**3GPP TSG-CT WG4 Meeting #96C4-200500**

**E-Meeting; 24th – 28th February 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **29.274** | **CR** | **1977** | **rev** | **-** | **Current version:** | **16.2.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | Support of MT-EDT | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_CIoT | | | | |  | ***Date:*** | | | 2020-02-03 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The support of MT-EDT has been specified in TS 23.401, e.g.  in the Attach procedure,  "If the UE supports MT-EDT as indicated in the UE Network Capability, the MME shall consider this parameter to initiate MT-EDT as defined in clause 5.3.4B.6 (for CP optimisations), and clause 5.3.5B (for UP optimisations). "  e.g. in 5.3.4B.6:  " In step2, the Serving-GW may send the downlink data size to the MME for EDT consideration by the MME in downlink if the downlink data are applicable for Control Plane CIoT EPS Optimisation and MT-EDT is applied for this PDN connection. "  So during a PDN connection, if the MME, based on UE capability of supporting MT-EDT, Communication Pattern parameters or local policy, determine if the PDN is applied for MT-EDT, it shall then indicate it to the SGW.  The SGW, if support MT-EDT function, it shall include DL data packet size in the DDN.  If UE has changed its UE capability of supporting MT-EDT, so the new indication is also included in the Modify Bearer Request message. | | | | | | | | |
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| ***Summary of change:*** | | Add a new indication flag "MT-EDT Indication" over S11 in the Create Session Request and Modify Bearer Request messages;  Add DL Data Packet Size IE in the DDN.  Add new indication in Indication IE, and clarify the IE Integer Number is also applicable to DL Data Packet Size. | | | | | | | | |
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| ***Consequences if not approved:*** | | MT-EDT feature is not supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.2.1, 7.2.7, 7.2.11.1, 8.12, 8.118 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

## 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].

5GC 5G Core Network

AMBR Aggregate Maximum Bit Rate

APN Access Point Name

APN-NI Access Point Name Network Identifier

APN-OI Access Point Name Operator Identifier

C-MSISDN Correlation MSISDN

EBI EPS Bearer ID

eNodeB Evolved Node B

EPC Evolved Packet Core

ePDG Evolved Packet Data Gateway

EPS Evolved Packet System

F-TEID Fully Qualified Tunnel Endpoint Identifier

G-PDU GTP-U non-signalling PDU

GPRS General Packet Radio Service

GTP GPRS Tunnelling Protocol

GTP-PDU GTP-C PDU or GTP-U PDU

GTPv2-C GTP version 2, control plane

GTPv2-U GTP version 2, user plane

IMSI International Mobile Subscriber Identity

IP Internet Protocol

LBI Linked EPS Bearer ID

L1 Layer 1

L2 Layer 2

LGW Local Gateway

LIPA Local IP Access

MBMS Multimedia Broadcast/Multicast Service

MEI Mobile Equipment Identity

MSISDN Mobile Subscriber ISDN Number

MT-EDT Mobile Terminated Early Data Transmission

NBIFOM Network-based IP Flow Mobility

NTP Network Time Protocol

PAA PDN Address Allocation

PCO Protocol Configuration Options

PDU Protocol Data Unit

PDN Packet Data Network or Public Data Network

PGW PDN Gateway

PTI Procedure Transaction Id

QoS Quality of Service

RAT Radio Access Technology

RIM RAN Information Management

RLOS Restricted Local Operator Services

SGW Serving Gateway

SPID Subscriber Profile ID for RAT/Frequency Priority

STN-SR Session Transfer Number for SRVCC

TEID Tunnel Endpoint Identifier

TEID-C Tunnel Endpoint Identifier, control plane

TEID-U Tunnel Endpoint Identifier, user plane

TFT Traffic Flow Template

TLIV Type Length Instance Value

TWAN Trusted WLAN Access Network

UDP User Datagram Protocol

ULI User Location Information

\* \* \* Next Change \* \* \* \*

### 7.2.1 Create Session Request

The direction of this message shall be from MME/S4-SGSN to SGW and from SGW to PGW, and from ePDG/TWAN to the PGW (see Table 6.1-1).

The Create Session Request message shall be sent on the S11 interface by the MME to the SGW, and on the S5/S8 interface by the SGW to the PGW as part of the procedures:

- E-UTRAN Initial Attach when a PDN connection needs to be established through the SGW and PGW

- Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN with GTP on S5/S8 interface (see clauses 8.2, 8.6 and 16.11 of 3GPP TS 23.402 [45])

- UE requested PDN connectivity when a PDN connection needs to be established through the SGW and PGW

- Addition of a 3GPP access of NBIFOM procedure as specified by 3GPP TS 23.161 [71]

The message shall also be sent on S4 interface by the SGSN to the SGW, and on the S5/S8 interface by the SGW to the PGW as part of the procedures:

- PDP Context Activation

- Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN with GTP on S5/S8 interface (see clauses 8.2, 8.6 and 16.11 of 3GPP TS 23.402 [45])

- Addition of a 3GPP access of the NBIFOM procedure as specified by 3GPP TS 23.161 [71]

The message shall also be sent on the S11 interface by the MME to the SGW as part of the procedures:

- Tracking Area Update procedure with Serving GW change

- S1/X2-based handover with SGW change

- UTRAN Iu mode to E-UTRAN Inter RAT handover with SGW change

- GERAN A/Gb mode to E-UTRAN Inter RAT handover with SGW change

- 3G Gn/Gp SGSN to MME combined hard handover and SRNS relocation procedure

- Gn/Gp SGSN to MME Tracking Area Update procedure

- Restoration of PDN connections after an SGW failure if the MME and PGW support these procedures as specified in 3GPP TS 23.007 [17]

- MME triggered Serving GW relocation

- Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN with PMIP on S5/S8 interface (see clauses 8.2 and 16.11 of 3GPP TS 23.402 [45])

and on the S4 interface by the SGSN to the SGW as part of the procedures:

- Routing Area Update with MME interaction and with SGW change

- Gn/Gp SGSN to S4 SGSN Routing Area Update

- Inter SGSN Routeing Area Update Procedure and Combined Inter SGSN RA / LA Update using S4 with SGW change

- Iu mode RA Update Procedure using S4 with SGW change

- E-UTRAN to UTRAN Iu mode Inter RAT handover with SGW change

- E-UTRAN to GERAN A/Gb mode Inter RAT handover with SGW change

- Serving RNS relocation using S4 with SGW change

- Combined hard handover and SRNS relocation using S4 with SGW change

- Combined Cell / URA update and SRNS relocation using S4 with SGW change

- Enhanced serving RNS relocation with SGW relocation

- Restoration of PDN connections after an SGW failure if the SGSN and PGW support these procedures as specified in 3GPP TS 23.007 [17]

- S4-SGSN triggered Serving GW relocation

- Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN with PMIP on S5/S8 interface (see clauses 8.2 and 16.11 of 3GPP TS 23.402 [45])

and on the S2b interface by the ePDG to the PGW as part of the procedures:

- Initial Attach with GTP on S2b

- UE initiated Connectivity to Additional PDN with GTP on S2b

- Handover to Untrusted Non-3GPP IP Access with GTP on S2b (See clause 8.6 of 3GPP TS 23.402 [45])

- Initial Attach for emergency session (GTP on S2b)

- Addition of an access using S2b of NBIFOM procedure as specified by 3GPP TS 23.161 [71]

and on the S2a interface by the TWAN to the PGW as part of the procedure:

- Initial Attach in WLAN on GTP S2a

- Initial Attach in WLAN for Emergency Service on GTP S2a

- UE initiated Connectivity to Additional PDN with GTP on S2a

- Handover to TWAN with GTP on S2a (See clause 16.10 of 3GPP TS 23.402 [45])

- Addition of an access using S2a of NBIFOM procedure as specified by 3GPP TS 23.161 [71].

If the new Create Session Request received by the SGW collides with an existing active PDN connection context (the existing PDN connection context is identified with the tuple [IMSI, EPS Bearer ID], where IMSI shall be replaced by TAC and SNR part of ME Identity for emergency or RLOS attached UE without UICC or authenticated IMSI), this Create Session Request shall be treated as a request for a new session. Before creating the new session, the SGW should delete:

- the existing PDN connection context locally, if the Create Session Request is received with the TEID set to zero in the header, or if it is received with a TEID not set to zero in the header and it collides with the default bearer of an existing PDN connection context;

- the existing dedicated bearer context locally, if the Create Session Request collides with an existing dedicated bearer context and the message is received with a TEID not set to zero in the header.

In the former case, if the PGW S5/S8 IP address for control plane received in the new Create Session Request is different from the PGW S5/S8 IP address for control plane of the existing PDN connection, the SGW should also delete the existing PDN connection in the corresponding PGW by sending a Delete Session Request message.

NOTE 1: The SGW can send the Create Session Request and Delete Session Request over S5/S8 asynchronously, e.g. the SGW can send the Delete Session Request and then the Create Session Request without having to wait for the Delete Session Response. It does not matter if the PGW happens to receive the Delete Session Request after the Create Session Request since the PGW assigns a different S5/S8 F-TEID for control plane to the new PDN connection.

If the new Create Session Request received by the PGW collides with an existing PDN connection context (the existing PDN connection context is identified with the triplet [IMSI, EPS Bearer ID, Interface type], where applicable Interface type here is S2a TWAN GTP-C interface or S2b ePDG GTP-C interface or S5/S8 SGW GTP-C interface, and where IMSI shall be replaced by TAC and SNR part of ME Identity for emergency or RLOS attached UE without UICC or authenticated IMSI), this Create Session Request shall be treated as a request for a new session. Before creating the new session, the PGW should delete:

- the existing PDN connection context, if the Create Session Request collides with the default bearer of an existing PDN connection context;

- the existing dedicated bearer context, if the Create Session Request collides with a dedicated bearer of an existing PDN connection context.

The PGW shall allocate a new PGW S5/S8 F-TEID for control plane to the new PDN connection, i.e. not the same F-TEID value as the one which was assigned to the existing PDN connection.

NOTE 2: With GTP based S2a and S2b, the EPS Bearer IDs assigned for specific UE over S2a between the TWAN and PGW and over S2b between an ePDG and PGW are independent of the EPS Bearer IDs assigned for the same UE over S5/S8 and may overlap in value (see 3GPP TS 23.402 [45] clause 4.6.2).

NOTE 3: Only the TAC and SNR part of the ME Identity is used to identify an emergency or RLOS attached UE without UICC or authenticated IMSI.

