control plane procedures related to this MS shall be aborted. The MME shall send a Delete PDP Context Request messages for all active PDP contexts to the peer PDNs. This will have to be investigated as it. This will have to be investigated as it looks like stage 2 matter.

## 7.7 Restoration and Recovery

*To be edited*

> Editor's note: This should be considered separately.

## 7.8 Fallback to GTPv1 mechanism

GTPv2 entity shall fallback to GTPv1 only if it receives "Version Not Supported" message in GTPv1 format as specified in 3GPP TS 29.060 [4]. Stage 2 spec 3GPP TS 23.401 [3] defines cases when GTPv2 entity shall execute the respective legacy procedure by sending GTPv1 messages.

# 8 GTP-U messages

*To be edited*

## 8.1 Path Management Messages

Two path management messages are specified for GTP-U: Echo Request and Echo Response.

> Editor's note: It is FFS if GTP-U needs also Version Not Supported message.

### 8.1.1 Echo Request

A GTP-U entity may send an Echo Request to find out if the peer entity is alive. When and how often an Echo Request message may be sent is implementation specific but an Echo Request shall not be sent more often than every 60 s on each path. Table 8.1.1 specifies the information elements included in the Echo Request message.

Editor's note: This is an implementation issue, but it is recommended that Echo Request should be sent only when a GTP-U entity has not received any G-PDU on the GTP-U path for a specific time.

The optional Private Extension contains vendor or operator specific information.

**Table 8.1.1: Information Element in Echo Request**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Private Extension | O | None | 0 | Private Extension |

## 8.1.2 Echo Response

A GTP-U shall be prepared to receive an Echo Request at any time and it shall reply with an Echo Response. Table 8.1.2 specifies the information element included in the Echo Response message.

The optional Private Extension contains vendor or operator specific information.

Editor's note: It is FFS if Recovery is necessary for GTP-U Echo Response.

**Table 8.1.2: Information Element in Echo Response**

| Information elements | P | Condition / Comment | CR | IE Type |
|---|---|---|---|---|
| Private Extension | O | None | 0 | Private Extension |

## 8.2 Tunnel Management Messages

*To be edited*

## 8.3 User Plane Data Messages

*To be edited*

## 8.4 Error Handling

*To be edited*

# 9 Information Elements

## 9.1 Information Element Types

A GTP control plane (signaling) message may contain several information elements. In order to have forward compatible type definitions for the GTPv2 information elements, all of them shall be TLV coded. GTPv2 information element type values are specified in the Table 9.1.

The Length field contains the length of the information element excluding the Type and Length field.

For all the length fields, bit 8 of the lowest numbered octet is the most significant bit and bit 1 of the highest numbered octet is the least significant bit.

Within information elements, certain fields may be described as spare. These bits shall be transmitted with the value set to 0. To allow for future features, the receiver shall not evaluate these bits.

**Table 9.1: Information Element types for GTPv2**

| IE Type value (Decimal) | Information elements | Comment / Reference |
|---|---|---|
| 0 | Reserved | |
| 1 | International Mobile Subscriber Identity (IMSI) | Extendable / |
| 2 | Cause | Extendable / |
| 3 | Recovery (Restart Counter) | Extendable / |
| 4-70 | Reserved for other protocols (e.g. S101 AP) | Extendable / |
| 71 | Access Point Name (APN) | Extendable / |
| 72 | Aggregate Maximum Bit Rate (AMBR) | Extendable / |
| 73 | EPS Bearer ID (EBI) | Extendable / |
| 74 | IP Address | Extendable / |
| 75 | Mobile Equipment Identity (MEI) | Extendable / |
| 76 | MSISDN | Extendable / |
| 77 | Indication | Extendable / |
| 78 | Protocol Configuration Options (PCO) | Extendable / |
| 79 | PDN Address Allocation (PAA) | Extendable / |
| 80 | EPS Bearer Level Quality of Service (Bearer QoS) | Extendable / |
| 81 | Service Data Flow Level Quality of Service (Flow QoS) | Extendable / |
| 82 | RAT Type | Not Extendable / |
| 83 | Serving Network | Extendable / |
| 84 | TEID-C | Not Extendable / |
| 85 | TEID-U | Not Extendable / |
| 86 | TEID-U with EPS Bearer ID | Extendable / |
| 87 | EPS Bearer Level Traffic Flow Template (Bearer TFT) | Extendable / |
| 88 | Service Data Flow Level Traffic Flow Template (Flow TFT) | Extendable / |
| 89 | User Location Info (ULI) | Extendable / |
| 90 | Fully Qualified Tunnel Endpoint Identifier (F-TEID) | Extendable / |
| 91 | Scope Indicator | Extendable / |
| 92 | Protocol Type | Extendable / |
| 93 | Legacy Quality of Service (QoS) | Extendable/ |
| 94 | S103 PDN Data Forwarding Info | Extendable / |
| 95 | S1-U Data Forwarding Info | Extendable / |
| 96-254 | Spare. For future use. | FFS |
| 255 | Private Extension | Extendable / |

