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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Core Network and Terminals;

Interface between the Control Plane and the User Plane Nodes;

Stage 3

(Release 15)

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## 7.3 Message Types

The PFCP message types to be used over the Sxa, Sxb, Sxc and N4 reference points are defined in Table 7.3-1.

Table 7.3-1: Message Types

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Message Type value (Decimal) | Message | Applicability | | | |
| Sxa | Sxb | Sxc | N4 |
| 0 | Reserved |  |  |  |  |
|  | **PFCP Node related messages** |  |  |  |  |
| 1 | PFCP Heartbeat Request | X | X | X | X |
| 2 | PFCP Heartbeat Response | X | X | X | X |
| 3 | PFCP PFD Management Request | - | X | X | X |
| 4 | PFCP PFD Management Response | - | X | X | X |
| 5 | PFCP Association Setup Request | X | X | X | X |
| 6 | PFCP Association Setup Response | X | X | X | X |
| 7 | PFCP Association Update Request | X | X | X | X |
| 8 | PFCP Association Update Response | X | X | X | X |
| 9 | PFCP Association Release Request | X | X | X | X |
| 10 | PFCP Association Release Response | X | X | X | X |
| 11 | PFCP Version Not Supported Response | X | X | X | X |
| 12 | PFCP Node Report Request | X | X | X | X |
| 13 | PFCP Node Report Response | X | X | X | X |
| 14 | PFCP Session Set Deletion Request | X | X | - |  |
| 15 | PFCP Session Set Deletion Response | X | X | - |  |
| 16 to 49 | For future use |  |  |  |  |
|  | **PFCP Session related messages** |  |  |  |  |
| 50 | PFCP Session Establishment Request | X | X | X | X |
| 51 | PFCP Session Establishment Response | X | X | X | X |
| 52 | PFCP Session Modification Request | X | X | X | X |
| 53 | PFCP Session Modification Response | X | X | X | X |
| 54 | PFCP Session Deletion Request | X | X | X | X |
| 55 | PFCP Session Deletion Response | X | X | X | X |
| 56 | PFCP Session Report Request | X | X | X | X |
| 57 | PFCP Session Report Response | X | X | X | X |
| 58 to 99 | For future use |  |  |  |  |
|  | **Other messages** |  |  |  |  |
| 100 to 255 | For future use |  |  |  |  |

## 7.4 PFCP Node Related Messages

### 7.4.1 General

This subclause specifies the node related messages used over the Sxa, Sxb, Sxc and N4 reference points.

### 7.4.2 Heartbeat Messages

#### 7.4.2.1 Heartbeat Request

Table 7.4.2.1-1: Information Elements in Heartbeat Request

|  |  |  |  |
| --- | --- | --- | --- |
| **Information elements** | **P** | **Condition / Comment** | **IE Type** |
| Recovery Time Stamp | M | This IE shall contain the time stamp when the node was started see clause 19A of 3GPP TS 23.007 [24]. | Recovery Time Stamp |

#### 7.4.2.2 Heartbeat Response

Table 7.4.2.2-1: Information Elements in Heartbeat Response

|  |  |  |  |
| --- | --- | --- | --- |
| **Information elements** | **P** | **Condition / Comment** | **IE Type** |
| Recovery Time Stamp | M | This IE shall contain the time stamp when the node was started see clause 19A of 3GPP TS 23.007 [24]. | Recovery Time Stamp |

### 7.4.3 PFCP PFD Management

#### 7.4.3.1 PFCP PFD Management Request

Table 7.4.3.1-1: Information Elements in PFCP PFD Management Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Application ID's PFDs | C | This IE shall contain an Application Identifier and the associated PFDs to be provisioned in the UP function.  Several IEs with the same IE type may be present to provision PFDs for multiple Application IDs.  The UP function shall delete all the PFDs received and stored earlier for all the Application IDs if this IE is absent in the message. | - | X | X | X | Application ID's PFDs |