Table 7.2.1-1: Information Elements in a Create Session Request

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| IMSI | C | The IMSI shall be included in the message on the S4/S11 interface, and on S5/S8 interface if provided by the MME/SGSN, except for the case:  - If the UE is emergency or RLOS attached and the UE is UICCless.  The IMSI shall be included in the message on the S4/S11 interface, and on S5/S8 interface if provided by the MME/SGSN, but not used as an identifier   * if UE is emergency or RLOS attached but IMSI is not authenticated.   The IMSI shall be included in the message on the S2a/S2b interface, except for the case:  - if the UE is emergency attached and the UE is UICCless.  The IMSI shall be included in the message on the S2a/S2b interface, but not used as an identifier:  - if UE is emergency attached but IMSI is not authenticated. | IMSI | 0 |
| MSISDN | C | For an E-UTRAN Initial Attach and a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN the IE shall be included when used on the S11 interface, if provided in the subscription data from the HSS.  For a PDP Context Activation procedure and a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN the IE shall be included when used on the S4 interface, if provided in the subscription data from the HSS.  The IE shall be included for the case of a UE Requested PDN Connectivity, if the MME has it stored for that UE.  It shall be included when used on the S5/S8 interfaces if provided by the MME/SGSN.  The ePDG shall include this IE on the S2b interface during an Attach with GTP on S2b, UE initiated Connectivity to Additional PDN with GTP on S2b and a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, Initial Attach for emergency session (GTP on S2b), if provided by the HSS/AAA.  The TWAN shall include this IE on the S2a interface during an Initial Attach in WLAN on GTP S2a, Initial Attach in WLAN for Emergency Service on GTP S2a, UE initiated Connectivity to Additional PDN with GTP on S2a and a Handover to TWAN with GTP on S2a, if provided by the HSS/AAA. | MSISDN | 0 |
| ME Identity (MEI) | C | The MME/SGSN shall include the ME Identity (MEI) IE on the S11/S4 interface:  - If the UE is emergency attached and the UE is UICCless; or  - If the UE is emergency attached and the IMSI is not authenticated  For all other cases the MME/SGSN shall include the ME Identity (MEI) IE on the S11/S4 interface if it is available. | MEI | 0 |
| CO | The MME shall include the ME Identity (MEI) IE on the S11 interface:  - If the UE is RLOS attached and the UE is UICCless; or  - If the UE is RLOS attached and the IMSI is not authenticated. |
| CO | If the SGW receives this IE, it shall forward it to the PGW on the S5/S8 interface. |
| CO | The TWAN/ePDG shall include the ME Identity (MEI) IE on the S2a/S2b interface:  - If the UE is emergency attached and the UE is UICCless; or  - If the UE is emergency attached and the IMSI is not authenticated.  For all other cases, the TWAN/ePDG shall include the ME Identity (MEI) IE on the S2a/S2b interface, if it is available. |
| User Location Information (ULI) | C | This IE shall be included on the S11 interface for E-UTRAN Initial Attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN and UE-requested PDN Connectivity procedures. It shall include ECGI and TAI. The MME/SGSN shall also include it on the S11/S4 interface for TAU/RAU/X2-Handover/Enhanced SRNS Relocation procedure if the PGW/PCRF has requested location information change reporting and MME/SGSN support location information change reporting. | ULI  (NOTE 10) | 0 |
| CO | This IE shall also be included on the S4 interface for PDP Context Activation procedure. It shall include CGI/SAI, together with RAI. |
| CO | This IE shall also be included on the S4/S11 interface for a TAU/RAU procedure if  - the level of support (User Location Change Reporting and/or CSG Information Change Reporting) changes; or  - the target MME/S4-SGSN cannot derive the level of support (User Location Change Reporting and/or CSG Information Change Reporting) for the source Gn/Gp SGSN. See NOTE 9.  The MME shall include the ECGI and /or TAI in the ULI, the S4-SGSN shall include either the CGI or SAI or RAI, or CGI/SAI together with RAI in the ULI. |
| CO | This IE shall also be included on the S4/S11 interface for:  - a TAU procedure with an S4-SGSN interaction, if the MME supports location information change reporting;  - a RAU procedure with an MME interaction, if the S4-SGSN supports location information change reporting.  The MME shall include the ECGI and TAI in the ULI, the S4-SGSN shall include the CGI/SAI together with RAI in the ULI. |
| CO | The SGW shall include this IE on S5/S8 if it receives the ULI from MME/SGSN. |
| Serving Network | C | This IE shall be included on the S4/S11, S5/S8 and S2b interfaces for an E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, a PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN, a UE requested PDN connectivity, an Attach with GTP on S2b, a UE initiated Connectivity to Additional PDN with GTP on S2b, a Handover to Untrusted Non-3GPP IP Access with GTP on S2b and an Initial Attach for emergency session (GTP on S2b).  See NOTE 10. | Serving Network | 0 |
| CO | This IE shall be included on S4/S11 for RAU/TAU/Handover with SGW relocation procedures.  See NOTE 10. |
| CO | This IE shall be included on the S2a interface for an Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, a UE initiated Connectivity to Additional PDN with GTP on S2a and a Handover to TWAN with GTP on S2a.  The TWAN shall set this IE to the PLMN identity of the selected PLMN used for 3GPP-based access authentication. The selected PLMN is the PLMN of the 3GPP AAA Proxy in roaming case and the PLMN of the 3GPP AAA Server in non-roaming case. |  |
| RAT Type | M | This IE shall be set to the 3GPP access type or to the value matching the characteristics of the non-3GPP access the UE is using to attach to the EPS.  The MME shall set the RAT Type to LTE-M if it has received the LTE-M indication from the eNodeB, otherwise it shall set it to the RAT type the UE is using.  The ePDG may use the access technology type of the untrusted non-3GPP access network if it is able to acquire it; otherwise it shall indicate Virtual as the RAT Type.  The TWAN shall set the RAT Type value to "WLAN" on the S2a interface.  If the LTE-M RAT type is received from the MME, the SGW shall signal the following RAT type to the PGW:   * LTE-M RAT type, if the 'LTE-M RAT type reporting to PGW' flag is received from the MME; or * WB-E-UTRAN RAT type, otherwise.   See NOTE 3, NOTE 4, NOTE 22. | RAT Type | 0 |
| Indication Flags | C | This IE shall be included if any one of the applicable flags is set to 1.  Applicable flags are:   * S5/S8 Protocol Type: This flag shall be set to 1 on the S11/S4 interfaces if the chosen protocol type for the S5/S8 interface is PMIP. * Dual Address Bearer Flag: This flag shall be set to 1 on the S2b, S11/S4 and S5/S8 interfaces when the PDN Type, determined based on UE request and subscription record, is set to IPv4v6 and all SGSNs which the UE may be handed over to support dual addressing. This shall be determined based on node pre-configuration by the operator. (see also NOTE 5).  The TWAN shall set this flag to 1 on the S2a interface if it supports IPv4 and IPv6 and the PDN Type determined from the UE request if single-connection mode or multi-connection mode is used (see 3GPP TS 23.402 [45]) and the user subscription data is set to IPv4v6. * Handover Indication: This flag shall be set to 1 on the S11/S4 and S5/S8 interface during a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, or a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN procedures, or an Addition of a 3GPP access of NBIFOM procedure, or during a 5GS to EPS handover without the N26 interface.  This flag shall be set to 1 on the S2b interface during a Handover from 3GPP access to Untrusted Non-3GPP IP Access with GTP on S2b and IP address preservation is requested by the UE, or an Addition of an access using S2b of NBIFOM procedure.  This flag shall be set to 1 on the S2a interface during a Handover from 3GPP access to TWAN with GTP on S2a and IP address preservation is requested by the UE, or an Addition of an access using S2a of NBIFOM procedure. * Operation Indication: This flag shall be set to 1 on the S4/S11 interface for a TAU/RAU procedure with SGW relocation, Enhanced SRNS Relocation with SGW relocation, X2-based handovers with SGW relocation and MME triggered Serving GW relocation. * Direct Tunnel Flag: This flag shall be set to 1 on the S4 interface if Direct Tunnel is used. * Piggybacking Supported: This flag shall be set to 1 on the S11 interface only if the MME supports the piggybacking feature as described in Annex F of 3GPP TS 23.401 [3]. This flag shall be set to 1 on S5/S8 only if both the MME and the SGW support piggybacking. * Change Reporting support Indication: This flag shall be set to 1 on S4/S11 and S5/S8 interfaces if the SGSN/MME supports location Info Change Reporting and if the SGSN/MME's operator policy permits reporting of location change to the operator of the PGW with which the session is being established. See NOTE2. * CSG Change Reporting Support Indication: This flag shall be set to 1 on S4/S11 and S5/S8 interfaces if the SGSN/MME supports CSG Information Change Reporting and if the SGSN/MME's operator policy permits reporting of CSG Information change to the operator of the PGW with which the session is being established. See NOTE 2. * Unauthenticated IMSI: This flag shall be set to 1 on the S4/S11, S5/S8 and S2a/S2b interfaces if the IMSI present in the message is not authenticated and is for an emergency attached UE. It shall also be set to 1 on the S11 and S5/S8 interfaces if the IMSI is present in the message is not authenticated and is for an RLOS attached UE. * PDN Pause Support Indication: this flag shall be set to 1 on the S5/S8 interface if the SGW supports the PGW Pause of Charging procedure. * NBIFOM Support Indication: This flag shall be set to 1 on S11/S4 if the MME/SGSN supports NBIFOM. This flag shall be set to 1 on S5/S8 if both the SGW and the MME/SGSN support NBIFOM.  This flag shall be set to 1 on S2a/S2b if the TWAN/ePDG supports NBIFOM. * WLCP PDN Connection Modification Support Indication: This flag shall be set to 1 on the S2a interface if the TWAN supports the WLCP PDN Connection Modification procedure. * UE Not Authorised Cause Code Support Indication: This flag shall be set to 1 on S4/S11 and S5/S8 interface if the SGSN/MME supports the "UE not authorised by OCS or external AAA Server" Cause Code. * UE Available for Signalling Indication: this flag shall be set to 1 on S11/S4 during a TAU/RAU with SGW relocation procedure if there is pending network initiated PDN connection signalling for this PDN connection. The SGW shall include this IE on S5/S8 if it receives the flag from the MME/SGSN. * S11-U Tunnel Flag: this flag shall be set to 1 on the S11 interface if user data is transported in NAS signalling. * Extended PCO Support Indication: this flag shall be set to 1 on S11 interface by the MME if the UE and the MME support ePCO; and this flag shall be set to 1 on S5/S8 interface by the SGW if the SGW supports ePCO and MME has set the flag to 1. * Control Plane Only PDN Connection Indication: this flag shall be set to 1 over S11 and S5/S8 if the PDN Connection is set to Control Plane Only. * eNB Change Reporting Support Indication: This flag shall be set to 1 on S11 and S5/S8 interfaces if the MME supports location Info Change Reporting and if the MME's operator policy permits reporting of location change to the operator of the PGW with which the session is being established. See NOTE 19. * LTE-M RAT Type reporting to PGW Indication: this flag shall be set to 1 on S11, based on operator policy or roaming agreements (for Home Routed PDN connections), if the SGW needs to forward the LTE-M RAT type to the PGW. * 5GS Interworking Indication(5GSIWKI): this flag shall be set to 1 on S11, S5/S8 and S2b interfaces if the UE supports N1 mode and the PDN connection is not restricted from interworking with 5GS by user subscription (see "5GC" bit within Core-Network-Restrictions AVP and Interworking-5GS-Indicator AVP specified in 3GPP TS 29.272 [70] and 3GPP TS 29.273 [68]). * 5GS Interworking without N26 Indication: this flag shall be set to 1 on S11 and S5/S8 interfaces if the 5GS Interworking Indication (5GSIWKI) is set to 1 and the N26 interface is not supported. See clause 4.11.1.1 in 3GPP TS 23.502 [83]). (NOTE 23) * 5GCNRI (5GC Not Restricted Indication): this flag shall be set to 1 on S11, S5/S8 and S2b interfaces if access to the 5GC is not restricted for the PDN connection by user subscription (see "5GC" bit within Core-Network-Restrictions AVP and Interworking-5GS-Indicator AVP specified in 3GPP TS 29.272 [70] and 3GPP TS 29.273 [68]). * 5GCNRS (5GC Not Restricted Support): this flag shall be set to 1 on S11, S5/S8 and S2b interfaces if the sending node (i.e. MME or ePDG) supports setting the 5GCNRI flag. An MME or an ePDG compliant with this version of the specification shall support setting the 5GCNRI flag. * MTEDTA (MT-EDT Applicable): this flag shall be set to 1 on the S11 interface if MT-EDT is applicable for the PDN connection, i.e. if the UE has indicated its support of MT-EDT as part of the UE network capability and if the local policy requires so. (NOTE X) | Indication | 0 |
| Sender F-TEID for Control Plane | M |  | F-TEID | 0 |
| PGW S5/S8 Address for Control Plane or PMIP | C | This IE shall be sent on the S11 / S4 interfaces. The TEID or GRE Key is set to "0" in the E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, the PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN and the UE requested PDN connectivity procedures. | F-TEID | 1 |
| Access Point Name (APN) | M |  | APN | 0 |
| Selection Mode | C | This IE shall be included on the S4/S11 and S5/S8 interfaces for an E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, a PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN and a UE requested PDN connectivity.  This IE shall be included on the S2b interface for an Initial Attach with GTP on S2b, a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, a UE initiated Connectivity to Additional PDN with GTP on S2b and an Initial Attach for emergency session (GTP on S2b).  It shall indicate whether a subscribed APN or a non- subscribed APN chosen by the UE/MME/SGSN/ePDG/TWAN was selected, see NOTE 17.  This IE shall be included on the S2a interface for an Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, a Handover to TWAN with GTP on S2a and a UE initiated Connectivity to Additional PDN with GTP on S2a. The value shall be set to "MS or network provided APN, subscription verified". | Selection Mode | 0 |
| CO | When available, this IE shall be sent by the MME/SGSN on the S11/S4 interface during TAU/RAU/HO with SGW relocation. |
| PDN Type | C | This IE shall be included on the S4/S11 and S5/S8 interfaces for an E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, a PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN and a UE requested PDN connectivity.  This IE shall be set to IPv4, IPv6, IPv4v6, Non-IP or Ethernet. This is based on the UE request and the subscription record retrieved from the HSS (for MME see 3GPP TS 23.401 [3], clause 5.3.1.1, and for SGSN see 3GPP TS 23.060 [35], clause 9.2.1). See NOTE 1. See NOTE 14. See NOTE 24 and 25. | PDN Type | 0 |
| PDN Address Allocation (PAA) | C | This IE shall be included the S4/S11, S5/S8 and S2a/S2b interfaces for an E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, a PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN, a UE requested PDN connectivity, an Attach with GTP on S2b, a UE initiated Connectivity to Additional PDN with GTP on S2b, a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, an Initial Attach for emergency session (GTP on S2b, an Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, a UE initiated Connectivity to Additional PDN with GTP on S2a and a Handover to TWAN with GTP on S2a. For PMIP-based S5/S8, this IE shall also be included on the S4/S11 interfaces for TAU/RAU/Handover cases involving SGW relocation.  The PDN type field in the PAA shall be set to IPv4, or IPv6 or IPv4v6, Non-IP or Ethernet by MME/SGSN, based on the UE request and the subscription record retrieved from the HSS (see clause 8.12 and also NOTE 5. See also NOTE 24).  The TWAN shall set the PDN type field in the PAA to IPv4, or IPv6 or IPv4v6 based on the UE request if single-connection mode or multi-connection mode is used (see 3GPP TS 23.402 [45]), the IP versions the TWAN supports and the PDN type received in the user subscription data from the HSS/3GPP AAA Server, or based on the UE request and the TWAN Emergency Configuration Data for an Initial Attach in WLAN for Emergency Service on GTP S2a.  The ePDG shall set the PDN type field in the PAA to IPv4, or IPv6 or IPv4v6 based on the UE request and the subscription record retrieved from the HSS/3GPP AAA Server, or based on the UE request and the ePDG Emergency Configuration Data for an Initial Attach for emergency session (GTP on S2b).  For static IP address assignment (for MME see 3GPP TS 23.401 [3], clause 5.3.1.1, for SGSN see 3GPP TS 23.060 [35], clause 9.2.1, for ePDG see 3GPP TS 23.402 [45] clause 4.7.3, and for TWAN see 3GPP TS 23.402 [45] clause 16.1.5), the MME/SGSN/ePDG/TWAN shall set the IPv4 address and/or IPv6 prefix length and IPv6 prefix and Interface Identifier based on the subscribed values received from HSS, if available. For PDN Type IPv4v6, either one of the IP versions (i.e. IPv4 address or IPv6 prefix and Interface Identifier) or both the IP versions may be statically provisioned in the HSS. If only one of the IP versions is statically provisioned in the HSS, the MME/SGSN/ePDG/TWAN shall set the other IP version as all zeros. The value of PDN Type field shall be consistent with the value of the PDN Type IE, if present in this message.  For a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, the ePDG shall set the IPv4 address and/or IPv6 prefix length and IPv6 prefix and Interface Identifier based on the IP address(es) received from the UE.  For IP PDN connections, if static IP address assignment is not used (e.g. static address is not received from the HSS), and for scenarios other than a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, the IPv4 address shall be set to 0.0.0.0, and/or the IPv6 Prefix Length and IPv6 prefix and Interface Identifier shall all be set to zero.  For Non-IP or Ethernet PDN connections, the PDN Address and Prefix field shall not be present. See NOTE 14 and 25. | PAA | 0 |
| CO | This IE shall be sent by the MME/SGSN on S11/S4 interface during TAU/RAU/HO with SGW relocation. |
| Maximum APN Restriction | C | This IE shall be included on the S4/S11 and S5/S8 interfaces in the E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN and UE Requested PDN connectivity procedures.  This IE denotes the most stringent restriction as required by any already active bearer context. If there are no already active bearer contexts, this value is set to the least restrictive type. | APN Restriction | 0 |
| Aggregate Maximum Bit Rate (APN-AMBR) | C | This IE represents the APN-AMBR. It shall be included on the S4/S11, S5/S8 and S2a/S2b interfaces for an E-UTRAN initial attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, UE requested PDN connectivity, PDP Context Activation procedure using S4, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN, TAU/RAU/Handover from the Gn/Gp SGSN to the S4 SGSN/MME procedures, Attach with GTP on S2b, a Handover to Untrusted Non-3GPP IP Access with GTP on S2b, UE initiated Connectivity to Additional PDN with GTP on S2b, an Initial Attach for emergency session (GTP on S2b), Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, a Handover to TWAN with GTP on S2a and UE initiated Connectivity to Additional PDN with GTP on S2a. | AMBR | 0 |
| Linked EPS Bearer ID | C | This IE shall be included on S4/S11 in RAU/TAU/HO except in the Gn/Gp SGSN to MME/S4-SGSN RAU/TAU/HO procedures with SGW change to identify the default bearer of the PDN Connection | EBI | 0 |
| Trusted WLAN Mode Indication | CO | The TWAN shall include this IE on S2a interface (during initial attach, handover to TWAN with GTP on S2a procedure, UE-initiated additional PDN connectivity procedures), if the single-connection mode or multiple-connection mode is used.  The TWAN shall not include this IE if transparent single-connection mode is used. The PGW shall assume that transparent single-connection mode is used if it receives this message without this IE from the TWAN. | TWMI | 0 |
| Protocol Configuration Options (PCO) | C | If MME/SGSN receives PCO from the UE during the Attach, PDN connectivity or Handover to 3GPP access procedures, the MME/SGSN shall forward the PCO IE to SGW. The SGW shall also forward it to PGW. | PCO | 0 |
| CO | If the TWAN receives a PCO from the UE during: an initial attach, handover to TWAN or UE-initiated additional PDN connectivity with GTP on S2a procedures (in multi-connection mode or single connection mode), the TWAN shall forward the PCO IE to the PGW, see 3GPP TS 23.402 [45]. |
| Bearer Contexts to be created | M | Several IEs with the same type and instance value shall be included on the S4/S11 and S5/S8 interfaces as necessary to represent a list of Bearers. One single IE shall be included on the S2a/S2b interface.  One bearer shall be included for E-UTRAN Initial Attach, PDP Context Activation, UE requested PDN Connectivity, Attach with GTP on S2b, UE initiated Connectivity to Additional PDN with GTP on S2b, Handovers between Untrusted Non-3GPP IP Access with GTP on S2b and 3GPP Access, Initial Attach for emergency session (GTP on S2b), Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, Handovers between TWAN with GTP on S2a and 3GPP Access and UE initiated Connectivity to Additional PDN with GTP on S2a.  One or more bearers shall be included for a Handover/TAU/RAU with an SGW change.  See NOTE 6 and NOTE 7. | Bearer Context | 0 |
| Bearer Contexts to be removed | C | This IE shall be included on the S4/S11 interfaces for the TAU/RAU/Handover cases where any of the bearers existing before the TAU/RAU/Handover procedure will be deactivated as consequence of the TAU/RAU/Handover procedure.  For each of those bearers, an IE with the same type and instance value shall be included.  See NOTE 6 and NOTE 7. | Bearer Context | 1 |
| Trace Information | C | This IE shall be included on the S4/S11 interface if an SGW trace is activated, and/or on the S5/S8 and S2a/2b interfaces if a PGW trace is activated. See 3GPP TS 32.422 [18]. | Trace Information | 0 |
| Recovery | C | This IE shall be included on the S4/S11, S5/S8 and S S2a/2b interfaces if contacting the peer node for the first time. | Recovery | 0 |
| MME-FQ-CSID | C | This IE shall be included by the MME on the S11 interface and shall be forwarded by an SGW on the S5/S8 interfaces according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 0 |
| SGW-FQ-CSID | C | This IE shall be included by the SGW on the S5/S8 interfaces according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 1 |
| ePDG-FQ-CSID | C | This IE shall be included by the ePDG on the S2b interface according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 2 |
| TWAN-FQ-CSID | C | This IE shall be included by the TWAN on the S2a interface according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 3 |
| UE Time Zone | CO | This IE shall be included by the MME over S11 during Initial Attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN and UE Requested PDN Connectivity procedure.  This IE shall be included by the SGSN over S4 during PDP Context Activation procedure and a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN.  This IE shall be included by the MME/SGSN over S11/S4 TAU/RAU/Handover with SGW relocation. | UE Time Zone | 0 |
| C | If SGW receives this IE, SGW shall forward it to PGW across S5/S8 interface. |
| O | This IE shall be included by the TWAN on the S2a interface for Initial Attach in WLAN procedure, UE-initiated Connectivity to Additional PDN with GTP on S2a and handover to TWAN with GTP on S2a procedure as specified in 3GPP TS 23.402 [45]. |