# 9.2    Information Element Format

T9iable 9.2 depicts the format of an information element, which has the following mandatory fields:

- Type field: This field indicates the type of Information Element. The valid values of the IE type are defined in clause 9.1.

- Comprehension Required (CR) flag: If CR flag is set to 1, the comprehension of the IE is required. This flag may have variable values (0 or 1) only within optional IEs, and shall be set to 1 for all mandatory or conditional IEs.

Editor's note: Currently it is assumed that CR = 0 for GTP-U.

- Length: This field contains the length of the information element excluding the Type and Length field

**Table 9.2: Common IE Fields**

| Octets | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type | | | | | | | |
| 2 | CR | Length (fist octet) | | | | | | |
| 3 | Length (second octet) | | | | | | | |
| 4-(n+3) | IE specific data | | | | | | | |

The Comprehension Required (CR) flag shall be used in the following way:

- CR flag is set to 1 in a Request message: if the receiving GTP entity cannot comprehend the IE, then the receiver shall discard the request, should log the error, and shall send a response with an appropriate Cause value.

Editor's note: it is FFS if Cause should be amended by complete IE or only its Type.

- CR flag is set to 1 in a Response message: if the receiving GTP entity cannot comprehend the IE, then the receiver shall notify the upper layer that a message with this unknown IE has been received and should log the error.

Editor's note: it is FFS if an error notification should be sent.

# 9.3 International Mobile Subscriber Identity (IMSI)

International Mobile Subscriber Identity (IMSI) is transferred via GTP tunnels. The sending entity copies the value part of the IMSI into the Value field of the IMSI IE. IMSI is defined in 3GPP TS 23.003 [2].

Editor's note: IMSI coding will be defined in TS 24.301.

Editor's note: In the first release of GTPv2 spec (TS 29.274v8.0.0) n = 8. That is, the overall length of the IE is 11 octets. In future releases of the spec additional octets may be specified. The legacy receiving entity simply ignores the unknown octets.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 1 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | International Mobile Subscriber Identity (IMSI) | | | | | | | |

**Figure 9.3: IMSI**

# 9.4 Cause

Cause IE is coded as this is depicted in Figure 9.4.1.

| . | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 2 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Cause value | | | | | | | |
| 5-(n+3) | These octet(s) is/are present only if explicitly specified | | | | | | | |

**Figure 9.4.1: Cause**

The Cause value shall be included in the response message. In a response message, the Cause value indicates the acceptance or the rejection of the corresponding request message. The Cause value shall indicate the explicit reason for the rejection.

If the rejection is due to a faulty IE, the offending IE shall be included as embedded IE within the cause "IE". In this case, the Cause IE becomes a grouped IE. The IE would be coded as depicted if Figure 9.4.2.

Editor's note: The actual cause values for which the "offending IE" parameter shall be present shall be added explicitly in the previous paragraph.

| . | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 71 (decimal) | | | | | | | |
| 2-3 | Length = n + 4 | | | | | | | |
| 4 | Cause value | | | | | | | |
| 5 | Type = <type of the offending IE> | | | | | | | |
| 6-7 | Length = n (decimal) | | | | | | | |
| 8-(n+7) | Value of the offending IE | | | | | | | |

**Figure 9.4.2: Cause including an embedded "offending IE"**

The Cause may also be included in the request message. In a request message, the Cause value indicates the reason for the request.