Table 7.4.3.1-2: Application ID's PFDs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Application ID's PFDs IE Type = 58 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Application ID | M | This IE shall identify the Application ID for which PFDs shall be provisioned in the UP function. | - | X | X | X | Application ID |
| PFD | C | This IE shall be present if the PFD needs to be provisioned in the UP function.  When present, it shall describe the PFD to be provisioned in the UP function.  Several IEs with the same IE type may be present to provision multiple PFDs for this Application ID.  When this IE is absent, the UP function shall delete all the PFDs received and stored earlier in the UP function for this Application ID. | - | X | X | X | PFD |

Table 7.4.3.1-3: PFD

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | PFD IE Type = 59 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PFD Contents | M | This IE shall describe the PFD to be provisioned in the UP function. Several IEs with the same IE type may be present to provision multiple contents for this PFD. | - | X | X | X | PFD Contents |

#### 7.4.3.2 PFCP PFD Management Response

Table 7.4.3.2-1: Information Elements in PFCP PFD Management Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | - | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to an conditional or mandatory IE missing or faulty. | - | X | X | X | Offending IE |

### 7.4.4 PFCP Association messages

#### 7.4.4.1 PFCP Association Setup Request

Table 7.4.4.1-1: Information Elements in a PFCP Association Setup Request

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |
| Recovery Time Stamp | M | This IE shall contain the time stamp when the node was started, see clause 19A of 3GPP TS 23.007 [24]. | Recovery Time Stamp |
| UP Function Features | C | This IE shall be present if the UP function sends this message and the UP function supports at least one UP feature defined in this IE.  When present, this IE shall indicate the features the UP function supports. | UP Function Features |
| CP Function Features | C | This IE shall be present if the CP function sends this message and the CP function supports at least one CP feature defined in this IE.  When present, this IE shall indicate the features the CP function supports. | CP Function Features |
| User Plane IP Resource Information | O | This IE may be present if the UP function sends this message.  When present, this IE shall contain an IPv4 and/or an IPv6 address, together with a TEID range that the CP function shall use to allocate GTP-U F-TEID in the UP function.  Several IEs with the same IE type may be present to represent multiple User Plane IP Resources. | User Plane IP Resource Information |

#### 7.4.4.2 PFCP Association Setup Response

Table 7.4.4.2-1: Information Elements in a PFCP Association Setup Response

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | Cause |
| Recovery Time Stamp | M | This IE shall contain the time stamp when the node was started, see clause 19A of 3GPP TS 23.007 [24]. | Recovery Time Stamp |
| UP Function Features | C | This IE shall be present if the UP function sends this message and the UP function supports at least one UP feature defined in this IE.  When present, this IE shall indicate the features the UP function supports. | UP Function Features |
| CP Function Features | C | This IE shall be present if the CP function sends this message and the CP function supports at least one CP feature defined in this IE.  When present, this IE indicates the features the CP function supports. | CP Function Features |
| User Plane IP Resource Information | O | This IE may be present if the UP function sends this message.  When present, this IE shall contain an IPv4 and/or an IPv6 address, together with a TEID range that the CP function shall use to allocate GTP-U F-TEID in the UP function.  Several IEs with the same IE type may be present to represent multiple User Plane IP Resources. | User Plane IP Resource Information |

#### 7.4.4.3 PFCP Association Update Request

Table 7.4.4.3-1: Information Elements in a PFCP Association Update Request

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |
| UP Function Features | O | If present, this IE shall indicate the supported Features when the sending node is the UP function. | UP Function Features |
| CP Function Features | O | If present, this IE shall indicate the supported Features when the sending node is the CP function. | CP Function Features |
| PFCP Association Release Request | C | This IE shall be present if the UP function requests the CP function to release the PFCP association. | PFCP Association Release Request |
| Graceful Release Period | C | This IE shall be present if the UP function requests a graceful release of the PFCP association. | Graceful Release Period |
| User Plane IP Resource Information | O | This IE may be present if the UP function sends this message.  When present, this IE shall contain an IPv4 and/or an IPv6 address, together with a TEID range that the CP function shall use to allocate GTP-U F-TEID in the UP function.  Several IEs with the same IE type may be present to represent multiple User Plane IP Resources. | User Plane IP Resource Information |