| User CSG Information (UCI) | CO | This IE shall be included on the S4/S11 interface for E-UTRAN Initial Attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, UE-requested PDN Connectivity, PDP Context Activation and a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN using S4 procedures, if the UE is accessed via CSG cell or hybrid cell.  The MME/SGSN shall also include it for TAU/RAU/Handover procedures with SGW relocation if the UE is accessed via a CSG cell or hybrid cell or leaves a CSG or hybrid cell and the PGW/PCRF has requested CSG info reporting and MME/SGSN support CSG info reporting. NOTE 11.  The SGW shall include this IE on S5/S8 if it receives the User CSG information from MME/SGSN.  See NOTE 10. | UCI | 0 |
| Charging Characteristics | C | This IE shall be included on the S4/S11, S5/S8 and S2a/S2b interfaces according to 3GPP TS 32.251 [8] | Charging Characteristics | 0 |
| MME/S4-SGSN LDN | O | This IE is optionally sent by the MME to the SGW on the S11 interface and by the S4-SGSN to the SGW on the S4 interface (see 3GPP TS 32.423 [44]), when communicating the LDN to the peer node for the first time. | Local Distinguished Name (LDN) | 0 |
| SGW LDN | O | This IE is optionally sent by the SGW to the PGW on the S5/S8 interfaces (see 3GPP TS 32.423 [44]), when communicating the LDN to the peer node for the first time. | Local Distinguished Name (LDN) | 1 |
| ePDG LDN | O | This IE is optionally sent by the ePDG to the PGW on the S2b interfaces (see 3GPP TS 32.423 [44]), when contacting the peer node for the first time. | Local Distinguished Name (LDN) | 2 |
| TWAN LDN | O | This IE may be sent by the TWAN to the PGW on the S2a interfaces (see 3GPP TS 32.423 [44]), when contacting the peer node for the first time. | Local Distinguished Name (LDN) | 3 |
| Signalling Priority Indication | CO | The SGSN/MME shall include this IE on the S4/S11 interface if the UE indicates low access priority when requesting to establish the PDN connection.  The SGW shall forward this IE in the Create Session Request message on the S5/S8 interfaces if received from the MME/SGSN. | Signalling Priority Indication | 0 |
| UE Local IP Address | CO | The ePDG shall include this IE on the S2b interface during an Initial Attach for emergency session (GTP on S2b). Otherwise the ePDG shall include this IE on the S2b interface based on local policy. | IP Address | 0 |
| UE UDP Port | CO | The ePDG shall include this IE on the S2b interface if NAT is detected, the UDP encapsulation is used and the UE Local IP Address is present. | Port Number | 0 |
| Additional Protocol Configuration Options (APCO) | CO | If multiple authentications are supported by the ePDG, the ePDG shall include this IE on the S2b interface and perform the corresponding procedures as specified for PAP and CHAP authentication of the UE with external networks in 3GPP TS 33.402 [50]. | Additional Protocol Configuration Options (APCO) | 0 |
| O | If the UE requests the DNS IPv4/IPv6 address in the Configuration Payload (CFG\_REQ) during the IPsec tunnel establishment procedure (as specified in 3GPP TS 33.402 [50]), and if the ePDG supports the Additional Protocol Configuration Options IE, the ePDG may include this IE over S2b interface and correspondingly set the "DNS Server IPv4/v6 Address Request" parameter as defined in 3GPP TS 24.008 [5]. |
| CO | If the UE includes the P-CSCF\_IP6\_ADDRESS attribute, or the P-CSCF\_IP4\_ADDRESS attribute or both in the CFG\_REQUEST configuration payload during the IPsec tunnel establishment procedure as specified in 3GPP TS 24.302 [63]), and if the ePDG supports these IKEv2 attributes and the Additional Protocol Configuration Options IE, the ePDG shall include this IE over the S2b interface and correspondingly set the P-CSCF IPv6 Address Request, or P-CSCF IPv4 Address Request, or both parameters as defined in 3GPP TS 24.008 [5]. |
| CO | If the UE includes the P-CSCF\_RESELECTION\_SUPPORT Private Status Type in a Notify payload within the IKE\_AUTH request message during the IPsec tunnel establishment procedure asspecified in 3GPP TS 24.302 [63], and if the ePDG supports the P-CSCF restoration extension procedure for the untrusted WLAN access (see 3GPP TS 23.380 [61]), the ePDG shall include this IE over the S2b interface and correspondingly set the P-CSCF\_RESELECTION\_SUPPORT, as defined in 3GPP TS 24.008 [5]. |
| O | The TWAN may include this IE on the S2a interface to retrieve additional IP configuration parameters from the PGW (e.g. DNS server) if the transparent single-connection mode is used as specified in 3GPP TS 23.402 [45]. |
| CO | The ePDG shall include this IE over the S2b interface and correspondingly set the PDU session ID, as defined in 3GPP TS 24.008 [5] if:   * the UE includes the N1\_MODE\_CAPABILITY Notify payload within the IKE\_AUTH request message during the IPsec tunnel establishment procedure as specified in 3GPP TS 24.302 [63]; * the ePDG supports this IKEv2 attribute and the Additional Protocol Configuration Options IE; and * the PDN connection is not restricted from interworking with 5GS by user subscription (see "5GC" bit within Core-Network-Restrictions AVP and Interworking-5GS-Indicator AVP specified in 3GPP TS 29.273 [68]). |  |
| H(e)NB Local IP Address | CO | The MME/SGSN shall include this IE on S11/S4 interface if the MME/SGSN receives this information from H(e)NB in UE associated S1/Iu signalling according (see 3GPP TS 23.139 [51]) during:   * E-UTRAN Initial Attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, UE-requested PDN Connectivity, PDP Context Activation and a a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN using S4; * TAU/RAU/X2-based handover/Enhanced Serving RNS Relocation Procedure with SGW change, if the PGW/PCRF has requested H(e)NB information reporting for the PDN connection.   The SGW shall forward this IE on S5/S8 interface if the SGW receives it from the MME/SGSN. | IP Address | 1 |
| H(e)NB UDP Port | CO | The MME/SGSN shall include this IE on S11/S4 interface if the MME/SGSN receives this information from H(e)NB in UE associated S1/Iu signalling according (see 3GPP TS 23.139 [51]) during:   * E-UTRAN Initial Attach, a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, UE-requested PDN Connectivity, PDP Context Activation and a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN using S4; * TAU/RAU/X2-based handover/Enhanced Serving RNS Relocation Procedure with SGW relocation, if the PGW/PCRF has requested H(e)NB information reporting for the PDN connection.   The SGW shall forward this IE on S5/S8 interface if the SGW receives it from the MME/SGSN. | Port Number | 1 |
| MME/S4-SGSN Identifier | CO | If the PGW triggered SGW restoration procedure is supported, the MME/S4-SGSN shall include this IE on S11/S4 interface and the SGW shall forward this IE on S5 interface in the existing signalling as specified in 3GPP TS 23.007 [17].  If the overload control feature is supported by the MME/S4-SGSN and is activated for the PLMN to which the PGW belongs (see clause 12.3.11), the MME/S4-SGSN shall include this IE on the S11/S4 interface. In that case, the SGW shall forward this IE on the S5/S8 interface. | IP Address | 2 |
| TWAN Identifier | CO | This IE shall be included on the S2a interface for Initial Attach in WLAN procedure, UE-initiated Connectivity to Additional PDN with GTP on S2a and handover to TWAN with GTP on S2a procedure as specified in 3GPP TS 23.402 [45]. | TWAN Identifier | 0 |
| ePDG IP Address | O | This IE may be included on the S2b interface based on local policy for Fixed Broadband access network interworking, see 3GPP TS 23.139 [51]. If present, it shall contain the ePDG IP address which is used as IKEv2 tunnel endpoint with the UE. | IP Address | 3 |
| CN Operator Selection Entity | CO | In shared networks, the SGSN shall include this IE on the S4 interface for a PDP Context Activation, a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN and RAU with SGW relocation procedures, if the information is available, to indicate whether the Serving Network has been selected by the UE or by the network. | CN Operator Selection Entity | 0 |
| CO | The SGW shall include this IE on S5/S8 if it receives it from the SGSN. |
| Presence Reporting Area Information | CO | The MME/SGSN shall include this IE in the following procedures, if the PGW/PCRF/OCS requested reporting changes of UE presence in the Presence Reporting Area(s) and the MME/SGSN supports such reporting:  - TAU/RAU/X2 Handover/Enhanced SRNS Relocation procedures with SGW relocation and MME/SGSN change. The new MME/SGSN shall then indicate whether the UE is inside or outside the PRA for each of the active Presence Reporting Area(s), or indicate that the Presence Reporting Area (s) is inactive;  - TAU/RAU/X2 Handover/Enhanced SRNS Relocation procedures with SGW relocation and without MME/SGSN change, if the UE enters or leaves the Presence Reporting Area(s). In this case, this IE shall only include the active PRA(s) that the UE has newly entered or left.  Several IEs with the same type and instance value may be included as necessary to represent a list of Presence Reporting Area Actions. See NOTE 20. | Presence Reporting Area Information | 0 |
| MME/S4-SGSN's Overload Control Information | O | During an overload condition, the MME/S4-SGSN may include this IE on the S11/S4 interface if the overload control feature is supported by the MME/S4-SGSN and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the MME/S4-SGSN shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 0 |
| CO | If the SGW receives this IE and if it supports the overload control feature, it shall forward it to the PGW on the S5/S8 interface. |
| SGW's Overload Control Information | O | During an overload condition, the SGW may include this IE over the S5/S8 interface if the overload control feature is supported by the SGW and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the SGW shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 1 |
| TWAN/ePDG's Overload Control Information | O | During an overload condition, the TWAN/ePDG may include this IE over the S2a/S2b interface if the overload control feature is supported by the TWAN/ePDG and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the TWAN/ePDG shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 2 |
| Origination Time Stamp | CO | The MME/SGSN and the TWAN/ePDG shall include this IE on the S11/S4 and S2a/S2b interface respectively, in the conditions specified in clause 13.2.  When present, the Origination Time Stamp shall contain the UTC time when the originating entity initiated the request. | Millisecond Time Stamp | 0 |
| CO | The SGW shall include this IE on the S5/S8 interface if it receives the Origination Time Stamp from the MME/SGSN and if it supports the procedure specified in clause 13.2. |
| Maximum Wait Time | CO | The MME/SGSN and the TWAN/ePDG shall include this IE on the S11/S4 and S2a/S2b interface respectively, in the conditions specified in clause 13.3.  When present, the Maximum Wait Time shall contain the duration (number of milliseconds since the Origination Time Stamp) during which the originator of the request waits for a response. | Integer Number | 0 |
| CO | The SGW shall include this IE on the S5/S8 interface if it receives the Maximum Wait Time from the MME/SGSN and if it supports the procedure specified in clause 13.3. |
| WLAN Location Information | CO | This IE shall be included on the S2b interface if the WLAN Location Information is available. | TWAN Identifier | 1 |
| WLAN Location Timestamp | CO | This IE shall be included on the S2b interface, if the WLAN Location Timestamp is available. | TWAN Identifier Timestamp | 0 |
| NBIFOM Container | CO | This IE shall be included on the S11/S4 or S2a/S2b interfaces if the MME/S4-SGSN or the TWAN/ePDG receives an NBIFOM Container from the UE as specified in TS 24.161 73]. The Container Type shall be set to 4. | F-Container | 0 |
| CO | If the SGW receives an NBIFOM Container from the MME/S4-SGSN, the SGW shall forward this IE to the PGW on the S5/S8 interface. |
| Remote UE Context Connected | CO | The MME shall include this IE on the S11 interface during a SGW relocation procedure if such information is available.  Several IEs with the same type and instance value may be included as necessary to represent a list of remote UEs connected. | Remote UE Context | 0 |
| 3GPP AAA Server Identifier | O | The ePDG/TWAN may include this IE on the S2a/S2b interface to provide the selected 3GPP AAA server identifier to the PGW. See NOTE 13. | Node Identifier | 0 |
| Extended Protocol Configuration Options (ePCO) | CO | If the MME receives ePCO from the UE during the Initial Attach, UE requested PDN Connectivity procedures, the MME shall forward the ePCO IE to the SGW if the MME supports ePCO.  The SGW shall also forward it to the PGW if the SGW supports ePCO. See NOTE 15. | ePCO | 0 |
| Serving PLMN Rate Control | CO | The MME shall include this IE on the S11 interface if Serving PLMN Rate control is configured by the MME operator and the PDN Connection is set to Control Plane Only:  - during an Initial Attach, or a UE Requested PDN Connectivity procedure.  - during an inter MME TAU with SGW relocation procedure  See NOTE 18.  The SGW shall include this IE on S5/S8 if it receives this IE from MME. | Serving PLMN Rate Control | 0 |
| MO Exception Data Counter | CO | The MME shall include the counter if it has received the counter for RRC cause "MO Exception data" in the Context Response message during a TAU with an MME and SGW change. | Counter | 0 |
| UE TCP Port | CO | The ePDG shall include this IE on the S2b interface if NAT is detected, the TCP encapsulation is used and the UE Local IP Address is present. | Port Number | 2 |
| Mapped UE Usage Type | CO | The MME/SGSN shall include this IE on the S11/S4 interface, if available. When present, this IE shall contain the mapped UE usage type applicable to the PDN connection. See NOTE 21. | Mapped UE Usage Type | 0 |
| CO | The SGW shall include this IE on S5 if it receives it from the MME/SGSN. |
| User Location Information for SGW | CO | The MME/SGSN shall include this IE on the S11/S4 interface, based on operator policy for the User Location Information to be sent to the SGW, if the user location information to be passed to the SGW is not already reported in the ULI IE in this message.  When present, this IE shall include the ECGI, TAI, eNodeB ID, RAI and/or RNC-ID, based on local policy.  See NOTE 21. | ULI | 1 |
| SGW-U node name | CO | The SGW-C shall include this IE on the S5 interface, if available. See NOTE 21. | FQDN | 0 |
| Secondary RAT Usage Data Report | CO | If the PLMN has configured secondary RAT usage reporting and PDN GW Secondary RAT reporting is active, the MME shall include this IE on the S11 interface if it has received Secondary RAT usage data from eNodeB in an X2-based handover with Serving GW relocation. The MME shall also set the IRSGW flag to "0", to indicate that the Secondary RAT usage data is reported for the Source SGW, and sent via the Target SGW to the PGW.  Several IEs with the same type and instance value may be included, to represent multiple usage data reports. | Secondary RAT Usage Data Report | 0 |
| UP Function Selection Indication Flags | CO | Based on operator policy, the MME/S4-SGSN shall include this IE on the S4/S11 interface, if any of the applicable flags is set to 1.  Applicable flags are:   * DCNR: This flag shall be set to 1 if it is desired to select a specific SGW-U and PGW-U for UEs supporting Dual Connectivity with NR and not restricted from using NR by user subscription, e.g. due to requirements of higher bitrates.   See NOTE 21. | UP Function Selection Indication Flags | 0 |
| CO | The SGW shall include this IE on S5/S8 if it receives it from the MME/S4-SGSN. |
| APN RATE Control Status | CO | If APN RATE Control Status is available in MME/S4-SGSN, APN RATE Control Status shall be transfered on the S4/S11 interface.  The SGW shall include the APN RATE Control Status IE on the S5/S8 interface, if received from the MME/S4-SGSN. | APN RATE Control Status | 0 |
| Private Extension | O | This IE may be sent on the S5/S8, S4/S11 and S2a/S2b interfaces. | Private Extension | VS |
| NOTE 1: The conditional PDN Type IE is redundant on the S4/S11 and S5/S8 interfaces (as the PAA IE contains exactly the same field). The receiver may ignore it. This IE is never sent on the S2a/S2b interface.  NOTE 2: 3GPP TS 23.401 [3] (e.g. clause 5.3.2.1) and 3GPP TS 23.060 [35] (e.g. clause 9.2.2.1) defines the MME/SGSN shall send the MS Info Change Reporting Support Indication to the PGW. In such case MME/SGSN shall use the Change Reporting Support Indication and/or CSG Change Reporting Support Indication (whichever is applicable), even if stage 2 refers to MS Info Change Reporting Support Indication.  NOTE 3: The methods that the ePDG may use to acquire the RAT type of the untrusted non-3GPP IP access network are not specified in this release.  NOTE 4: The PDN-GW can be informed about the type of access network used by the UE over several reference points, see 3GPP TS 29.212 [30] for the mapping between the code values for the different access network types.  NOTE 5: 3GPP TS 23.401 [3] (see clause 5.3.1.1) and 3GPP TS 23.060 [35] (see clause 9.2.1) specify the handling of the cases when UE has requested IPv4v6 PDN Type, but MME does not set the Dual Address Bearer Flag due to the MME operator using single addressing per bearer to support interworking with nodes of earlier releases.  NOTE 6: The Bearer Context to be created IE and Bearer Context to be removed IE, together, shall contain all the bearers belonging to the given PDN connection with each bearer appearing in only one of these IEs.  NOTE 7: During S1 based handover/ Inter RAT handover/TAU/RAU with S4-SGSN/MME and SGW change, and handover/RAU/TAU from Gn/Gp SGSN to S4-SGSN/MME, if the target MME/S4-SGSN cannot accept one or more PDN connection(s) but can accept at least one or more remaining PDN Connection(s) of the UE, the target MME/SGSN shall indicate all the non GBR bearers of the unaccepted PDN Connection in the Bearer Contexts to be created IE. The (target) MME/SGSN shall indicate all the GBR bearers of the unaccepted PDN connection in the Bearer Contexts to be removed IE.  NOTE 8: The conditions of presence of the IEs in the Create Session Request for the MME and S4-SGSN triggered Serving GW relocation (see clause 5.10.4 of 3GPP TS 23.401 [3] and clause 9.2.2.4 of 3GPP TS 23.060 [35]) are identical to those specified respectively for X2 handover with SGW relocation and for Enhanced Serving RNS Relocation with SGW relocation.  NOTE 9: During the TAU/RAU/Handover from Gn/Gp SGSN, the target MME/S4-SGSN cannot derive the level of support for User Location Change Reporting and/or CSG Information Change Reporting at the source Gn/Gp SGSN.  NOTE 10: In shared networks, when the message is sent from the VPLMN to the HPLMN, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator for supporting UEs, or that of the allocated Core Network Operator for non-supporting UEs. As an exception, based on inter-operator roaming/sharing agreement, if the information on whether the UE is a supporting or non-supporting UE is available, the PLMN ID that is communicated to the HPLMN for non-supporting UEs shall be the Common PLMN ID.  In shared networks, when the MME/S4-SGSN and PGW pertain to the same PLMN, the Primary PLMN ID shall be communicated in the ECGI to the PGW, and the Common PLMN ID shall be communicated in SAI/CGI to the PGW, for both supporting and non-supporting UEs. The Core Network Operator PLMN ID (selected by the UE for supporting UEs or allocated by the network for non-supporting UEs) shall be communicated in the TAI, RAI, UCI and the Serving Network. See clause 4.4 of 3GPP TS 23.251 [55].  NOTE 11: If the UE initiates a TAU or RAU procedure back to the old MME/old S4 SGSN before completing the ongoing TAU or RAU procedure and the UE is not accessed via a CSG cell or hybrid cell, the old MME/old S4-SGSN shall treat this case as the UE leaves a CSG or hybrid cell. .  NOTE 12: Void  NOTE 13: If supported, the PGW shall contact the 3GPP AAA server (identified by this IE which carries the Origin-Host and Origin-Realm included in the DEA message received by the ePDG/TWAN over SWm or STa interface) for establishing the S6b session.  NOTE 14: Before contacting an EPC entity, e.g. to send a Create Session Request message, the MME/SGSN shall ensure, during the selection procedure, that the receiving entities support Non-IP PDN type, as specified in clause 5.9 of 3GPP TS 29.303 [32], e.g. using the Notification of Supported features procedure to learn if the candidate SGW supports the CIOT feature. See also the clause 8.83.  NOTE 15: An MME, SGW and PGW which supports NB-IoT and/or Non-IP or Ethernet PDN type and/or inter-system change with 5GS shall support ePCO. A UE supporting NB-IoT access and/or Non-IP or Ethernet PDN type and/or N1 mode also support ePCO.  NOTE 16: All the UE's SGi PDN Connections shall either have the Control Plane Only PDN Connection Indication set or not set.  NOTE 17: If the APN was authorized based on the wildcard APN, the Selection Mode Value shall be set to indicate that the subscription is not verified, see Annex A of 3GPP TS 23.060 [35].  NOTE 18: The MME can set the Control Plane Only Indication only during a PDN connection creation procedure, and the Serving PLMN Rate Control is only applicable to the PDN connection with Control Plane Only Indication set.  During an inter MME with SGW relocation procedure, when the source MME has not set the Control Plane Only Indication, and the target MME supports only the Control Plane CIoT Optimizations, then the target MME shall not include the Serving PLMN Rate Control IE as the PDN connection cannot be changed to Control Plane Only. During an inter MME with SGW relocation procedure, when the source MME has set the Control Plane Only Indication and included Serving PLMN rate control IE in the Context Response message, and the target MME supports both the Control Plane CIoT Optimisation and the establishment of the User Plane, the target MME cannot stop the Serving PLMN Rate Control, i.e. the PGW will continue to enforce Serving PLMN Rate Control as the Control Plane Only Indication for this PDN connection cannot be changed during this mobility procedure.  NOTE 19: An MME which supports eNB Change Reporting shall also support Change reporting and therefore shall set both the Change Report Supporting indication and the eNB Changing Reporting Support Indication.  NOTE 20: Upon inter MME/SGSN mobility, the target MME/SGSN shall report Presence Reporting Area Information for all the active and inactive PRAs requested by the PGW. Upon intra MME/SGSN mobility with SGW relocation, the MME/SGSN shall only report active PRAs whose Presence Reporting Area Information is changed, e.g. from inside to outside, or vice versa.  NOTE 21: This information is used for the SGW-U, PGW-U or combined SGW-U/PGW-U selection (see Annex B.2 of 3GPP TS 29.244 [80]).  NOTE 22: An MME shall send the LTE-M RAT type to the SGW only if the latter is known to support it. The forwarding of the LTE-M RAT type to the PGW is controlled by the LTE-M RAT Type reporting to PGW Indication.  NOTE 23: It is assumed that the N26 interface is supported homogeneously across a PLMN.  NOTE 24: PDN connections of PDN Type "Ethernet" are not supported in GERAN/UTRAN. For PDN connections of PDN type "Ethernet", mobility to GERAN/UTRAN or Non 3GPP access from E-UTRAN is not supported. See clause 4.3.17.8a of TS 23.401 [3].  NOTE 25: Before contacting an EPC entity, e.g. to send a Create Session Request message, the MME shall ensure, during the selection procedure, that the receiving entities support Ethernet PDN type, as specified in clause 5.x of 3GPP TS 29.303 [32], e.g. using the Notification of Supported features procedure to learn if the candidate SGW supports the ETH feature. See also the clause 8.83.  NOTE X: The MME should select an SGW supporting MT-EDT if MT-EDT is applicable for the PDN connection. | | | | |