"Request accepted" is returned when the GTPv2 entity has accepted a control plane request.

**Table 9.4.2: Cause values**

| Message Type | Cause value (decimal) | Meaning |
|---|---|---|
|  | 0 | Reserved. Shall not be sent and if received the Cause shall be treated as an invalid IE |
| Request | 1-15 | Spare. This value range is reserved for Cause values in a request message |
| Acceptance Response | 16 | Request accepted |
| Acceptance Response | 17-63 | Spare. This value range is reserved for Cause values in acceptance response message |
| Rejection Response | 64-255 | Spare. This value range is reserved for Cause values in rejection response message |

Editor's note: In the first release of GTPv2 spec (TS 29.274v8.0.0) the value of the length field of this IE is 1 for cause values without "offending IE", and 4 + the length of the offending IE for those including it. In future releases of the spec additional octets may be specified. The legacy receiving entity simply ignores the unknown octets and values in the spare bits.

# 9.5 Recovery (Restart Counter)

Recovery IE is coded as this is depicted in Figure 9.5.

Editor's note: In the first release of GTPv2 spec (TS 29.274v8.0.0) n = 1. That is, the overall length of the IE is 4 octets. In future releases of the spec additional octets may be specified. The legacy receiving entity simply ignores the unknown octets.

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 3 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Recovery (Restart Counter) | | | | | | | |
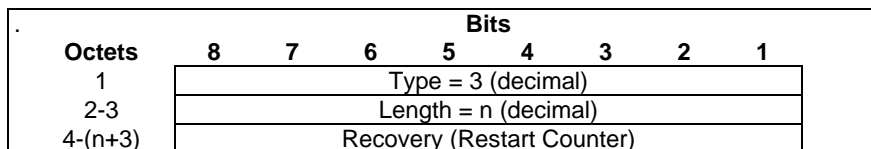
**Figure 9.5: Recovery (Restart Counter)**

# 9.6 Access Point Name (APN)

Access Point Name (APN) is transferred via GTP tunnels. The sending entity copies the value part of the APN into the Value field of the APN IE.

Editor's note: APN will be defined in 3GPP TS 23.003.

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 71 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Access Point Name (APN) | | | | | | | |

**Figure 9.6: Access Point Name (APN)**

# 9.7 Aggregate Maximum Bit Rate (AMBR)

Aggregate Maximum Bit Rate (AMBR) is transferred via GTP tunnels. The sending entity copies the value part of the AMBR into the Value field of the AMBR IE.

Editor's note: AMBR will be defined in 3GPP TS 23.003 and its coding in TS 24.301.

| | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 72 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Aggregate Maximum Bit Rate (AMBR) | | | | | | | |

**Figure 9.7: Aggregate Maximum Bit Rate (AMBR)**

# 9.8 EPS Bearer ID (EBI)

EPS Bearer ID (EBI) is coded as this is depicted in Figure 9.8.

Editor's note: In the first release of GTPv2 spec (TS 29.274v8.0.0) n = 1 and all spare bits in Octet 4 are set to 0. That is, the overall length of the IE is 4 octets. In future releases of the spec additional octets may be specified and new semantic for the spare bits may be defined. The legacy receiving entity simply ignores the unknown octets and values in the spare bits.

| | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 73 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Spare (all bits set to 0) | | | | EPS Bearer ID (EBI) | | | |
| 5-(n+3) | These octet(s) is/are present only if explicitly specified | | | | | | | |

**Figure 9.8: EPS Bearer ID (EBI)**

# 9.9 IP Address

IP Address is coded as this is depicted in Figure 9.9. The Length field may have only two values (4 or 16) that determine if the Value field contains IPv4 or IPv6 address.

| | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 74 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | IPv4 or IPv6 Address | | | | | | | |

**Figure 9.9: IP address**

# 9.10 Mobile Equipment Identity (MEI)

Mobile Equipment Identity (MEI) is transferred via GTP tunnels. The sending entity copies the value part of the MEI into the Value field of the MEI IE. MEI is defined in 3GPP TS 23.003 [2].

Editor's note: MEI coding will be defined in TS 24.301.

| | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 75 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Mobile Equipment (ME) Identity | | | | | | | |

**Figure 9.10: ME Identity**

# 9.11 MSISDN

MSISDN is transferred via GTP tunnels. The sending entity copies the value part of the MSISDN into the Value field of the MSISDN IE. MSISDN is defined in 3GPP TS 23.003 [2].

Editor's note: MSISDN coding will be defined in TS 24.301.

| | | | | **Bits** | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 76 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | MSISDN | | | | | | | |

**Figure 9.11: MSISDN**

## 9.12 Indication

Indication is coded as this is depicted in Figure 9.12.

| | | | | **Bits** | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 77 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Indicaiton | | | | | | | |
| 5-(n+3) | These octet(s) is/are present only if explicitly specified | | | | | | | |

**Figure 9.12: Indication**

**Table 9.12: Indication values**

| Indication | Values (Decimal) |
|---|---|
| <reserved> | 0 |
| Opertaion Indication | 1 |
| SGW Change Indication | 2 |
| Bearer Update Indication | 3 |
| Direct Forwarding Indication | 4 |
| <spare> | 5-255 |

Editor's Notes:    It is FFS how to define the indication values.

## 9.13 Protocol Configuration Options (PCO)

Protocol Configuration Options (PCO) is transferred via GTP tunnels. The sending entity copies the value part of the PCO into the Value field of the PCO IE.

Editor's note: PCO will be defined in 3GPP TS 23.003 and its coding in TS 24.301.

| | | | | **Bits** | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 78 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Protocol Configuration Options (PCO) | | | | | | | |

**Figure 9.13: Protocol Configuration Options (PCO)**

## 9.14 PDN Address Allocation (PAA)

PDN Address Allocation (PAA) is transferred via GTP tunnels. The sending entity copies the value part of the PAA into the Value field of the PAA IE.

Editor's note: PAA will be defined in 3GPP TS 23.003 and its coding in TS 24.301.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 79 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | PDN Address Allocation (PAA) | | | | | | | |

**Figure 9.14: PDN Address Allocation (PAA)**

# 9.15 EPS Bearer Level Quality of Service (Bearer QoS)

EPS Bearer Level Quality of Service (Bearer QoS) is transferred via GTP tunnels. The sending entity copies the value part of the EPS Bearer Level QoS into the Value field of the EPS Bearer Level QoS IE.

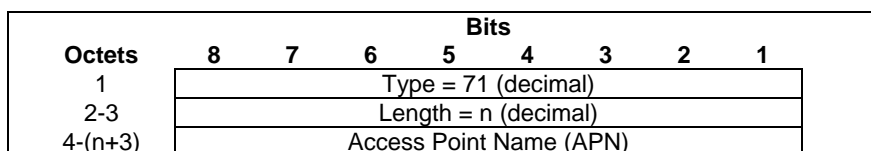Editor's note: EPS Bearer Level QoS will be defined in 3GPP TS 23.003 (?) and its coding in TS 24.301.

Editor's note: It is FFS whether it needs two separate IE types for EPS Bearer Level QoS and SDF Level QoS.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 80 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | EPS Bearer Level Quality of Service (QoS) | | | | | | | |

**Figure 9.15: EPS Bearer Level Quality of Service (Bearer QoS)**

# 9.16 Service Data Flow Level Quality of Service (Flow QoS)

Service Data Flow Level Quality of Service (Flow QoS) is transferred via GTP tunnels. The sending entity copies the value part of the Service Data Flow Level QoS into the Value field of the Service Data Flow Level QoS IE.