Table 7.2.1-2: Bearer Context to be created within Create Session Request

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Bearer Context IE Type = 93 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| EPS Bearer ID | M |  | EBI | 0 |
| TFT | O | This IE may be included on the S4/S11 interfaces. | Bearer TFT | 0 |
| S1-U eNodeB F-TEID | C | This IE shall be included on the S11 interface for X2-based handover with SGW relocation. | F-TEID | 0 |
| S4-U SGSN F-TEID | C | This IE shall be included on the S4 interface if the S4-U interface is used. | F-TEID | 1 |
| S5/S8-U SGW F-TEID | C | This IE shall be included on the S5/S8 interface for an "E-UTRAN Initial Attach", a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN, a "PDP Context Activation", a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN or a "UE Requested PDN Connectivity". | F-TEID | 2 |
| S5/S8-U PGW F-TEID | C | This IE shall be included on the S4 and S11 interfaces for the TAU/RAU/Handover cases when the GTP-based S5/S8 is used. | F-TEID | 3 |
| CO | For PMIP-based S5/S8, this IE shall be included on the S11/S4 interface for the TAU/RAU/Handover cases if the PGW provided an alternate address for user plane, i.e. an IP address for user plane which is different from the IP address for control plane.  When present, this IE shall contain the alternate IP address for user plane and the uplink GRE key.  See NOTE 1. |
| S12 RNC F-TEID | CO | This IE shall be included on the S4 interface if the S12 interface is used in the Enhanced serving RNS relocation with SGW relocation procedure. | F-TEID | 4 |
| S2b-U ePDG F-TEID | C | This IE shall be included on the S2b interface for an Attach with GTP on S2b, a UE initiated Connectivity to Additional PDN with GTP on S2b, a Handover to Untrusted Non-3GPP IP Access with GTP on S2b and an Initial Attach for emergency session (GTP on S2b). | F-TEID | 5 |
| S2a-U TWAN F-TEID | C | This IE shall be included on the S2a interface for an Initial Attach in WLAN on GTP S2a, an Initial Attach in WLAN for Emergency Service on GTP S2a, a UE initiated Connectivity to Additional PDN with GTP on S2a and a Handover to TWAN with GTP on S2a. | F-TEID | 6 |
| Bearer Level QoS | M |  | Bearer QoS | 0 |
| S11-U MME F-TEID | CO | This IE shall be sent on the S11 interface, if S11-U is being used, during the E-UTRAN Initial Attach and UE requested PDN connectivity procedures.  This IE may also be sent on the S11 interface, if S11-U is being used, during a Tracking Area Update procedure with Serving GW change, if the MME needs to establish the S11-U tunnel.  See NOTE 2. | F-TEID | 7 |
| NOTE 1: The capability to receive from the LMA an alternate LMA address for user plane shall be supported homogeneously across all the SGWs, when supported over PMIP-based S5/S8.  NOTE 2: Establishing the S11-U tunnel at once during the Create Session Request/Response procedure avoids the need for a subsequent Modify Bearer Request/Response exchange to transfer DL or UL user data. | | | | |

Table 7.2.1-3: Bearer Context to be removed within Create Session Request

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Bearer Context IE Type = 93 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| EPS Bearer ID | M |  | EBI | 0 |
| S4-U SGSN F-TEID | C | This IE shall be sent on the S4 interface if the S4-U interface is used. See NOTE 1. | F-TEID | 0 |
| NOTE 1: The conditional S4-U SGSN F-TEID IE is redundant. | | | | |

Table 7.2.1-4: Overload Control Information within Create Session Request

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Overload Control Information IE Type = 180 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Overload Control Sequence Number | M | See clause 12.3.5.1.2.1 for the description and use of this parameter. | Sequence Number | 0 |
| Overload Reduction Metric | M | See clause 12.3.5.1.2.3 for the description and use of this parameter. | Metric | 0 |
| Period of Validity | M | See clause 12.3.5.1.2.2 for the description and use of this parameter.  This IE should be set to "0" if the "Overload Reduction Metric" is null. This IE shall be ignored by the receiver if the "Overload Reduction Metric" is null. | EPC Timer | 0 |

**Table 7.2.1-5: Remote UE Context Connected within Create Session Request**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octets 1 |  | Remote UE Context IE Type = 191 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octets 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Remote User ID | M | See clause 8.123 for the description and use of this parameter | Remote User ID | 0 |
| Remote UE IP Information | M | See clause 8.124 for the description and use of this parameter | Remote UE IP Information | 0 |

\* \* \* Next Change \* \* \* \*

### 7.2.7 Modify Bearer Request

The direction of this message shall be from MME/S4-SGSN to SGW and/or from SGW to PGW (see Table 6.1-1).

The Modify Bearer Request message shall only be sent on the S11 interface by the MME to the SGW and on the S5/S8 interfaces by the SGW to the PGW as part of the procedures:

- E-UTRAN Tracking Area Update without SGW Change

- UE triggered Service Request

- S1-based Handover

- UTRAN Iu mode to E-UTRAN Inter RAT handover

- GERAN A/Gb mode to E-UTRAN Inter RAT handover

- Tracking Area Update procedure with a RAT type change

- E-UTRAN Initial Attach

- Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN with GTP on S5/S8 interface (see clauses 8.2, 8.6 and 16.11 of 3GPP TS 23.402 [45])

- UE requested PDN connectivity

- 3G SGSN to MME combined hard handover and SRNS relocation procedure

- X2-based handover without SGW relocation

- UTRAN/GERAN to E-UTRAN SRVCC

- HSS-based P-CSCF restoration for 3GPP access (see 3GPP TS 23.380 [61])

- Connection Resume procedure (see clause 5.3.5A of 3GPP TS 23.401 [3])

- reception of the RRC establishment cause "MO Exception data" in the NB-IoT RAT

It shall also only be sent on the S11 interface by the MME to the SGW as part of the procedure:

- E-UTRAN Initiated E-RAB modification procedure

- Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN with PMIP on S5/S8 interface (see clauses 8.2 and 16.11 of 3GPP TS 23.402 [45])

- Tracking Area Update procedure with Serving GW change and data forwarding

- Mobile Originated Data transport in Control Plane CIoT EPS optimisation with P-GW connectivity

- Mobile Terminated Data Transport in Control Plane CIoT EPS optimisation with P-GW connectivity

- Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS optimisation procedure (see clause 5.3.4B.4 of 3GPP TS 23.401 [3]).

It shall also only be sent on the S4 interface by the SGSN to the SGW and on the S5/S8 interfaces by the SGW to the PGW as part of the procedures:

- Routeing Area Update with MME interaction and without SGW change

- E-UTRAN to UTRAN Iu mode Inter RAT handover

- E-UTRAN to GERAN A/Gb mode Inter RAT handover

- Inter SGSN Routeing Area Update Procedure and Combined Inter SGSN RA / LA Update to S4 SGSNs without SGW change

- Iu mode RA Update Procedure without SGW change

- Serving RNS Relocation Procedure

- Combined Hard Handover and SRNS Relocation Procedure

- Combined Cell / URA Update and SRNS Relocation Procedure

- Enhanced Serving RNS Relocation without SGW relocation

- UE Initiated Service Request Procedure

- Iu mode to A/Gb mode Intra SGSN Change

- A/Gb mode to Iu mode Intra SGSN Change

- Iu mode to A/Gb mode Inter-SGSN Change

- A/Gb mode to Iu mode Inter-SGSN Change

- Paging Response with no established user plane on S4

- PDP Context Activation Procedure

- Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN with GTP on S5/S8 interface (see clauses 8.2, 8.6 and 16.11 of 3GPP TS 23.402 [45])

- UTRAN/GERAN to UTRAN (HSPA) SRVCC

- HSS-based P-CSCF restoration for 3GPP access (see 3GPP TS 23.380 [61])

It shall also only be sent on the S4 interface by the SGSN to the SGW as part of the procedures:

- RAB Assignment Procedure

- SRVCC from E-UTRAN to UTRAN or GERAN with DTM HO support procedures and SRVCC from UTRAN (HSPA) to UTRAN or GERAN with DTM HO support.

- Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN with PMIP on S5/S8 interface (see clauses 8.2 and 16.11 of 3GPP TS 23.402 [45])

- Routeing Area Update procedure with Serving GW change and data forwarding

and only on the S5/S8 interfaces by the SGW to the PGW as part of the procedures:

- Tracking Area Update procedure with SGW change

- Gn/Gp SGSN to S4 SGSN Routing Area Update

- X2 based handover with SGW relocation

- Gn/Gp SGSN to MME Tracking Area Update

- Enhanced Serving RNS Relocation with SGW relocation

- Routeing Area Update with MME interaction and with SGW change

- Inter SGSN Routeing Area Update Procedure and Combined Inter SGSN RA / LA Update using S4 with SGW change

- Iu mode RA Update Procedure using S4 with SGW change

- Restoration of PDN connections after an SGW failure if the MME/SGSN and PGW support these procedures as specified in 3GPP TS 23.007 [17]

- MME triggered Serving GW relocation

- S4-SGSN triggered Serving GW relocation

- PGW Pause of Charging procedure

and on the S2b interface by the ePDG to the PGW as part of the procedures:

- UE initiated IPsec tunnel update procedure

If the optional network triggered service restoration feature is supported by the MME, SGSN and SGW, then the Modify Bearer Request message shall also be sent as part of the network triggered service restoration procedure with ISR during an intra MME TAU and an intra S4-SGSN RAU procedure for UEs that had ISR active before either the MME or the S4-SGSN has restarted, as specified in 3GPP TS 23.007 [17]:

- on the S11 interface by the MME to the SGW, if the MME detected that the ISR associated S4-SGSN has restarted and UE performs a TAU procedure;

- on the S4 interface by the S4-SGSN to the SGW, if the S4-SGSN detected that the ISR associated MME has restarted and UE performs a RAU procedure.

This message can be used as an implicit resume of the suspended bearers in the SGW and in the PGW (see 3GPP TS 23.216 [43] clauses 6.2.2.1 and 6.3.2.1, 3GPP TS 23.272 [21] clauses 6.3, 6.5 and 7.4). A Modify Bearer Request used as an implicit resume can contain zero or more IE(s), depending on the conditions of presence of the IEs specified in table 7.2.7-1. The PGW should not consider a Modify Bearer Request with zero IE as an error.

The Modify Bearer Request message may also be sent in the following cases from the S4-SGSN to the SGW/PGW to report a change of Serving Network, User CSG Information or/and UE Time Zone which occured during a previous RAU procedure without SGSN change but which has not been reported yet to the SGW/PGW, or to indicate to the PGW that the UE is available for signalling if the PDN connection is delay tolerant and if there is pending network initiated PDN connection signalling:

- during a Service Request procedure to establish data radio bearers for the corresponding PDP context for a UE in UTRAN with an existing S4-U tunnel;

- when the SGSN receives an uplink LLC PDU for user data or any valid LLC frame serving as a paging response from a UE in GERAN with an existing S4-U tunnel.

The Modify Bearer Request message may also be sent in the following cases from the S4-SGSN to the SGW/PGW to report a change of User Location Information which occured during a previous RAU procedure without SGSN change but which has not been reported yet to the SGW/PGW, if the S4-SGSN is configured to defer the reporting of ULI change until a RAB/user plane is established:

- during a Service Request procedure to establish data radio bearers for the corresponding PDP context for a UE in UTRAN with an existing S4-U tunnel;

- when the SGSN receives an uplink LLC PDU for user data or any valid LLC frame serving as a paging response for a UE in GERAN with an existing S4-U tunnel.

NOTE 1: the S4-SGSN can alternatively send a Change Notification Request message in the above cases, if no other information which requires the sending of a Modify Bearer Request, needs to be reported to the PGW.

The Modify Bearer Request message may also be sent by the MME to the SGW/PGW to report a change of Serving Network, User Location Information, User CSG Information, UE Time Zone or/and RAT Type, when user data is transported in NAS signalling, for a UE with an existing S11-U tunnel.

When requesting the PGW to pause or unpause charging for a PDN connection, the SGW shall wait for the PGW acknowledgement (i.e. Modify Bearer Response) before sending a new pause or unpause request.

NOTE 2: this ensures that the PGW always act per the most recent SGW request in particular in scenarios where the SGW would need to request the PGW to pause and unpause charging in a row (or vice-versa) and the Modify Bearer Request messages would arrive out of order at the PGW.

Upon receipt of a request from the PGW/PCRF/OCS in a message other than Create Bearer Request and Update Bearer Request to report changes of UE presence in new or modified Presence Reporting Area(s), the MME/S4-SGSN shall immediately send a Modify Bearer Request message or a Change Notification Request message to report to the PGW whether the UE is inside or outside the new or modified Presence Reporting Area(s) or whether the Presence Reporting Area(s) is inactive.

The MME/S4-SGSN shall also send a Modify Bearer Request message or a Change Notification Request message to report any subsequent change of UE presence in the Presence Reporting Area, as specified in 3GPP TS 23.401 [3] and 3GPP TS 23.060 [35].

If the Modify Bearer Request message is sent from the old MME/SGSN as part of Tracking/Routeing Area Update procedure with SGW change and data forwarding as specified in clause 5.3.3.1A of 3GPP TS 23.401 [3], the old MME/SGSN shall only include the Bearer Contexts to be modified IE.

NOTE 3: Since the UE has left the old MME/SGSN, some information related to the UE, e.g. ULI, UE Time Zone, CSG, RAT Type in the old MME/SGSN are not valid any more.

Upon receipt of a Modify Bearer Request message that includes the Presence Reporting Area Information from the MME/S4-SGSN, the SGW shall send a Modify Bearer Request message on the S5/S8 interface if any of the following condition is met:

- ISR is not active;

- ISR is active, and the RAT Type has changed since last reported or the CPRAI flag has been set to 1.

The MME shall increment the "MO Exception data counter" by one each time the MME has received the RRC cause "MO Exception data". The MME may defer sending a Modify Bearer Request message to report a non-zero value for the MO Exception Data Counter based on local configuration.

Upon receipt of a Modify Bearer Request message that includes the Secondary RAT Usage Data Report from the MME, the SGW shall send a Modify Bearer Request message on the S5/S8 interface if the IRPGW flag is set to 1 in the Secondary RAT Usage Data Report IE.

**Table 7.2.7-1: Information Elements in a Modify Bearer Request**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| ME Identity (MEI) | C | If an SGW receives this IE from an MME/SGSN during a TAU/RAU/Handover procedure, the SGW shall forward it across the S5/S8 interface to the PGW. | MEI | 0 |
| O | The MME/SGSN should include this IE on the S11/S4 interface if the IMSI is not available. The SGW shall forward it across the S5/S8 interface to the PGW if received. See NOTE 23. |
| User Location Information (ULI) | C | The MME/SGSN shall include this IE for the TAU/RAU/Handover procedures if the PGW/PCRF has requested location information change reporting and MME/SGSN support location information change reporting.  An MME/SGSN which supports location information change shall include this IE for UE-initiated Service Request and UE initiated Connection Resume procedures if the PGW/PCRF has requested location information change reporting and the UE's location info has changed.  See NOTE 5, NOTE 17.  The MME shall include the ECGI and/or TAI, or TAI and Macro eNB ID, or Macro eNB ID depending on the Change Reporting Action provided to the MME. The SGSN shall include either the CGI or SAI or RAI, or CGI/SAI together with RAI in the ULI depending on the Change Reporting Action provided to the SGSN.  When ISR is active, the MME/SGSN which supports location information change shall include this IE for UE-initiated Service Request procedure, if the PGW/PCRF has requested location information change reporting. | ULI  (NOTE 15) | 0 |
| CO | This IE shall also be included on the S4/S11 interface for a TAU/RAU/Handover with MME/SGSN change without SGW change procedure, if the level of support (User Location Change Reporting and/or CSG Information Change Reporting) changes.  The MME shall include the ECGI and /or TAI in the ULI, the S4-SGSN shall include either the CGI or SAI or RAI, or CGI/SAI together with RAI in the ULI. See NOTE 10. |
| CO | This IE shall also be included on the S4/S11 interface for a handover procedure with SGW change procedure if  - the level of support (User Location Change Reporting and/or CSG Information Change Reporting) changes; or  - the target MME/S4-SGSN can not derive the level of support (User Location Change Reporting and/or CSG Information Change Reporting) for the source Gn/Gp SGSN. See NOTE 14.  The MME shall include the ECGI and /or TAI in the ULI, the S4-SGSN shall include either the CGI or SAI or RAI, or CGI/SAI together with RAI in the ULI. See NOTE 10. |
| CO | This IE shall also be included on the S11/S4 interface during the following procedures if the MME/SGSN is configured to defer the reporting of ULI change until an E-RAB/RAB/ user plane is established, the ULI has changed during previous mobility procedures i.e. intra MME/S4-SGSN TAU/RAU, and the change has not been reported to the PGW yet:  - UE initiated Service Request, TAU or RAU with a request to establish data radio bearers;  - when the SGSN receives an uplink LLC PDU for user data or any valid LLC frame serving as a paging response for a UE in GERAN with an existing S4-U tunnel. |
| CO | This IE shall also be included on the S4/S11 interface for:  - a TAU/Handover procedure with an S4-SGSN interaction, if the MME supports location information change reporting;  - a RAU/Handover procedure with an MME interaction, if the SGSN supports location information change reporting.  The MME shall include the ECGI and TAI in the ULI. The S4-SGSN shall include the RAI and, if available, the CGI/SAI information, in the ULI. |
| CO | When ISR is not active, the SGW shall include this IE on S5/S8 if it receives the ULI from MME/SGSN.  When ISR is active, the SGW shall include this IE on S5/S8 if  - it receives the ULI from MME/S4-SGSN and the RAT Type has changed since last reported; or  - it receives the ULI from MME/S4-SGSN and the CLII flag has been set to 1. |
| Serving Network | CO | This IE shall be included on S11/S4 interface during the following procedures:  - TAU/RAU/handover if Serving Network is changed.  - TAU/RAU when the UE was ISR activated which is indicated by ISRAU flag.  - UE triggered Service Request when UE is ISR activated.  - UE initiated Service Request if ISR is not active, but the Serving Network has changed during previous mobility procedures, i.e. intra MME/S4-SGSN TAU/RAU and the change has not been reported to the PGW yet.  - TAU/RAU procedure as part of the optional network triggered service restoration procedure with ISR, as specified by 3GPP TS 23.007 [17]. | Serving Network  (NOTE 15) | 0 |
| CO | This IE shall also be included on the S4/S11 interface during a TAU/RAU/Handover with MME/SGSN change if the source MME/SGSN has set the SNCR bit in the Change to Report Flags IE in the Forward Relocation Request or Context Response message. |
| CO | This IE shall be included on S5/S8 if the SGW receives this IE from MME/SGSN and if ISR is not active.  This IE shall be included on S5/S8 if the SGW receives this IE from MME/SGSN and ISR is active and the Modify Bearer Request message needs to be sent to the PGW as specified in the 3GPP TS 23.401 [3]. |
| RAT Type | C | This IE shall be sent on the S11 interface for a TAU with a RAT type change, UE triggered Service Request or an I-RAT Handover.  This IE shall be sent on the S4 interface for a RAU with MME interaction, a RAU with an SGSN change, a UE Initiated Service Request or an I-RAT Handover.  This IE shall be sent on the S5/S8 interface if the RAT type changes. | RAT Type | 0 |
| CO | If SGW receives this IE from MME/SGSN during a TAU/RAU/Handover with SGW change procedure, the SGW shall forward it across the S5/S8 interface to PGW. See NOTE 10.  If any condition for including the RAT Type over S5/S8 is met (e.g. the RAT type changes), and if the LTE-M RAT type is received from the MME, the SGW shall signal the following RAT type to the PGW:   * LTE-M RAT type, if the 'LTE-M RAT type reporting to PGW' flag is received from the MME; or   WB-E-UTRAN RAT type, otherwise. |
| CO | The IE shall be sent on the S11/S4 interface during the following procedures:  - an inter MME TAU or inter SGSN RAU when UE was ISR activated which is indicated by ISRAU flag.  - TAU/RAU procedure as part of optional network triggered service restoration procedure with ISR, as specified by 3GPP TS 23.007 [17].  If ISR is active, this IE shall also be included on the S11 interface in the S1-U GTP-U tunnel setup procedure during an intra-MME intra-SGW TAU procedure. |
| CO | The MME shall set the RAT type to LTE-M, if the eNodeB indicated this is an LTE-M UE and the LTE-M RAT Type has not been reported yet to the SGW. |  |
| Indication Flags | C | This IE shall be included if any one of the applicable flags is set to 1.  Applicable flags are:   * Idle mode Signalling Reduction Activation Indication: This flag shall be set to 1 on S4/S11 interface, if the ISR is established between the MME and the S4 SGSN. * Handover Indication: This flag shall be set to 1 on the S4/S11 and S5/S8 interfaces during a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN or a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN procedures. * Direct Tunnel Flag: This flag shall be set to 1 on the S4 interface, if Direct Tunnel is used. * Change Reporting Support Indication: shall be set to 1 on S4/S11, S5/S8 interfaces, if the SGSN/MME supports location Info Change Reporting and if the SGSN/MME's operator policy permits reporting of location change to the operator of the PGW with which the session is established. This flag should be ignored by SGW if no message is sent on S5/S8. See NOTE 4. * CSG Change Reporting Support Indication: shall be set to 1 on S4/S11, S5/S8, if the SGSN/MME supports CSG Information Change Reporting and if the SGSN/MME's operator policy permits reporting of the CSG Information change to the operator of the PGW with which the session is established. This flag shall be ignored by SGW if no message is sent on S5/S8. See NOTE 4. * Change F-TEID support Indication: This flag shall be set to 1 on S4/S11 for an IDLE state UE initiated TAU/RAU procedure to allow the SGW changing the GTP-U F-TEID. * Propagate BBAI Information Change:  The MME/SGSN shall set this flag to 1 on S11/S4 in procedures without MME/SGSN change if the PGW has requested H(e)NB information reporting and the H(e)NB local IP address or UDP port number information from H(e)NB in UE associated S1/Iu signalling has changed.  (NOTE 8) The MME/SGSN shall set this flag to 1 on S11/S4 during TAU/RAU/Handover with MME/SGSN change procedures if the PGW has requested H(e)NB information reporting. See 3GPP TS 23.139 [51]. * CS to PS SRVCC indication: This flag shall be set to 1 on S4/S11 and on S5/S8 during UTRAN/GERAN to E-UTRAN/UTRAN (HSPA) SRVCC procedure as specified in 3GPP TS 23.216 [43]. * Change of Location Information Indication (CLII): This flag shall be set to 1 on S4/S11 interface only when the ISR is active for the UE. This flag shall be set to 1 by the MME/S4-SGSN if the ULI IE is included in the Modify Bearer Request message and the location information has changed since last reported by the MME/S4-SGSN. See NOTE 9. . * PDN Pause Support Indication: this flag shall be set to 1 on the S5/S8 interface during the TAU/RAU/handover with SGW relocation procedures if the new SGW supports the PGW Pause of Charging procedure. * PDN Pause On Indication: this flag shall be set to 1 on the S5/S8 interface if the SGW requests the PGW to pause the charging for the PDN connection as specified in 3GPP TS 23.401 [3]. (NOTE 13). * PDN Pause Off Indication: this flag shall be set to 1 on the S5/S8 interface if the SGW requests the PGW to unpause the charging for the PDN connection as specified in 3GPP TS 23.401 [3]. (NOTE 13). * Change of Presence Reporting Area information Indication (CPRAI): this flag shall be set to 1 on the S4/S11 interface if ISR is active for the UE and if the Presence Reporting Area Information IE is included in the Modify Bearer Request message and the Presence Reporting Area information has changed since last reported by the MME/S4-SGSN. See NOTE 9. * P-CSCF Restoration Indication: this flag shall be set to 1 on the S11/S4 and S5/S8 interfaces, for the IMS PDN connection, if the MME/S4-SGSN has received the indication from the HSS that a P-CSCF restoration is required for this user. * UE Available for Signalling Indication: this flag shall be set to 1 on S11/S4 by the MME/SGSN during a TAU/RAU or a Service Request procedure for E-UTRAN/UTRAN, or UE initiated Connection Resume procedure for E-UTRAN, or at receipt of an uplink LLC PDU for user data or any valid LLC frame serving as a paging response for GERAN, if the PDN connection is delay tolerant and if there is pending network initiated PDN connection signalling. The SGW shall include this IE on S5/S8 if it receives the flag from the MME/SGSN. * S11-U Tunnel Flag: this flag shall be set to 1 on the S11 interface if user data is transported in NAS signalling. * Extended PCO Support Indication: this flag shall be set to 1 on S11 interface by the MME if the UE and the MME support ePCO. This flag shall be set to 1 on S5/S8 interface by the SGW if the SGW support ePCO and the MME has set the flag to 1 over the S11 interface. See NOTE 18. * NBIFOM Support Indication: this flag shall be set to 1 on S11/S4 during an inter-PLMN mobility procedure for E-UTRAN/UTRAN if the MME/SGSN supports NBIFOM. This flag shall be set to 1 on S5/S8 during an inter-PLMN mobility procedure for E-UTRAN/UTRAN if both the SGW and the MME/SGSN support NBIFOM. See NOTE 19. * eNB Change Reporting Support Indication: shall be set to 1 on S11, S5/S8 interfaces, if the MME supports location Info Change Reporting and if the MME's operator policy permits reporting of location change to the operator of the PGW with which the session is being established. See NOTE 21. * LTE-M RAT Type reporting to PGW Indication: this flag shall be set to 1 on S11, based on operator policy or roaming agreements (for Home Routed PDN connections), if the SGW needs to forward the LTE-M RAT type to the PGW. * MTEDTA (MT-EDT Applicable): this flag shall be set to "1" on the S11 interface if MT-EDT is applicable to the PDN connection; otherwise the flag shall be set to "0". | Indication | 0 |
| Sender F-TEID for Control Plane | C | The new MME/SGSN shall include this IE on the S11 and S4 interfaces for a TAU/RAU/ Handover with an MME/SGSN change and without any SGW change. See NOTE 10.  If the SGW receives this IE and if it finds that its value is the same as the earlier received value of this IE for this UE, it should interpret this to mean that the MME/SGSN has not changed.  The new SGW shall include this IE on the S5 and S8 interfaces for a TAU/RAU/Handover with a SGW change. See NOTE 10.  If the PGW receives this IE and if it finds that its value is the same as the earlier received value of this IE for this PDN connection, it should interpret this to mean that the SGW has not changed. | F-TEID | 0 |
| Aggregate Maximum Bit Rate (APN-AMBR) | C | The APN-AMBR shall be sent for TAU/RAU/Handover from the Gn/Gp SGSN to the S4 SGSN/MME procedures. | AMBR | 0 |
| Delay Downlink Packet Notification Request | C | his IE shall be sent on the S11 interface for a UE triggered Service Request and UE initiated Connection Resume procedures. It shall contain the delay the SGW shall apply between receiving downlink data and sending Downlink Data Notification for all UEs served by that MME (see clause 5.3.4.2 of 3GPP TS 23.401 [3]). | Delay Value | 0 |
| CO | This IE shall be sent on the S4 interface for a UE triggered Service Request. It shall contain the delay the SGW shall apply between receiving downlink data and sending Downlink Data Notification for all UEs served by that SGSN (see clause 5.3.4.2 of 3GPP TS 23.401 [3]). |
| Bearer Contexts to be modified | C | This IE shall be sent on the S4/S11 interface and S5/S8 interface, except   * on the S5/S8 interface for a UE triggered Service Request and UE initiated Connection Resume procedures. * on the S5/S8 interface for a TAU/RAU/HO without SGW change procedure. See NOTE 10. . * on the S5/S8 interface when requesting the PGW to pause or unpause charging for the PDN connection. * on the S5/S8 interface for any other procedure without SGW change which requires to send a Modify Bearer Request to the PGW, e.g. HSS-based P-CSCF restoration for 3GPP access, reporting of UE presence in a Presence Reporting Area, implicit resume of suspended bearers.   (see NOTE 6).  When Handover Indication flag is set to 1 (i.e., for a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN or a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN procedures), the PGW shall ignore this IE. See NOTE 1.  Several IEs with the same type and instance value may be included as necessary to represent a list of Bearers to be modified.  During a TAU/RAU/Handover procedure with an SGW change, the SGW includes all bearers it received from the MME/SGSN (Bearer Contexts to be created, or Bearer Contexts to be modified and also Bearer Contexts to be removed) into the list of 'Bearer Contexts to be modified' IEs, which are then sent on the S5/S8 interface to the PGW (see NOTE 2, see NOTE 10).  During an E-UTRAN Initiated E-RAB modification procedure the MME shall send a Modify Bearer Request, including all the bearers (those modified and those not modified), per PDN connection for which at least one bearer has changed. See NOTE 11. | Bearer Context | 0 |
| Bearer Contexts to be removed | C | This IE shall be included on the S4 and S11 interfaces for the TAU/RAU/Handover, UE initiated Connection Resume and Service Request procedures where any of the bearers existing before the TAU/RAU/Handover procedure, UE initiated Connection Resume and Service Request procedures will be deactivated as consequence of the TAU/RAU/Handover procedure, UE initiated Connection Resume and Service Request procedures. See NOTE 3 and NOTE 6.  For each of those bearers, an IE with the same type and instance value, shall be included.  See NOTE 11. | Bearer Context | 1 |
| Recovery | C | This IE shall be included if contacting the peer for the first time | Recovery | 0 |
| UE Time Zone | CO | This IE shall be included by the MME/SGSN on the S11/S4 interfaces if the UE Time Zone has changed in the case of TAU/RAU/Handover or UE initiated Service Request procedure. See NOTE 5. | UE Time Zone | 0 |
| CO | This IE shall also be included on the S4/S11 interface during a TAU/RAU/Handover with MME/SGSN change if the source MME/SGSN has set the TZCR bit in the Change to Report Flags IE in the Forward Relocation Request or Context Response message. |
| C | If SGW receives this IE, SGW shall forward it to PGW across S5/S8 interface. |
| MME-FQ-CSID | C | This IE shall be included by MME on S11 and shall be forwarded by SGW on S5/S8 according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 0 |
| SGW-FQ-CSID | C | This IE shall be included by SGW on S5/S8 according to the requirements in 3GPP TS 23.007 [17]. | FQ-CSID | 1 |
| User CSG Information (UCI) | CO | The MME/SGSN shall include this IE for Handover procedures, UE initiated Connection Resume and UE-initiated Service Request procedure if the PGW/PCRF has requested CSG Info reporting and the MME/SGSN support the CSG information reporting and the User CSG information has changed (i.e. the UE is accessed via a new CSG cell or hybrid cell or leaves a CSG or hybrid cell).  In TAU/RAU procedure without SGW change, this IE shall also be sent if the PGW/PCRF has requested CSG info reporting and MME/SGSN supports CSG info reporting and the User CSG information has changed (i.e. the UE is accessed via a new CSG cell or hybrid cell or leaves a CSG or hybrid cell) when UE requested to activate E-RAB for all the active EPS bearers in TAU procedure or to keep the Iu connection after the completion of the RAU procedure. See NOTE 5. See NOTE 10. See NOTE 16.  The SGW shall include this IE on S5/S8 if it receives the User CSG Information from MME/SGSN.  See NOTE 15. | UCI | 0 |
| UE Local IP Address | CO | If the UE local IP Address has changed, the ePDG shall include this IE on S2b interface based on local policy for Fixed Broadband access network interworking (see 3GPP TS 23.139 [51]). | IP Address | 1 |
| UE UDP Port | CO | The ePDG shall include this IE on S2b interface if NAT is detected and UE Local IP Address is present for Fixed Broadband access network interworking (see 3GPP TS 23.139 [51]). | Port Number | 1 |
| MME/S4-SGSN LDN | O | This IE is optionally sent by the MME to the SGW on the S11 interface and by the SGSN to the SGW on the S4 interface (see 3GPP TS 32.423 [44]), when communicating the LDN to the peer node for the first time. | Local Distinguished Name (LDN) | 0 |
| SGW LDN | O | This IE is optionally sent by the SGW to the PGW on the S5/S8 interfaces (see 3GPP TS 32.423 [44]), for inter-SGW mobity, when communicating the LDN to the peer node for the first time. | Local Distinguished Name (LDN) | 1 |
| H(e)NB Local IP Address | CO | The MME/SGSN shall include this IE on S11/S4 interface if the PGW/PCRF has requested H(e)NB information reporting and the MME/SGSN has received this information from H(e)NB in UE associated S1/Iu signalling (see 3GPP TS 23.139 [51]).  The SGW shall forward this IE on S5/S8 interface if it is received from the MME/SGSN and   * the Modify Bearer Request message needs to be sent to the PGW as specified in the 3GPP TS 23.401 [3]; or * the Propagate BBAI information change flag is received from the MME/SGSN.   (NOTE 7) | IP Address | 0 |
| H(e)NB UDP Port | CO | The MME/SGSN shall include this IE on S11/S4 interface if the PGW/PCRF has requested H(e)NB information reporting and the MME/SGSN has received this information from H(e)NB in UE associated S1/Iu signalling (see 3GPP TS 23.139 [51]).  The SGW shall forward this IE on S5/S8 interface if it is received from the MME/SGSN and   * the Modify Bearer Request message needs to be sent to the PGW as specified in the 3GPP TS 23.401 [3]; or * the Propagate BBAI information change flag is received from the MME/SGSN.   (NOTE 7) | Port Number | 0 |
| MME/S4-SGSN Identifier | CO | If the PGW triggered SGW restoration procedure is supported, the MME/S4-SGSN shall include this IE on S11/S4 interface and the SGW shall forward this IE on S5 interface in the existing signalling as specified in 3GPP TS 23.007 [17].  If the overload control feature is supported by the MME/S4-SGSN and is activated for the PLMN to which the PGW belongs(see clause 12.3.11), the MME/S4-SGSN shall include this IE on the S11/S4 interface during mobility procedures with MME/S4-SGSN change. | IP Address | 2 |
| CO | If the overload control feature is supported by the SGW and if the currently serving MME/S4-SGSN has provided this IE (in this message or in earlier message), the SGW shall include this IE on the S5/S8 interface and shall set it to the last received value of the serving MME/S4-SGSN identity. |
| CN Operator Selection Entity | CO | In shared networks, the SGSN shall include this IE on the S4 interface for the RAU procedure, if the information is available, and if the Serving Network IE is present in the message or if the CN Operator Selection Entity has changed, to indicate whether the Serving Network has been selected by the UE or by the network. | CN Operator Selection Entity | 0 |
| CO | The SGW shall include this IE on S5/S8 if it receives it from the SGSN. |
| Presence Reporting Area Information | CO | The MME/SGSN shall include this IE:  - if the PGW/PCRF/OCS has just requested to start or modify reporting changes of UE presence in a Presence Reporting Area and the MME/SGSN supports such reporting. The MME/SGSN shall then indicate whether the UE is inside or outside the newly started or modified Presence Reporting Area(s), or indicate the Presence Reporting Area(s) is inactive. Several IEs with the same type and instance value may be included as necessary to represent a list of Presence Reporting Area Information. One IE shall be included for each Presence Reporting Area newly started or modified.  The MME/SGSN shall also include this IE in the following procedures, if the PGW/PCRF requested to report changes of UE presence in a Presence Reporting Area and the MME/SGSN supports such reporting:  - TAU/RAU/Handover procedures without SGW change and with MME/SGSN change and S1-based handover procedure with SGW change. The MME/SGSN shall then indicate whether the UE is inside or outside the Presence Reporting Area(s) for each of the active Presence Reporting Area(s), or indicate that the Presence Reporting Area(s) is inactive. Several IEs with the same type and instance value may be included as necessary to represent a list of Presence Reporting Area Information.  - TAU/RAU/Handover/Cell Update procedures without MME/SGSN change, UE initiated Connection Resume and UE-initiated Service Request procedure if the UE enters or leaves the Presence Reporting Area(s). Several IEs with the same type and instance value may be included as necessary to represent a list of Presence Reporting Area Information. One IE shall be included for each active Presence Reporting Area that the UE has newly entered or left. See NOTE 5, NOTE 10.  - UE initiated Service Request, if ISR is active;  See NOTE 22. | Presence Reporting Area Information | 0 |
| CO | When ISR is not active, the SGW shall include this IE(s) on S5/S8 if it receives the Presence Reporting Area Information from MME/SGSN.  When ISR is active, the SGW shall include this IE(s) on S5/S8 if it receives the Presence Reporting Area Information from MME/S4-SGSN and  - the RAT Type has changed since last reported; or  - the CPRAI flag has been set to 1. |
| MME/S4-SGSN's Overload Control Information | O | During an overload condition, the MME/S4-SGSN may include this IE on the S11/S4 interface if the overload control feature is supported by the MME/S4-SGSN and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the MME/S4-SGSN shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 0 |
| CO | If the SGW receives this IE and if it supports the overload control feature, it shall forward it to the PGW on the S5/S8 interface. |
| SGW's Overload Control Information | O | During an overload condition, the SGW may include this IE over the S5/S8 interface if the overload control feature is supported by the SGW and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the SGW shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 1 |
| ePDG's Overload Control Information | O | During an overload condition, the ePDG may include this IE over the S2b interface if the overload control feature is supported by the ePDG and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the ePDG shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 2 |
| Serving PLMN Rate Control | CO | The MME shall include this IE on the S11 interface if the Serving PLMN Rate is changed.  The target MME shall also include this IE on the S11 interface during an Inter-MME mobility procedure if the Serving PLMN Rate control is configured, and if the configured value is different from the one received from the old MME.  See NOTE 20.  The SGW shall include this IE on S5/S8 if it receives this IE from MME via the Create Session Request or the Modify Bearer Request message. | Serving PLMN Rate Control | 0 |
| MO Exception Data Counter | CO | The MME shall include this IE on the S11 interface when it needs to send a non-zero counter value for the MO Exception Data Counter. The timestamp in the counter shall be set with the time at which the counter value increased from 0 to 1. | Counter | 0 |
| CO | The SGW shall include this IE on S5/S8 if it has received the counter from the MME. |
| IMSI | O | The MME/SGSN should include the IMSI if available. See NOTE 23. | IMSI | 0 |
| User Location Information for SGW | CO | The MME/SGSN shall include this IE on the S11/S4 interface, based on operator policy for the User Location Information to be sent to the SGW, if the user location information to be passed to the SGW is not already reported in the ULI IE in this message.  When present, this IE shall include the ECGI, TAI, eNodeB ID, RAI and/or RNC-ID, based on local policy.  See NOTE 25. | ULI | 1 |
| WLAN Location Information | CO | This IE shall be included on the S2b interface, during a UE initiated IPsec tunnel update procedure, if the WLAN Location Information is available. | TWAN Identifier | 0 |
| WLAN Location Timestamp | CO | This IE shall be included on the S2b interface, during a UE initiated IPsec tunnel update procedure, if the WLAN Location Timestamp is available. | TWAN Identifier Timestamp | 0 |
| Secondary RAT Usage Data Report | CO | If the PLMN has configured secondary RAT usage reporting, the MME shall include this IE on the S11 interface if it has received Secondary RAT usage data from eNodeB in an X2-based handover without Serving GW relocation, S1-based handover without MME or SGW relocation, or E-UTRAN initiated E-RAB modification procedure.  The MME shall also include this IE on the S11 interface if it has received a Secondary RAT Usage Data Report from the source MME in an S1-based handover with MME relocation procedure.  For S1-based handover with SGW relocation, the MME shall also set the IRSGW flag to "0", to indicate that the Secondary RAT usage data is reported for the Source SGW, and sent via the Target SGW to the PGW.  Several IEs with the same type and instance value may be included, to represent multiple usage data reports. | Secondary RAT Usage Data Report | 0 |
| Private Extension | O |  | Private Extension | VS |
| NOTE1: This requirement is introduced for backwards compatibility reasons. If Bearer Contexts to be modified IE(s) is received in the Modify Bearer Request message, the PGW shall include corresponding Bearer Contexts modified IE(s) in the Modify Bearer Response message.  NOTE2:According to the description in 3GPP TS 23.401 [3] e.g. clause 5.3.3.1 "Tracking Area Update procedure with Serving GW change" and 3GPP TS 23.060 [35], during a TAU/RAU/Handover procedure with an SGW change, if the SGW receives 'Bearer Context to be removed' IEs, the SGW shall allocate the S5/8-U SGW F-TEID for those bearers and include also these bearers in the 'Bearer contexts to be modified' IE, which is then sent within this message on the S5/S8 interface to the PGW.  NOTE3:The 'Bearer Contexts to be removed' IE signals to the SGW that these bearers will be removed by the MME/SGSN later on by separate procedures (e.g. MME/S4-SGSN initiated Dedicated Bearer Deactivation procedure). Therefore, the SGW will not delete these bearers during the ongoing TAU/RAU/Handover procedure (without an SGW change), a Handover procedure (with an SGW change except for an X2-Handover), an UE initiated Connection Resume and a Service Request procedure.  NOTE 4: 3GPP TS 23.401 [3] (e.g. clause 5.3.2.1) and 3GPP TS 23.060 [35] (e.g. clause 9.2.2.1) defines the MME/SGSN shall send the MS Info Change Reporting Support Indication to the PGW. In such case MME/SGSN shall use the Change Reporting Support Indication and/or CSG Change Reporting Support Indication (whichever is applicable), even if stage 2 refers to MS Info Change Reporting Support Indication.  NOTE 5: In TAU/RAU procedure, if the UE requested to activate E-RAB for all the active EPS bearers in TAU procedure or to keep the Iu connection after the completion of the RAU procedure, the User Location Info/User CSG Information/UE Time Zone/Presence Reporting Area Information shall not be sent in S1-U GTP-U tunnel setup procedure during the TAU procedure when the "active flag" is set (see 3GPP TS 24.301 [23] and 3GPP TS 23.401 [3]) or in the Service Request procedure after the completion of the RAU procedure.  NOTE 6: 3GPP TS 23.401 [3] specifies that the target MME/SGSN (for a handover with MME/SGSN change and with or without SGW change) and the MME/SGSN (for a handover without MME/SGSN change and with SGW change) shall send the Modify Bearer Request message to the SGW in the S1 based handover/ Inter RAT handover for an unaccepted PDN Connection when at least one PDN Connection of the UE was accepted by the RAN. In this case, the (target) MME shall indicate the reserved IP address to the SGW in the S1 eNodeB F-TEID and the (target) SGSN shall indicate the reserved IP address to the SGW in the S12 RNC F-TEID for all the non GBR bearers of the unaccepted PDN Connection in the Bearer Contexts to be modified IE. An implementation may provide the mentioned reserved IP address e.g. from one of the reserved IP address ranges (see RFC5735 or <http://www.iana.net/assignments/ipv4-address-space/ipv4-address-space.xml>), or the IP address may be provisioned by a configuration. The (target) MME/SGSN shall indicate all the GBR bearers of the unaccepted PDN connection in the Bearer Contexts to be removed IE.  NOTE 7: This IE is sent on S11/S4 in the specified conditions regardless of whether the H(e)NB local IP address and UDP port number information has changed or not to enable the SGW to propagate this IE in Modify Bearer Request over S5/S8 when required for reasons other than reporting a change in the H(e)NB local IP address and UDP port number information.  NOTE 8: H(e)NB local IP address and UDP port number information changes when the UE moves from an (e)NB to an H(e)NB, or from one H(e)NB to another H(e)NB with a change in the fixed network backhaul, or from one H(e)NB to a (e)NB.  The SGW shall send a Modify Bearer Request on S5/S8 if any of the following condition is met:  a) the Propagate BBAI Information Change flag is received from the MME/SGSN;  b) ISR is active and the RAT type has changed.  NOTE 9: When ISR is active, the CLII and CPRAI flags allow the SGW to avoid sending Modify Bearer Request message over S5/S8 interface during UE-initiated Service Request procedure, when the ULI IE and/or the Presence Reporting Area Information IE is included over S11/S4 Modify Bearer Request message but the location information and/or the Presence Reporting Area information and the RAT Type has not changed since last reported by the SGW.  NOTE 10: The RAU/TAU/Handover procedure which requires an SGW selection for the first time, e.g. a Gn/Gp SGSN to an S4 SGSN/MME RAU/TAU/Handover procedure, shall be handled in a similar manner to the RAU/TAU/Handover with an SGW change procedure.  NOTE 11: The Bearer Context to be modified IE and Bearer Context to be removed IE, together, shall contain all the bearers belonging to the given PDN connection with each bearer appearing in only one of these IEs. See clause 14 for the cases when a Bearer Context mismatch is detected.  NOTE 12: The conditions of presence of the IEs in the Modify Bearer Request for the MME and S4-SGSN triggered Serving GW relocation (see clause 5.10.4 of 3GPP TS 23.401 [3] and clause 9.2.2.4 of 3GPP TS 23.060 [35]) are identical to those specified respectively for X2 handover with SGW relocation and for Enhanced Serving RNS Relocation with SGW relocation.  NOTE 13: If this flag is set in the message, the PGW shall not interpret the absence of other IEs (e.g. MME-FQ-CSID, H(e)NB Local IP Address) as bearing any significance. The message may contain either the PDN Pause On Indication or the PDN Pause Off Indication, not both.  NOTE 14: During the TAU/RAU/Handover from Gn/Gp SGSN, the target MME/S4-SGSN can not derive the level of support for User Location Change Reporting and/or CSG Information Change Reporting at the source Gn/Gp SGSN.  NOTE 15: In shared networks, when the message is sent from the VPLMN to the HPLMN, the PLMN ID that is communicated in this IE shall be that of the selected Core Network Operator for supporting UEs, or that of the allocated Core Network Operator for non-supporting UEs. As an exception, based on inter-operator roaming/sharing agreement, if the information on whether the UE is a supporting or non-supporting UE is available, the PLMN ID that is communicated to the HPLMN for non-supporting UEs shall be the Common PLMN ID.  In shared networks, when the MME/S4-SGSN and PGW pertain to the same PLMN, the Primary PLMN ID shall be communicated in the ECGI to the PGW, and the Common PLMN ID shall be communicated in SAI/CGI to the PGW, for both supporting and non-supporting UEs. The Core Network Operator PLMN ID (selected by the UE for supporting UEs or allocated by the network for non-supporting UEs) shall be communicated in the TAI, RAI, UCI and the Serving Network. See clause 4.4 of 3GPP TS 23.251 [55].  NOTE 16: If the UE initiates a TAU or RAU procedure back to the old MME/old S4 SGSN before completing the ongoing TAU or RAU procedure and the UE is not accessed via a CSG cell or hybrid cell, the old MME/old S4-SGSN shall treat this case as the UE leaves a CSG or hybrid cell.  NOTE 17: The MME/S4-SGSN may be configured to defer the reporting of ULI change until an E-RAB, RAB or user plane is established. In that case, the MME/S4-SGSN shall not send a Modify Bearer Request, unless this is required for other reasons, during TAU/RAU without MME/SGSN change or Service Request (for UTRAN) procedures not requesting to activate data radio bearer(s). For GERAN, the SGSN shall defer the reporting of ULI changes, if so configured in the SGSN, until receipt of an uplink LLC PDU for user data or any valid LLC frame serving as a paging response. The MME/S4-SGSN shall report ULI changes as soon as detected if it is not configured to defer the reporting of ULI changes until an E-RAB, RAB or user plane is established, or if an E-RAB, RAB or user plane is established.  NOTE 18: During an Inter-MME/SGSN and Intra-SGW mobility procedure, if the SGW detects that the support of ePCO has changed, e.g. when the source MME supports ePCO while the target MME does not support it, the SGW shall trigger a Modify Bearer Request without setting the EPCOSI flag if the Modify Bearer Request message is not sent due to other reasons. The PGW shall interpret that ePCO is not supported for this PDN Connection.  NOTE 19: The MME/SGSN or SGW reporting this indication to the PGW during an inter-PLMN procedure does not trigger any extra signalling.  NOTE 20: The MME can set the Control Plane Only Indication only during a PDN connection creation procedure, and the Serving PLMN Rate Control is only applicable to the PDN connection with Control Plane Only Indication set. During an inter MME without SGW relocation procedure, when the source MME has not set the Control Plane Only Indication, and the target MME supports only the Control Plane CIoT Optimizations, then the target MME shall not include the Serving PLMN Rate Control IE as the PDN connection cannot be changed to Control Plane Only. During an inter MME without SGW relocation procedure, when the source MME has set the Control Plane Only Indication and included Serving PLMN rate control IE in the Context Response message, and the target MME supports both the Control Plane CIoT Optimisation and the establishment of the User Plane, the target MME cannot stop the Serving PLMN Rate Control, i.e. the PGW will continue to enforce Serving PLMN Rate Control as the Control Plane Only Indication for this PDN connection cannot be changed during this mobility procedure.  NOTE 21: An MME which supports eNB Change Reporting shall also support Change reporting and therefore shall set both the Change Report Supporting indication and the eNB Changing Reporting Support Indication.  NOTE 22: Upon inter MME/SGSN mobility, the target MME/SGSN shall report Presence Reporting Area Information for all the active and inactive PRAs requested by the PGW. Upon intra MME/SGSN mobility, the MME/SGSN shall only report active PRAs whose Presence Reporting Area Information is changed, e.g. from inside to outside, or vice versa.  NOTE 23: The PGW should use the IMSI or the MEI to verify if the Modify Bearer Request message is received for the right UE context. In some error scenarios, e.g. when a delete bearer request (to delete a PDN connection) is lost over S5/S8, the PGW can receive the Modify Bearer Request message for the hanging PDN connection from the MME/SGSN and SGW, if the PGW has reassigned the F-TEID of the hanging PDN connection for another UE.  NOTE 24: The eNB Change Reporting feature should be supported homogeneously across all MMEs in the network. Otherwise the PGW would not be notified about the change of support of eNB Change Reporting when the UE moves from an MME supporting eNB Change Reporting to an MME that does not support eNB Change Reporting.  NOTE 25: This information is used for the SGW-U selection (see Annex B.2 of 3GPP TS 29.244 [80]). | | | | |