Editor's note: Service Data Flow Level QoS will be defined in 3GPP TS 23.003 (?) and its coding in TS 24.301.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 81 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Service Data Flow Level Quality of Service (QoS) | | | | | | | |

**Figure 9.16: Service Data Flow Level Quality of Service (Flow QoS)**

# 9.17 RAT Type

RAT Type is coded as this is depicted in Figure 9.17.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 82 (decimal) | | | | | | | |
| 2-3 | Length = 1 (decimal) | | | | | | | |
| 4 | RAT Type | | | | | | | |

**Figure 9.17: RAT Type**

Editor's note: RAT Type value range 1-255 is sufficient and extensions are not necessary.

**Table 9.17: RAT Type values**

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

Editor's note: Spare values 7-255 will be used for other RAT Type definitions (e.g. other non-3GPP accesses).

## 9.18 Serving Network

Serving Network is coded as this is depicted in Figure 9.18. If MNC is 2 digits long, MNC digit 1 shall be set to 0.

Editor's note: In the first release of GTPv2 spec (TS 29.274v8.0.0) n = 3. That is, the overall length of the IE is 6 octets. In future releases of the spec additional octets may be specified. The legacy receiving entity simply ignores the unknown octets.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 83 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | MCC digit 1 | | | | MCC digit 2 | | | |
| 5 | MCC digit 3 | | | | MNC digit 1 | | | |
| 6 | MNC digit 2 | | | | MNC digit 3 | | | |
| 7-(n+3) | These octet(s) is/are present only if explicitly specified | | | | | | | |

**Figure 9.18: Serving Network**

## 9.19 Tunnel Endpoint Identifier for Control Plane (TEID-C)

Tunnel Endpoint Identifier for Control Plane (TEID-C) is coded as this is depicted in Figure 9.19.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 84 (decimal) | | | | | | | |
| 2-3 | Length = 4 (decimal) | | | | | | | |
| 4-7 | Tunnel Endpoint Identifier for Control Plane (TEID-C) | | | | | | | |

**Figure 9.19: Tunnel Endpoint Identifier for Control Plane (TEID-C)**

Editor's note: TEID in GTP header is 4 octets long and that cannot be changed within GTPv2 lifetime.

## 9.20 Tunnel Endpoint Identifier for User Plane (TEID-U)

Tunnel Endpoint Identifier for User Plane (TEID-U) is coded as this is depicted in Figure 9.20.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 85 (decimal) | | | | | | | |
| 2-3 | Length = 4 (decimal) | | | | | | | |
| 4-7 | Tunnel Endpoint Identifier for User Plane (TEID-U) | | | | | | | |

**Figure 9.20: Tunnel Endpoint Identifier for User Plane (TEID-U)**

Editor's note: TEID in GTP header is 4 octets long and that cannot be changed within GTPv2 lifetime.

## 9.21 Tunnel Endpoint Identifier for User Plane with EBI (TEID-U EBI)

Tunnel Endpoint Identifier for User Plane with EBI (TEID-U EBI) is coded as this is depicted in Figure 9.21.

| Octets | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 86 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Tunnel Endpoint Identifier for User Plane with EBI | | | | | | | |

**Figure 9.21: Tunnel Endpoint Identifier for User Plane with EBI (TEID-U EBI)**

## 9.22 EPS Bearer Level Traffic Flow Template (Bearer TFT)

EPS Bearer Level Traffic Flow Template (Bearer TFT) is transferred via GTP tunnels. The sending entity copies the value part of the EPS Bearer Level TFT into the Value field of the EPS Bearer Level TFT IE.

Editor's note: EPS Bearer Level TFT will be defined in 3GPP TS 23.003 and its coding in TS 24.301.

Editor's note: It is FFS whether it needs two separate IE types for EPS Bearer Level TFT and SDF Level TFT.

| Octets | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 87 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | EPS Bearer Level Traffic Flow Template (TFT) | | | | | | | |

**Figure 9.22: EPS Bearer Level Traffic Flow Template (Bearer TFT)**

## 9.23 Service Data Flow Level Traffic Flow Template (Flow TFT)

Service Data Flow Level Traffic Flow Template (Flow TFT) is transferred via GTP tunnels. The sending entity copies the value part of the Service Data Flow Level TFT into the Value field of the Service Data Flow Level TFT IE.