**Table 7.2.7-2: Bearer Context to be modified within Modify Bearer Request**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octets 1 |  | Bearer Context IE Type = 93 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octets 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| EPS Bearer ID | M | See NOTE 1, NOTE 2. | EBI | 0 |
| S1 eNodeB F-TEID | C | This IE shall be sent on the S11 interface if the S1-U is being used:   * for an E-UTRAN initial attach; * for a Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN; * for an UE triggered Service Request; * for an UE initiated Connection Resume procedure; * in all S1-U GTP-U tunnel setup procedure during a TAU procedure (see 3GPP TS 24.301 [23]) /handover cases; * in all procedures where the UE is already in ECM-CONNECTED state, e.g. E-UTRAN Initiated E-RAB modification procedure, possibly HSS-based P-CSCF restoration for 3GPP access. See NOTE 4; * in the Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS optimisation procedure. See NOTE 7.   If an MME is aware that the eNodeB supports both IP address types, the MME shall send both IP addresses within an F-TEID IE. If only one IP address is included, then the SGW shall assume that the eNodeB does not support the other IP address type.  See NOTE 2, NOTE 5, NOTE 6. | F-TEID | 0 |
| S5/8-U SGW F-TEID | C | This IE shall be sent on the S5/S8 interfaces for a Handover or a TAU/RAU with a SGW change. | F-TEID | 1 |
| S12 RNC F-TEID | C | If available, this IE shall be included if the message is sent on the S4 interface if S12 interface is being used. If an S4-SGSN is aware that the RNC supports both IP address types, the S4-SGSN shall send both IP addresses within an F-TEID IE. If only one IP address is included, then the SGW shall assume that the RNC does not support the other IP address type.  See NOTE 2, NOTE 6. | F-TEID | 2 |
| S4-U SGSN F-TEID | C | If available, this IE shall be included if the message is sent on the S4 interface, if S4-U is being used. If an S4-SGSN supports both IP address types, the S4-SGSN shall send both IP addresses within an F-TEID IE. If only one IP address is included, then the SGW shall assume that the S4-SGSN does not support the other IP address type. See , NOTE 6. | F-TEID | 3 |
| S11-U MME F-TEID | CO | This IE shall be sent on the S11 interface if S11-U is being used, i.e. for the following procedures:   * Mobile Originated Data transport in Control Plane CIoT EPS optimisation with P-GW connectivity * Mobile Terminated Data Transport in Control Plane CIoT EPS optimisation with P-GW connectivity * in all procedures where the S11-U tunnel is already established, e.g. when reporting a change of User Location Information. * TAU/RAU with SGW change procedure and data forwarding of DL data buffered in the old SGW (see clause 5.3.3.1A of 3GPP TS 23.401 [3]) for a Control Plane Only PDN connection. See NOTE 6.   This IE may also be sent on the S11 interface, if S11-U is being used, during a E-UTRAN Tracking Area Update without SGW Change, if the MME needs to establish the S11-U tunnel.  See NOTE 8. | F-TEID | 4 |
| NOTE 1: If only EPS Bearer ID IE is included in the Bearer Context to be modified IE during the TAU/RAU without SGW change procedure, the SGW shall remove the stored SGSN/RNC/eNodeB/MME userplane F-TEID locally.  NOTE 2: When Direct Tunnel is used in 3G, e.g. during a Service Request procedure if the UE requests to establish a partial set of radio access bearers and if the SGSN accepts it, or during an SRNS relocation procedure with some bearer contexts being preserved, the SGSN shall provide EBI(s) without S12 RNC F-TEID(s) for these bearer context(s) without corresponding radio access bearer(s) being established. The SGW shall be able to handle these bearer context(s). However, in earlier releases this behaviour may not be supported by the SGW and hence for such SGW, the SGSN shall provide EBI together with S12 RNC F-TEID for each of the bearer context(s) in the Bearer Context to be modified IE.  NOTE 3: It is not possible to establish or release a partial set of radio access bearers in E-UTRAN. The MME shall provide in the Bearer Contexts to be modified IE, for a UE entering or being in CONNECTED state, the EBI together with the S1 eNodeB F-TEID for all the bearers of the PDN connection affected by the Modify Bearer Request other than those possibly indicated in the Bearer Context to be removed IE.  NOTE 4: When the PCO-based extension of the HSS based P-CSCF restoration for 3GPP access is supported as specified in clause 5.4.3 of 3GPP TS 23.380 [61], the MME shall store the S1 eNodeB F-TEID(s) of the IMS PDN connection for UEs with an IMS PDN connection in ECM-CONNECTED state, so that the MME can include all the S1 eNodeB F-TEID(s) of the IMS PDN connection for such a UE in ECM-CONNECTED state in the Modify Bearer Request message.  NOTE 5: When the PCO-based extension of the HSS based P-CSCF restoration for 3GPP access is supported as specified in clause 5.4.3 of 3GPP TS 23.380 [61], the S4-SGSN shall store the S12 RNC F-TEID(s) (if Direct Tunneling is used) for all the bearers of the IMS PDN connection with corresponding radio access bearers established, for UEs with an IMS PDN connection in PMM-CONNECTED state, so that the S4-SGSN can include all the S4-U SGSN F-TEID(s) (if Direct Tunneling is not used) or S12 RNC F-TEID(s) (if Direct Tunneling is used) for all the bearers of the IMS PDN connection with corresponding radio access bearers established, for such a UE in PMM-CONNECTED state in the Modify Bearer Request message.  NOTE 6: During a TAU/RAU with SGW change procedure and data forwarding of DL data buffered in the old SGW (see clause 5.3.3.1A of 3GPP TS 23.401 [3]), the old MME/SGSN shall provide the old SGW with the Forwarding F-TEID received in the Context Acknowledge message (or in the SGSN Context Acknowledge message when a Gn/Gp SGSN is involved) and encode it as either an: - eNB F-TEID for a PDN connection not established with the CPOPCI flag set to 1 (for an old MME), - S11-U MME F-TEID for a PDN connection established with the CPOPCI flag set to 1 (for an old MME), or  - S12 RNC F-TEID or S4-U SGSN F-TEID (for an old SGSN),  regardless of the interface type set in the F-TEID received from the new MME/SGSN. This is to make the downlink data forwarding appear as a regular downlink data transmission for the old SGW, i.e. like a Service Request procedure.  NOTE 7: In the Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS optimisation procedure (see clause 5.3.4B.4 of 3GPP TS 23.401 [3]), the MME may send a Modify Bearer Request to the SGW, to request the establishment of the S1-U bearers, without sending a prior Release Access Bearers Request to tear down the S11-U bearers. In this case, the MME shall encode the bearers being switched from S11-U to S1-U in the Bearer Contexts to be modified IE and the SGW shall release the S11-U bearers upon receipt of the Modify Bearer Request requesting the establishment of the S1-U bearers.  NOTE 8: All the SGi PDN connections of a UE in E-UTRAN shall either use S11-U or S1-U bearers at any point in time. If S11-U is used, the MME shall establish the S11-U bearer of all the UE's SGi PDN connections. | | | | |

**Table 7.2.7-3: Bearer Context to be removed within Modify Bearer Request**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octets 1 |  | Bearer Context IE Type = 93 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octets 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| EPS Bearer ID | M |  | EBI | 0 |

Table 7.2.7-4: Overload Control Information within Modify Bearer Request

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Overload Control Information IE Type = 180 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Overload Control Sequence Number | M | See clause 12.3.5.1.2.1 for the description and use of this parameter. | Sequence Number | 0 |
| Overload Reduction Metric | M | See clause 12.3.5.1.2.3 for the description and use of this parameter. | Metric | 0 |
| Period of Validity | M | See clause 12.3.5.1.2.2 for the description and use of this parameter.  This IE should be set to "0" if the "Overload Reduction Metric" is null. This IE shall be ignored by the receiver if the "Overload Reduction Metric" is null. | EPC Timer | 0 |

\* \* \* Next Change \* \* \* \*

#### 7.2.11.1 Downlink Data Notification

A Downlink Data Notification message shall be sent:

- on the S11 interface by the SGW to the MME as a part of the network triggered service request procedure;

- on the S4 interface by the SGW to the S4-SGSN as part of Paging with no established user plane on S4, SGW triggered paging with S4;

- on the S4 interface by the SGW to the S4-SGSN to re-establish all the previous released bearer(s) for a UE, upon receipt of downlink data for a UE in connected mode but without corresponding downlink bearer available;

NOTE: This may occur e.g. if the S4-SGSN releases some but not all the bearers of the UE as specified in clause 12.7.2.2 of 3GPP TS 23.060 [35].

- on S11/S4 interface by SGW to MME/S4-SGSN if the SGW has received an Error Indication (see 3GPP TS 29.281 [13]) from eNodeB/RNC/MME across S1-U/S12/S11-U interface. Respective SGW and MME/S4-SGSN functionality is specified in 3GPP TS 23.007 [17].

- on the S11/S4 interface by SGW to the MME/S4-SGSN as part of the network triggered service restoration procedure if both the SGW and the MME/S4-SGSN support this optional feature (see 3GPP TS 23.007 [17]).

- on the S11 interface by the SGW to the MME as a part of the Mobile Terminated Data Transport in Control Plane CIoT EPS optimisation with P-GW connectivity.

A Downlink Data Notification message may be sent:

- on the S4 by the SGW to the S4-SGSN if the SGW has received an Error Indication from S4-SGSN across S4-U interface.

Table 7.2.11.1-1 specifies the presence of the IEs in the message.

Table 7.2.11.1-1: Information Elements in a Downlink Data Notification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Cause | CO | If SGW receives an Error Indication from eNodeB/RNC/S4-SGSN/MME, the SGW shall send the Cause IE with value "Error Indication received from RNC/eNodeB/S4-SGSN/MME" to MME/S4-SGSN as specified in 3GPP TS 23.007 [17]. | Cause | 0 |
| EPS Bearer ID | CO | This IE shall be included on the S11 and S4 interfaces and shall be set as follows:   * If the Downlink Data Notification is triggered by the arrival of downlink data packets at the SGW, the SGW shall include the EPS Bearer ID stored in the EPS bearer context of the bearer on which the downlink data packet was received; * If the Downlink Data Notification is triggered by the receipt of an Error Indication from the eNodeB, RNC or S4-SGSN, the SGW shall include the EPS Bearer ID stored in the EPS bearer context of the bearer for which the Error Indication was received; * If the ISR is active and the Downlink Data Notification is triggered by the arrival of control plane signalling, the SGW shall include the EPS Bearer ID present in the control plane signalling or derived from the control plane signaling (for PMIP based S5/S8), See NOTE 3). For a Downlink Data Notification triggered by a Create Bearer Request message, the SGW shall include the EPS Bearer ID of the corresponding PDN connection's default bearer. * If both the SGW and the MME/S4-SGSN support the network triggered service restoration procedure (see 3GPP TS 23.007 [17]), and if the Downlink Data Notification is triggered by the arrival of control plane signalling, the SGW shall include the EPS Bearer ID present in the control plane signalling or derived from the control plane signaling (for PMIP based S5/S8). (See 3GPP TS 23.401[3], clause 5.3.4.3).   More than one IE with this type and instance values may be included to represent multiple bearers having received downlink data packets or being signalled in the received control plane message.  See NOTE 1. | EBI | 0 |
| Allocation/Retention Priority | CO | This IE shall be included on the S11 and S4 interfaces and shall be set as follows:   * If the Downlink Data Notification is triggered by the arrival of downlink data packets at the SGW, the SGW shall include the ARP stored in the EPS bearer context of the bearer on which the downlink data packet was received; * If the Downlink Data Notification is triggered by the receipt of an Error Indication from the eNodeB, RNC or S4-SGSN, the SGW shall include the ARP stored in the EPS bearer context of the bearer for which the Error Indication was received. * If the ISR is active and the Downlink Data Notification is triggered by the arrival of control plane signalling, the SGW shall include the ARP if present in the control plane signalling. If the ARP is not present in the control plane signalling, the SGW shall include the ARP in the stored EPS bearer context. See NOTE 3. * If both the SGW and the MME/S4-SGSN support the network triggered service restoration procedure (see 3GPP TS 23.007 [17]), and if the Downlink Data Notification is triggered by the arrival of control plane signalling, the SGW shall include the ARP if present in the control plane signalling. If the ARP is not present in the control plane signalling, the SGW shall include the ARP from the stored EPS bearer context.   (See 3GPP TS 23.401[3], clause 5.3.4.3).  If multiple EPS Bearers IDs are reported in the message, the SGW shall include the ARP associated with the bearer with the highest priority (i.e. the lowest ARP Priority Level value).  See NOTE 1. | ARP | 0 |
| IMSI | CO | This IE shall be included on the S11/S4 interface as part of the network triggered service restoration procedure if both the SGW and the MME/S4-SGSN support this optional feature (see 3GPP TS 23.007 [17]). | IMSI | 0 |
| Sender F-TEID for Control Plane | O | This IE may be included on the S11/S4 interface towards the restarted CN node or an alternative CN node (same type of mobility node as the failed one) as part of the network triggered service restoration procedure with or without ISR if both the SGW and the MME/S4-SGSN support this optional feature (see 3GPP TS 23.007 [17]).  This IE shall not be included otherwise.  (NOTE 2) | F-TEID | 0 |
| Indication Flags | CO | This IE shall be included if any one of the applicable flags is set to 1.  Applicable flags are:   * Associate OCI with SGW node's identity: The SGW shall set this flag to 1 on the S11/S4 interface if it has included the "SGW's Overload Control Information" and if this information is to be associated with the node identity (i.e. FQDN or the IP address received from the DNS during the SGW selection) of the serving SGW. | Indication | 0 |
| SGW's node level Load Control Information | O | The SGW may include this IE, over the S11/S4 interface if the load control feature is supported by the SGW and is activated in the network (see clause 12.2.6).  When present, the SGW shall provide only one instance of this IE, representing its node level load information. | Load Control Information | 0 |
| SGW's Overload Control Information | O | During an overload condition, the SGW may include this IE over the S5/S8 interface if the overload control feature is supported by the SGW and is activated for the PLMN to which the PGW belongs (see clause 12.3.11).  When present, the SGW shall provide only one instance of this IE, representing its overload information. | Overload Control Information | 0 |
| Paging and Service Information | CO | This IE shall be included on the S11 and S4 interfaces, for an IP PDN connection, if the SGW supports the Paging Policy Differentiation feature (see clause 4.9 of 3GPP TS 23.401 [3]) and if the Downlink Data Notification is triggered by the arrival of downlink data packets at the SGW. If the preceding conditions are fulfilled, then for each bearer and for each packet that triggers a Downlink Data Notification, the SGW shall copy, into the Paging Policy Indication value within this IE, the value of the DSCP in TOS (IPv4) or TC (IPv6) information received in the IP payload of the GTP-U packet from the PGW (see IETF RFC 2474 [65]).  See NOTE 4.  One IE with this type and instance value shall be included per EPS Bearers ID reported in the message,  See NOTE 1. | Paging and Service Information | 0 |
| DL Data Packets Size | CO | This IE shall be included on the S11 interfaces for a PDN connection if the MT-EDT is applicable and if the SGW supports MT-EDT feature as specified in clause 8.83.  When present, it shall contain the sum of DL Data Packets Size. | Integer Number | 0 |
| Private Extension | O |  | Private Extension | VS |
| NOTE 1: The usage of this parameter at the S4-SGSN is not specified in this release.  NOTE 2: In this version of the specification, the MME/S4-SGSN shall set the header TEID value in subsequent Downlink Data Notification Acknowledge or/and Downlink Data Notification Failure Indication to that of the SGW's Control Plane TEID if the Sender F-TEID for Control Plane IE is present in the Downlink Data Notification message. However the SGW shall be prepared to receive messages in which the header TEID value is set to zero from implementation conforming to earlier versions of this specification. When that is the case, the receiver identifies the subscriber context based on the included IMSI IE.  NOTE 3: For PMIP based S5/S8, if the SGW cannot derive the EPS bearer ID/ARP from the control plane signalling (received over Gxx interface) the SGW should use the corresponding PDN connection's (for which the control plane signalling is received) default EPS bearer's EPS bearer ID/ARP.  NOTE 4: Upon receiving a downlink data packet for a Non-IP or Ethernet PDN connection (see clause 5.3.1 of 3GPP TS 23.401 [3]), the Paging and Service Information shall not be included in the Downlink Data Notification message. | | | | |

Table 7.2.11.1-2: Load Control Information within Downlink Data Notification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Load Control Information IE Type = 181 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Load Control Sequence Number | M | See clause 12.2.5.1.2.1 for the description and use of this parameter. | Sequence Number | 0 |
| Load Metric | M | See clause 12.2.5.1.2.2 for the description and use of this parameter. | Metric | 0 |

Table 7.2.11.1-3: Overload Control Information within Downlink Data Notification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Octet 1 |  | Overload Control Information IE Type = 180 (decimal) |  |  |
| Octets 2 and 3 |  | Length = n |  |  |
| Octet 4 |  | Spare and Instance fields |  |  |
| Information elements | P | Condition / Comment | IE Type | Ins. |
| Overload Control Sequence Number | M | See clause 12.3.5.1.2.1 for the description and use of this parameter. | Sequence Number | 0 |
| Overload Reduction Metric | M | See clause 12.3.5.1.2.3 for the description and use of this parameter. | Metric | 0 |
| Period of Validity | M | See clause 12.3.5.1.2.2 for the description and use of this parameter.  This IE should be set to "0" if the "Overload Reduction Metric" is null. This IE shall be ignored by the receiver if the "Overload Reduction Metric" is null. | EPC Timer | 0 |

\* \* \* Next Change \* \* \* \*

## 8.12 Indication

Indication is coded as depicted in Figure 8.12-1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Bits | | | | | | | |  |
|  | Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 1 | Type = 77 (decimal) | | | | | | | |  |
|  | 2 to 3 | Length = n | | | | | | | |  |
|  | 4 | Spare | | | | Instance | | | |  |
|  | 5 | DAF | DTF | HI | DFI | OI | ISRSI | ISRAI | SGWCI |  |
|  | 6 | SQCI | UIMSI | CFSI | CRSI | P | PT | SI | MSV |  |
|  | 7 | RetLoc | PBIC | SRNI | S6AF | S4AF | MBMDT | ISRAU | CCRSI |  |
|  | 8 | CPRAI | ARRL | PPOF | PPON/PPEI | PPSI | CSFBI | CLII | CPSR |  |
|  | 9 | NSI | UASI | DTCI | BDWI | PSCI | PCRI | AOSI | AOPI |  |
|  | 10 | ROAAI | EPCOSI | CPOPCI | PMTSMI | S11TF | PNSI | UNACCSI | WPMSI |  |
|  | 11 | 5GSNN26 | REPREFI | 5GSIWK | EEVRSI | LTEMUI | LTEMPI | ENBCRSI | TSPCMI |  |
|  | 12 | Spare | Spare | MTEDTA | N5GNMI | 5GCNRS | 5GCNRI | 5SRHOI | ETHPDN |  |
|  | 13 to (n+4) | These octet(s) is/are present only if explicitly specified | | | | | | | |  |

Figure 8.12-1: Indication

For each message the applicable flags of the Indication IE shall be clearly specified in the individual message sub clause. The remaining flags of the Indication IE not so indicated shall be discarded by the receiver.

The receiver shall consider the value of the applicable flags as "0", if the Indication IE is applicable for the message but not included in the message by the sender.

The following bits within Octet 5 shall indicate:

- Bit 8 – DAF (Dual Address Bearer Flag): This bit shall be set when the PDN Type, determined based on UE request and subscription record, is set to IPv4v6 and all SGSNs which the UE may be handed over to are Release 8 or above supporting dual addressing, which is determined based on node pre-configuration by the operator..

- Bit 7 – DTF (Direct Tunnel Flag): This bit shall be set when the UE is in UTRAN and Direct Tunnel is selected

- Bit 6 – HI (Handover Indication): If this bit is set to 1 over S11/S4 and S5/S8 interfaces, it shall indicate a UE handover attach. This bit is applicable during the Handover from Trusted or Untrusted Non-3GPP IP Access to E-UTRAN or a Handover from Trusted or Untrusted Non-3GPP IP Access to UTRAN/GERAN procedures (see clauses 8.2, 8.6 and 16.11 of 3GPP TS 23.402 [45]), or a 5GS to EPS handover without the N26 interface (see clause 4.11.2.2 of 3GPP TS 23.502 [83]). If this bit is set to 1 over GTP based S2a interface, it shall indicate a UE handover from 3GPP access to Trusted Non-3GPP access and UE requested IP address preservation. If this bit is set to 1 over GTP based S2b interface, it shall indicate a UE handover from 3GPP access to Untrusted Non-3GPP Access and UE requested IP address preservation.

- Bit 5 – DFI (Direct Forwarding Indication): If this bit is set to 1, it shall indicate that the direct forwarding between the source eNodeB and the target eNodeB during the S1 based handover procedure is applied.

- Bit 4 – OI (Operation Indication):

- If this bit is set to 1, it shall denote that the receiving SGW of a "Create Session Request" shall send a Modify Bearer Request immediately to the PGW. This allows the SGW to differentiate if the "Create Session Request" received on S4/S11 interface belongs to a TAU/RAU with an SGW relocation (OI = 1), or X2-based handover with SGW relocation (OI = 1) or Enhanced SRNS Relocation with SGW relocation (OI=1) or MME triggered Serving GW relocation (OI = 1) or S1-based handover with SGW relocation (OI = 0).

- It shall be set to 1 on S4/S11 interface if the SGW needs to forward the Delete Session Request message to PGW.

- Bit 3 – ISRSI (Idle mode Signalling Reduction Supported Indication): If this is set to 1, it shall indicate that the old/source SGSN/MME and the associated SGW are capable to activate ISR.

- Bit 2 – ISRAI (Idle mode Signalling Reduction Activation Indication): If this bit is set to 1, it shall indicate that the ISR is established between the MME and the S4 SGSN during a TAU/RAU without an SGW change procedure or during an Inter RAT handover without an SGW change procedure. The SGW shall retain the resources for the other CN node that has its bearer resources on the SGW reserved. The old/source SGSN/MME shall maintain the UE's contexts and activate ISR.

- Bit 1 – SGWCI (SGW Change Indication):

- If this bit is set to 1, it shall indicate that the target MME/SGSN has selected a new SGW during a TAU/RAU or handover with an SGW change procedure.

- It shall be set to 1 by the target AMF during the EPS to 5GS handover/Idle mode Mobility using N26 interface.

The following bits within Octet 6 shall indicate:

- Bit 8 – SQCI (Subscribed QoS Change Indication): If this bit is set to 1, it indicates that the subscribed QoS profile of the related PDN connection has changed in the old MME/SGSN when the UE is in ECM-IDLE state and ISR is activated. The new MME/SGSN shall trigger the Subscribed QoS Modification procedure. See 3GPP TS 23.401 [3], clause 5.3.9.2.

- Bit 7 – UIMSI (Unauthenticated IMSI): If this bit is set to 1, it indicates that the IMSI present in the message is not authenticated and is for emergency or RLOS attached UE.

- Bit 6 – CFSI (Change F-TEID support indication): if this bit is set to 1, it indicates that the SGW can change the assigned GTP-U F-TEID in the current procedure. If the SGW needs to modify the GTP-U F-TEID and the CFSI flag is set to 1 in the corresponding request message, the SGW shall include the new F-TEID in the Modify Bearer Response/Modify Access Bearers Response message.