Editor's note: Service Data Flow Level TFT will be defined in 3GPP TS 23.003 and its coding in TS 24.301.

| Octets | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 88 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-(n+3) | Service Data Flow Level Traffic Flow Template (TFT) | | | | | | | |

**Figure 9.23: Service Data Flow Level Traffic Flow Template (Flow TFT)**

## 9.24 User Location Info (ULI)

User Location Info (ULI) is coded as this is depicted in Figure 9.24.

| Octets | Bits | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 89 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Location Type | | | | | | | |
| 5-(n+3) | Location | | | | | | | |

**Figure 9.24: User Location Info**

Location type values are specified in Table 9.24 and the respective identities are defined in 3GPP TS 23.003 [2].

**Table 9.24: Location Type values and their meanings**

| Location Types | Values (Decimal) |
|---|---|
| Cell Global Identification (CGI) | 0 |
| Service Area Identity (SAI) | 1 |
| Routing Area Identification (RAI) | 2 |
| Tracking Area Identity (TAI) | 3 |
| <spare> | 4-255 |

The following subclauses specify ULI coding for all Location Types.

## 9.24.1    ULI for CGI

The coding of ULI for CGI is depicted in Figure 9.24.1. If MNC is 2 digits long, MNC digit 1 shall be set to 0.

| | | | | Bits | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 88 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Location Type | | | | | | | |
| 5 | MCC digit 1 | | | | MCC digit 2 | | | |
| 6 | MCC digit 3 | | | | MNC digit 1 | | | |
| 7 | MNC digit 2 | | | | MNC digit 3 | | | |
| 8-9 | Location Area Code (LAC) | | | | | | | |
| 10-11 | Cell Identity (CI) | | | | | | | |

**Figure 9.24.1: User Location Info for CGI**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 8 is the most significant bit and bit 1 of Octet 9 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 10 is the most significant bit and bit 1 of Octet 11 the least significant bit. The coding of the cell identity is the responsibility of each administration. Coding using full hexadecimal representation shall be used.

## 9.24.2    ULI for SAI

The coding of ULI for SAI is depicted in Figure 9.24.2. If MNC is 2 digits long, MNC digit 1 shall be set to 0.

| | | | | Bits | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 88 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Location Type | | | | | | | |
| 5 | MCC digit 1 | | | | MCC digit 2 | | | |
| 6 | MCC digit 3 | | | | MNC digit 1 | | | |
| 7 | MNC digit 2 | | | | MNC digit 3 | | | |
| 8-9 | Location Area Code (LAC) | | | | | | | |
| 10-11 | Service Area Code (SAC) | | | | | | | |

**Figure 9.24.2: User Location Info for SAI**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 8 is the most significant bit and bit 1 of Octet 9 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 10 is the most significant bit and bit 1 of Octet 11 the least significant bit. The SAC is defined by the operator. See 3GPP TS 23.003 [2] section 12.5 for more information.

## 9.24.3    ULI for RAI

The coding of ULI for RAI is depicted in Figure 9.24.3. If MNC is 2 digits long, MNC digit 1 shall be set to 0.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 88 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | Location Type | | | | | | | |
| 5 | MCC digit 1 | | | | MCC digit 2 | | | |
| 6 | MCC digit 3 | | | | MNC digit 1 | | | |
| 7 | MNC digit 2 | | | | MNC digit 3 | | | |
| 8-9 | Location Area Code (LAC) | | | | | | | |
| 10-11 | Routing Area Code (RAC) | | | | | | | |

**Figure 9.24.3: User Location Info for SAI**

The Location Area Code (LAC) consists of 2 octets. Bit 8 of Octet 8 is the most significant bit and bit 1 of Octet 9 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 10 contains the RAC. Octet 11) is coded as all 1's (11111111). The RAC is defined by the operator.