- Bit 5 – CRSI (Change Reporting support indication): if this bit is set to 1, it indicates that the MME/S4 SGSN supports Location Change Reporting mechanism for the corresponding session.

- Bit 4 – PS (Piggybacking Supported). This bit denotes whether the MME/SGW support piggybacking feature as described in Annex F of 3GPP TS 23.401 [3]. If set to 1, it indicates that the node is capable of processing two different GTP-C messages appearing back to back in a single UDP payload.

- Bit 3 – PT (S5/S8 Protocol Type) If this bit set to 1, it shall indicate that the protocol type for the S5/S8 interface is PMIP; this bit is set to 0 to indicate that the protocol type for the S5/S8 interface is GTP.

- Bit 2 – SI (Scope Indication): If this bit is set to 1, it indicates that all bearer resources of the UE shall be released by the SGW. This flag is set in messages during TAU/RAU/Handover with SGW change /SRNS Relocation Cancel Using S4 with SGW change/Inter RAT handover Cancel procedure with SGW change/S1 Based handover Cancel procedure with SGW change.

- Bit 1 – MSV (MS Validated): If this bit is set to 1, it shall indicate that the new MME/SGSN has successfully authenticated the UE.

The following bits within Octet 7shall indicate:

- Bit 8 – RetLoc (Retrieve Location Indication Flag): if this bit is set to 1, it indicates that the PGW requests the MME/SGSN or TWAN/ePDG to provide the User Location Information.

Bit 7 – PBIC (Propagate BBAI Information Change): if this bit is set to 1, it indicates a change in the H(e)NB local IP address and/or UDP port number, i.e. the UE moves from an (e)NB to a H(e)NB, or from one H(e)NB to another H(e)NB with the fixed network backhaul changed, or the UE moves from a H(e)NB to a (e)NB.

- Bit 6 – SRNI (SGW Restoration Needed Indication): if this bit is set to 1, it indicates that the source MME/S4-SGSN has not performed the SGW relocation procedure after the source SGW has failed with or without restart, when the source and target MME/S4-SGSN support the MME/S4-SGSN triggered SGW restoration procedure as specified in 3GPP TS 23.007 [17].

- Bit 5 – S6AF (Static IPv6 Address Flag): if this bit is set to 1, it indicates that PDP/PDN IPv6 address is static.

- Bit 4 – S4AF (Static IPv4 Address Flag): if this bit is set to 1, it indicates that PDP/PDN IPv4 address is static.

- Bit 3 – MBMDT (Management Based MDT allowed flag): if this bit is set to 1, it indicates that management based MDT is allowed.

- Bit 2 – ISRAU (ISR is activated for the UE): if this bit is set to 1, it indicates that ISR is activated for the UE before the UE moving to the new SGSN/MME.

- Bit 1 – CCRSI (CSG Change Reporting support indication): if this bit is set to 1, it indicates that the MME/S4 SGSN supports CSG Information Change Reporting mechanism for the corresponding session.

The following bits within Octet 8 shall indicate:

- Bit 8 – CPRAI (Change of Presence Reporting Area information Indication): when ISR is active if this bit is set to 1, it indicates that the Presence Reporting Area information, which is provided as a part of the Presence Reporting Area Information IE, has changed since last reported by the MME/S4-SGSN. The SGW shall ignore this flag when ISR is not active.

- Bit 7 – ARRL (Abnormal Release of Radio Link): if this bit is set to 1 by the MME, it indicates to the SGW that the access bearers are released due to an abnormal release of the radio link. Based on operator policy, this indication may be used by the SGW in subsequent decisions to trigger PDN charging pause if the PGW Pause of Charging feature has been enabled on that PDN connection.

- Bit 6 – PPOFF (PDN Pause Off Indication): if this bit is set to 1 by the SGW, it indicates to the PGW that the charging for the PDN connection shall be unpaused.

- Bit 5 – PPON (PDN Pause On Indication) / PPEI (PDN Pause Enabled Indication): if this bit is set to 1 by the SGW, it indicates to the PGW that the charging for the PDN connection shall be paused; if it is set to 1 by the PGW, it indicates that PGW enables the SGW to use the PGW Pause of Charging procedure for the PDN connection.

- Bit 4 – PPSI (PDN Pause Support Indication): if this bit is set to 1 by the SGW, it indicates that the SGW supports the PGW Pause of Charging procedure; if it is set to 1 by the PGW, it indicates that the PGW supports the PGW Pause of Charging procedure.

- Bit 3 – CSFBI (CSFB Indication): if this bit is set to 1, it indicates that the UE has been subject to CSFB.

- Bit 2 – CLII (Change of Location Information Indication): when ISR is active if this bit is set to 1, it indicates that the location information, which is provided as a part of ULI IE, has changed since last reported by the MME/S4-SGSN. The SGW shall ignore this flag when ISR is not active.

- Bit 1 – CPSR (CS to PS SRVCC indication): if this bit is set to 1, it indicates that a UTRAN/GERAN to E-UTRAN/UTRAN (HSPA) SRVCC procedure is underway and the associated message, i.e. Modify Bearer Request shall be forwarded to the PGW from the SGW as specified in 3GPP TS 23.216 [43].

The following bits within Octet 9 shall indicate:

- Bit 8 – NSI (NBIFOM Support Indication): if this bit is set to 1, it indicates to the PGW that the NBIFOM is supported (see clause 5.10 of 3GPP TS 23.161 [71]).

- Bit 7 – UASI (UE Available for Signaling Indication): if this bit is set to 1, it indicates that the UE is available for end to end signalling and that the PGW should re-attempt the pending network initiated procedure.

- Bit 6 – DTCI (Delay Tolerant Connection Indication): if this bit is set to 1, it indicates that the PDN connection is delay tolerant according to the local policies in the PGW, e.g. per APN.For this PDN connection the PGW supports receiving the rejection cause "UE is temporarily not reachable due to power saving" from the MME/SGSN via the SGW during a network initiated procedure and holding the network initiated procedure, until the PGW receives the subsequent Modify Bearer Request message with the UASI flag indicating that the UE is available for end to end signalling.

Bit 5 – BDWI (Buffered DL Data Waiting Indication): if this bit is set to 1, it indicates that there is DL data buffered in the (old) SGW, i.e. that the new MME/SGSN shall invoke data forwarding if there is an SGW change as specified in clause 5.3.3.1A of 3GPP TS 23.401 [3], and that it shall setup the user plane in conjunction with the TAU/RAU procedure for delivery of the buffered DL data to the UE.

- Bit 4 – PSCI (Pending Subscription Change Indication): If this bit is set to 1, it indicates that there is a pending report of the changed subscribed QoS profile of the related PDN connection in the old MME, so that the new MME/SGSN shall trigger the HSS Initiated Subscribed QoS Modification procedure towards the PGW. See clause 5.3.9.2 of 3GPP TS 23.401 [3].

- Bit 3 – PCRI (P-CSCF Restoration Indication): if this bit is set to 1, it indicates a request to trigger a P-CSCF restoration for the corresponding user (see 3GPP TS 23.380 [61]).

- Bit 2 – AOSI (Associate OCI with SGW node's Identity): if this bit is set to 1, it indicates that the SGW provided "SGW's Overload Control Information" which shall be associated with the node identity (i.e. FQDN or the IP address received from the DNS during the SGW selection) of the serving SGW.

- Bit 1 – AOPI (Associate OCI with PGW node's Identity): if this bit is set to 1, it indicates that the PGW provided "PGW's Overload Control Information" which shall be associated with the node identity (i.e. FQDN or the IP address received from the HSS or DNS during the PGW selection) of the serving PGW.

The following bits within Octet 10 shall indicate:

- Bit 8 – ROAAI (Release Over Any Access Indication): If this bit is set to 1, it indicates to the PGW that, if this is an NB-IFOM PDN connection, the PGW shall initiate the release of the corresponding PDN connection over the non-3GPP access over the S2a/S2b interface with the cause "Local release".

- Bit 7 – EPCOSI (Extended PCO Support Indication): If this bit is set to 1, it indicates to the receiver that the Extended PCO is supported, e.g. when the PGW is the receiver, it indicates that the UE, the MME and the SGW support Extended PCO; when the target MME is the receiver, during an inter-MME mobility, it indicates that UE and the source MME support Extended PCO.

- Bit 6 – CPOPCI (Control Plane Only PDN Connection Indication): If this bit is set to 1, it indicates that the PDN Connection is set to Control Plane Only, i.e. the user data pertaining to this PDN connection can only be transferred in NAS PDUs via the control plane.

- Bit 5 – PMTSMI (Pending MT Short Message Indication): If this bit is set to 1, it indicates to the target MME/S4-SGSN that there is one (or more) pending MT Short Message(s) in the SMS-GMSC, i.e. that the target MME/S4-SGSN shall provide its E.164 address and Diameter Identity if available to receive the MT Short message and maintain the signalling connection with the UE for a longer time to enable the retransmission of the Short Message.

- Bit 4 – S11-U Tunnel Flag (S11TF): This flag shall be set to 1 on the S11 interface if user data is transported in NAS signalling.

- Bit 3 – PNSI (Pending Network Initiated PDN Connection Signalling Indication): if this bit is set to 1, it indicates to the target MME/SGSN that there is pending network initiated PDN connection signalling for the PDN connection, i.e. the target MME/SGSN shall set UASI flag in the Create Session Request or Modify Bearer Request message to indicate to the PGW that the UE is available for end to end signalling.

- Bit 2 – UNACCSI (UE Not Authorised Cause Code Support Indication): If this bit is set to 1, it indicates that the Cause Code for "UE not authorized by OCS or external AAA Server" is supported by the S4-SGSN/MME.

- Bit 1 - WLCP PDN Connection Modification Support Indication (WPMSI): if this bit is set to 1, it indicates that the TWAN supports the WLCP PDN Connection Modification procedure. This indication is used by the P-CSCF restoration extension procedure for TWAN access (see 3GPP TS 23.380 [61]).

The following bits within Octet 11 shall indicate:

- Bit 8 – 5GSNN26 (5GS Interworking without N26 Indication): if this bit is set to 1 and the 5GS Interworking Indication (5GSIWKI) is set to 1, it indicates to the PGW-C+SMF that 5GS Interworking is supported without the N26 interface. If this bit is set to 0 and the 5GSIWKI (5GS Interworking Indication) is set to 1, it indicates to the PGW-C+SMF that 5GS Interworking is supported with the N26 interface.

- Bit 7 – REPREFI (Return Preferred Indication): This flag shall be set to 1 to indicate a preferred return of the UE to the last used EPS or 5GS PLMN at a later access change to an EPS or 5GS shared network.

- Bit 6 –5GSIWKI (5GS Interworking Indication): This flag shall be set to 1 for UEs supporting N1 mode and not restricted from interworking with 5GS by user subscription (see "5GC" bit within Core-Network-Restrictions AVP and Interworking-5GS-Indicator AVP specified in 3GPP TS 29.272 [70] and 3GPP TS 29.273 [68]) and hence access to 5GC is allowed for the PDN connection.

- Bit 5 –EEVRSI (Extended EBI Value Range Support Indication): if this bit is set to 1, it indicates that the sending GTPv2 entity supports the 15 EPS Bearers, i.e. it supports to use EPS Bearer ID with a value between '1' and '15'.

- Bit 4 –LTEMUI (LTE-M UE Indication): if this bit is set to 1, it indicates that the UE is a LTE-M UE (see 3GPP TS 23.401 [3]);

- Bit 3 – LTEMPI (LTE-M RAT Type reporting to PGW Indication): if this bit is set to 1, it indicates to the SGW to forward the LTE-M RAT type to the PGW;

- Bit 2 – ENBCRSI (eNB Change Reporting Support Indication): if this bit is set to 1, it indicates that the MME supports Macro eNodeB Change Reporting mechanism for the corresponding session.

- Bit 1 –TSPCMI (Triggering SGSN initiated PDP Context Creation/Modification Indication): if this bit is set to 1, it indicates to the S4-SGSN that in the UE\_initiated PDP Context Modification procedure, when the NBIFOM container is included, the S4-SGSN accepts the UE initiated PDP Context Modification procedure and initiates SGSN initiated PDP Context Creation/modification procedures respectively towards UE to transfer the NBIFOM container received from the PGW either in Create Bearer Request or Update Bearer Request message as specified in 3GPP TS 23.161 [71].

The following bits within Octet 12 shall indicate:

- Bit 8 to 7: Spare, for future use and set to 0.

- Bit 6 – MTEDTA (MT-EDT Applicable): if this bit is set to 1, it indicates that MT-EDT is applicable for the PDN connection.

- Bit 5 – N5GNMI (No 5GS N26 Mobility Indication): if this bit is set to 1, it indicates that the PDN connection cannot be moved to 5GS via N26.

- Bit 4 –5GCNRS (5GC Not Restricted Support): if this bit is set to 1, this indicates to the PGW-C+SMF that the sending node (i.e. MME or ePDG) supports setting the 5GCNRI flag. An MME or an ePDG compliant with this version of the specification shall support setting the 5GCNRI flag.

- Bit 3 –5GCNRI (5GC Not Restricted Indication): if this bit is set to 1, this indicates to the PGW-C+SMF that access to the 5GC is not restricted for the PDN connection. If the 5GCNRS bit is set to 1 and the 5GCNRI bit is set to 0, this indicates that access to the 5GC is restricted for the PDN connection. The 5GCNRI flag shall be ignored by the PGW-C+SMF if the 5GSIWKI flag is set to 1 (i.e. 5GS Interworking is supported).

- Bit 2 – 5SRHOI (5G-SRVCC HO Indication): if this bit is set to 1, it indicates the HO is used for 5G-SRVCC as specified in 3GPP TS 23.216 [43].- Bit 1 – ETHPDN (Ethernet PDN Support Indication): if this bit is set to 1, it indicates the support of Ethernet PDN Connection.

\* \* \* Next Change \* \* \* \*

## 8.83 Node Features

Node Features IE is coded as depicted in Figure 8. 83-1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Bits | | | | | | | |  |
|  | Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 1 | Type = 152 (decimal) | | | | | | | |  |
|  | 2 to 3 | Length = n | | | | | | | |  |
|  | 4 | Spare | | | | Instance | | | |  |
|  | 5 | Supported-Features | | | | | | | |  |
|  | 6 to (n+4) | These octet(s) is/are present only if explicitly specified | | | | | | | |  |

Figure 8.83-1: Node Features IE

The Node Features IE takes the form of a bitmask where each bit set indicates that the corresponding feature is supported. Spare bits shall be ignored by the receiver. The same bitmask is defined for all GTPv2 interfaces.

The following table specifies the features defined on GTPv2 interfaces and the interfaces on which they apply.

Table 8.83-1: Node Features on GTPv2 interfaces

|  |  |  |  |
| --- | --- | --- | --- |
| Feature Octet / Bit | Feature | Interface | Description |
| 5/1 | PRN | S11, S4 | PGW Restart Notification.  If both the SGW and the MME/S4-SGSN support this feature, the SGW shall send PGW Restart Notification message to the MME/S4-SGSN when the SGW detects that the peer PGW has restarted, and the SGW may send PGW Restart Notification message when the SGW detects that the peer PGW has failed and not restarted, as specified in clause 7.9.5. |
| 5/2 | MABR | S11 | Modify Access Bearers Request.  If both the SGW and the MME support this feature, the MME may modify the S1-U bearers of all the PDN connections of the UE by sending a Modify Access Bearers Request message as specified in clause 7.2.24. |
| 5/3 | NTSR | S11/S4 | Network Triggered Service Restoration procedure.  If both the SGW and the MME/S4-SGSN support this feature (see 3GPP TS 23.007 [17]), the SGW shall send a Downlink Data Notification message including the IMSI to the MME/S4-SGSN on the TEID 0 as part of a network triggered service restoration procedure. |
| 5/4 | CIOT | S11/S4 | Cellular Internet Of Things.  Support of this feature may be indicated over the S11/S4 interface, from the SGW to the MME/SGSN. See NOTE 1.  If the SGW notifies the support of this feature over S11, it indicates to the MME that the SGW supports all the following CIoT features:   * EUTRAN-NB-IoT RAT type, * Non-IP PDN type, * S11-U tunneling, * Serving PLMN Rate Control, * MO Exception Data indication, * Extended PCO   If the SGW notifies the support of this feature over S4, it indicates to the SGSN that the SGW supports the Non-IP PDN type. |
| 5/5 | S1UN | S11 | S1-U path failure notification feature.  The support of this feature may be indicated over the S11 interface, from the MME to the SGW. See clause 20.3 of 3GPP TS 23.007 [17]. |
| 5/6 | ETH | S11 | Ethernet PDN type  Support of this feature may be indicated over the S11 interface, from the SGW to the MME. |
| 5/x | MTEDT | S11 | Support of MT-EDT  Support of this feature may be indicated over the S11 interface, from the SGW to the MME. |
| NOTE 1: An SGW does not need to know whether the MME/SGSN support the CIoT feature. | | | |
| Feature Octet / Bit: The octet and bit number within the Supported-Features IE, e.g. "5 / 1".  Feature: A short name that can be used to refer to the octet / bit and to the feature.  Interface: A list of applicable interfaces to the feature.  Description: A clear textual description of the feature. | | | |

\* \* \* Next Change \* \* \* \*

## 8.118 Integer Number

Integer Number is coded as depicted in Figure 8.118-1.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Bits | | | | | | | |  |
|  | Octets | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
|  | 1 | Type = 187 (decimal) | | | | | | | |  |
|  | 2 to 3 | Length = n | | | | | | | |  |
|  | 4 | Spare | | | | Instance | | | |  |
|  | 5 to n+4 | Integer Number Value | | | | | | | |  |

Figure 8.118-1: Integer Number

The Integer Number value is encoded with the number of octets defined in the Length field, e.g. when n=2, the range of the integer number value is from 0 to 65535.

The Integer Number value shall be encoded as further described below for the following information elements:

- Maximum Wait Time IE: the length shall be set to 2, i.e. the integer number value shall be encoded as a 16 bit unsigned integer.

- DL Buffering Suggested Packet Count IE: the length shall be set to 1 or 2;

- UE Usage Type IE: the length shall be set to 1, i.e. the integer number value shall be encoded as a 8 bit unsigned integer as specified in clause 7.3.202 of 3GPP TS 29.272 [70].

- Remaining Running Service Gap Timer IE: the length shall be set to 4, i.e. the integer number value shall be encoded as a 32 bit unsigned integer.

- DL Data Packet Size IE: the length shall be set to 2, i.e. the integer number value shall be encoded as a 16 bit unsigned integer.

\* \* \* End of Changes \* \* \* \*