## 9.24.4 ULI for TAI

*To be edited.*

# 9.25 Fully Qualified TEID (F-TEID)

Fully Qualified Tunnel Endpoint Identifier (F-TEID) is coded as this is depicted in Figure 9.25.

| | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 90 (decimal) | | | | | | | |
| 2-3 | Length = n | | | | | | | |
| 4 | V4 | V6 | EBI | CUP | MME | SGW | PGW | eNB |
| 5-8 | TEID | | | | | | | |
| 9-m | IPv4 and/or IPv6 address | | | | | | | |
| 9 or m+1 | Spare (all bits set to 0) | | | | EPS Bearer ID (EBI) | | | |
| k-(n+3) | These octet(s) is/are present only if explicitly specified | | | | | | | |

**Figure 9.25: Fully Qualified Tunnel Endpoint Identifier (F-TEID)**

The following flags are coded within Octet 4:

- Bit 8 – V4: If this bit is set to 1, then IPv4 address follows the TEID field. Otherwise, IPv4 address is not present at all.

- Bit 7 – V6: If this bit is set to 1, then IPv6 address follows IPv4 address, or if IPv4 is not present, then IPv6 address follows the TEID field. Otherwise, IPv6 address is not present at all.

- Bit 6 – EBI: If this bit is set to 1, then EBI follows follows IP address(es), or if no IP is present, then the Length field. Otherwise, EBI is not present at all.

- Bit 5 - CUP: If this bit is set to 1, then the F-TEID represents Control Plane IE. Otherwise, F-TEID represents User Plane IE.

- Bit 4 – MME: If this bit is set to 1, then F-TEID belongs to MME.

- Bit 3 – SGW: If this bit is set to 1, then F-TEID belongs to SGW.

- Bit 2 – PGW: If this bit is set to 1, then F-TEID belongs to PGW.

- Bit 1 – eNB: If this bit is set to 1, then F-TEID belongs to eNB.

Editor's note: If S4 is decided to be GTPv2, then another bit is needed to indicate that the F-TEID belongs to Rel8 SGSN. In such case one more octet may be added to the IE.9.26     Scope Indicator

Scope Indicator is coded as this is depicted in Figure 9.26.

| Octets | Bits |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 91 (decimal) |
| 2-3 | Length = 1 (decimal) |
| 4 | Scope Indicator |

**Figure 9.26: Scope Indicator**

**Table 9.26: Scope Indicator values**

| Values (Decimal) | Meaning |
|---|---|
| 0 | <reserved> |
| 1 | Release all GTP-U tunnels of the PDN connection |
| 2 | Release all bearers of the current PDN connection |
| 3-255 | <spare> |

Editor's note: It is FFS if the indicator could be extended for the case to release all the bearers or all GTP-U tunnels of the UE. It shall be related to the topic of whether per UE granularity for some interfaces could be adopted in GTPv2.

# 9.27     Protocol Type

Protocol Type is coded as this is depicted in Figure 9.27.

| Octets | Bits |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 92 (decimal) |
| 2-3 | Length = n (decimal) |
| 4 | Protocol Type |
| 5-(n+3) | These octet(s) is/are present only if explicitly specified |

**Figure 9.27: Protocol Type**

**Table 9.27: Protocol Type values**

| Protocol Types | Values (Decimal) |
|---|---|
| <reserved> | 0 |
| GTPv2 | 1 |
| PMIPv6 | 2 |
| <spare> | 3-255 |

# 9.28     Legacy Quality of Service(QoS)

Legacy Quality of Service (QoS) is transferred via GTP tunnels. The sending entity copies the value part of the Legacy QoS into the Value field of the Legacy QoS IE.

Legacy Quality of Service (QoS) in the Figure 9.28 is coded according to 3GPP TS 24.008 [5].

| Octets | Bits |
|---|---|---|---|---|---|---|---|---|
| | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| 1 | Type = 93 (decimal) |
| 2-3 | Length = n (decimal) |
| 4-(n+3) | Legacy Quality of Service (QoS) |

**Figure 9.28: Legacy Quality of Service (QoS)**

## 9.29    S103 PDN Data Forwarding Info (S103PDF)

The PDSN Address and GRE Key identify a GRE Tunnel towards a PDSN over S103 interface for a specific PDN connection of the UE. The EPS Bearer IDs specify the EPS Bearers which require data forwarding that belonging to this PDN connection. The number of EPS bearer Ids included is specified by the value of EPS Bearer ID Number.

The spare bits x indicate unused bits, which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 94 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | PDSN Address for forwarding Length | | | | | | | |
| 5-(m+4) | PDSN Address for forwarding [4..16] | | | | | | | |
| (m+5)-(m+8) | GRE Key | | | | | | | |
| (m+9) | EPS Bearer ID Number = n | | | | | | | |
| (m+10)-(m+9+n) | X | X | X | X | EPS Bearer ID | | | |

**Figure 9.29: S103 PDN Data Forwarding Info**

Editor's Notes: It is FFS whether it is needed to include PDN Identifer in this IE

## 9.30    S1-U Data Forwarding (S1UDF)

The Serving GW Address and Serving GW S1-U TEID consisit the S1-U Tunnel information allocated by the Serving GW for an EPS Bearer identified by the EPS Bearer ID which requires data forwarding during active handover from E-UTRAN Access to cdma2000 HRPD Access.

The spare bits x indicate unused bits, which shall be set to 0 by the sending side and which shall not be evaluated by the receiving side.

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 95 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4 | X | X | X | X | EPS Bearer ID | | | |
| 5 | Serving GW Address Length | | | | | | | |
| 6-(m+5) | Serving GW Address [4..16] | | | | | | | |
| (m+6)-(m+9) | Serving GW S1-U TEID | | | | | | | |

**Figure 9.30: S1-U Data Forwarding Info**

## 9.z    Private Extension

Private Extension is coded as this is depicted in Figure 9.z.

Enterprise ID can be found at IANA web site (http://www.iana.org/assignments/enterprise-numbers).

|  | **Bits** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Octets** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** |
| 1 | Type = 255 (decimal) | | | | | | | |
| 2-3 | Length = n (decimal) | | | | | | | |
| 4-5 | Enterprise   ID | | | | | | | |
| 6-(n+3) | Proprietary value | | | | | | | |

**Figure 9.z. Private Extension**

# 10 Security

*To be edited*

# Annex A (informative): Change History

| Date | TSG # | TSG Doc | CT4 Doc | CR | Rev | Cat | Subject/Comment | Old | New |
|---|---|---|---|---|---|---|---|---|---|
| 2008-02 | CT4#38 | - | C4-080555 | - | - | - | Initial draft | 0.0.0 | 0.1.0 |
| 2008-03 | CT#39 | - | - | - | - | - | TS number 29.274 was assigned to this spec | 0.1.0 | 0.1.0 |
| 2008-04 | CT4#38bis | - | C4-081015 | - | - | - | The following pseudo CRs were approved in CT4#38bis: C4-080586; C4-080812; C4-080813; C4-080885; C4-080891; C4-080892; C4-080893; C4-080896; C4-080900; C4-080945; C4-080946; C4-080948; C4-080949; C4-080951; C4-080953; C4-080956; C4-080957; C4-081011; C4-081013; C4-081014. | 0.1.0 | 0.2.4 |
| 2008-05 | CT4#39 | - | C4-081444 | - | - | - | The following pseudo CRs were approved in CT4#39: C4-081121; C4-081174; C4-081304; C4-081310; C4-081312; C4-081313; C4-081316; C4-081317; C4-081320; C4-081430; C4-081431; C4-081432; C4-081433; C4-081434; C4-081435; C4-081436; C4-081437; C4-081438; C4-081440; C4-081441; C4-081442; C4-081443; C4-081453. | 0.2.4 | 0.3.0 |
| 2008-06 | CT#40 | | CP-080247 | | | | V1.0.0 was sent for Information in CT#40 | 0.3.0 | 1.0.0 |
| 2008-06 | CT4#39bis | | | | | | The following pseudo CRs were approved in CT4#39bis: | | |
| 2008-08 | CT4#40 | | | | | | The following pseudo CRs were approved in CT4#40: | | |
| 2008-09 | CT#41 | | | | | | | | |
| 2008-11 | CT4#41 | | | | | | The following pseudo CRs were approved in CT4#41: | | |
| 2008-12 | CT#42 | | | | | | | | |
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