#### 7.4.4.4 PFCP Association Update Response

Table 7.4.4.4-1: Information Elements in a PFCP Association Update Response

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | Cause |
| UP Function Features | O | If present, this IE shall indicate the supported Features when the sending node is the UP function. | UP Function Features |
| CP Function Features | O | If present, this IE shall indicate the supported Features when the sending node is the CP function. | CP Function Features |

#### 7.4.4.5 PFCP Association Release Request

Table 7.4.4.5-1: Information Elements in a PFCP Association Release Request

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |

#### 7.4.4.6 PFCP Association Release Response

Table 7.4.4.6-1: Information Elements in a PFCP Association Release Response

|  |  |  |  |
| --- | --- | --- | --- |
| Information elements | P | Condition / Comment | IE Type |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | Cause |

#### 7.4.4.7 PFCP Version Not Supported Response

This message shall only contain the PFCP header. The PFCP protocol version in the PFCP header shall indicate the highest PFCP Version that the sending entity supports.

NOTE: The PFCP Version Not Supported Response message can be received by a PFCP entity when sending the very first message to a PFCP peer only supporting earlier version(s) of the protocol.

### 7.4.5 PFCP Node Report Procedure

#### 7.4.5.1 PFCP Node Report Request

##### 7.4.5.1.1 General

The PFCP Node Report Request shall be sent over the Sxa, Sxb, Sxc and N4 interface by the UP function to report information to the CP function that is not specific to an PFCP session.

Table 7.4.5.1.1-1: Information Elements in PFCP Node Report Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | X | X | X | X | Node ID |
| Node Report Type | M | This IE shall indicate the type of the report. | X | X | X | X | Node Report Type |
| User Plane Path Failure Report | C | This IE shall be present if the Node Report Type indicates a User Plane Path Failure Report. | X | X | - | X | User Plane Path Failure Report |

##### 7.4.5.1.2 User Plane Path Failure Report IE within PFCP Node Report Request

Table 7.4.5.1.2-1: User Plane Path Failure IE within PFCP Node Report Request

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  |  | User Plane Path Failure IE Type = 102 (decimal) | | | | | |
| Octets 3 and 4 |  |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Remote GTP-U Peer | M | This IE shall include the IP address of the remote GTP-U peer towards which a user plane path failure has been detected.  More than one IE with this type may be included to represent multiple remote GTP-U peers towards which a user plane path failure has been detected. | | X | X | - | X | Remote GTP-U Peer |

#### 7.4.5.2 PFCP Node Report Response

##### 7.4.5.2.1 General

The PFCP Node Report Response shall be sent over the Sxa, Sxb; Sxc and N4 interface by the CP function to the UP function as a reply to the PFCP Node Report Request.

Table 7.4.5.2.1-1: Information Elements in PFCP Node Report Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | X | X | X | X | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection cause is due to a conditional or mandatory IE missing or faulty. | X | X | X | X | Offending IE |

### 7.4.6 PFCP Session Set Deletion

#### 7.4.6.1 PFCP Session Set Deletion Request

The PFCP Session Set Deletion Request shall be sent over the Sxa and Sxb interface by the CP function to request the UP function to delete the PFCP sessions affected by a partial failure.

The PFCP Session Set Deletion Request shall be also sent over the Sxa and Sxb interface by the UP function to request the CP function to delete the PFCP sessions affected by a partial failure.

Table 7.4.6.1-1: Information Elements in a PFCP Session Set Deletion Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the node identity of the originating node of the message. | X | X | - |  | Node ID |
| SGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - |  | FQ-CSID |
| PGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - |  | FQ-CSID |
| SGW-U FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | - | - |  | FQ-CSID |
| PGW-U FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - |  | FQ-CSID |
| TWAN FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - |  | FQ-CSID |
| ePDG FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - |  | FQ-CSID |
| MME FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - |  | FQ-CSID |

#### 7.4.6.2 PFCP Session Set Deletion Response

The PFCP Session Set Deletion Response shall be sent over the Sxa and Sxb interface by the UP function or the CP function as a reply to the PFCP Session Set Deletion Request.

Table 7.4.6.2-1: Information Elements in a PFCP Session Set Deletion Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the unique identifier of the sending node. | X | X | - |  | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | - |  | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to an conditional or mandatory IE missing or faulty. | X | X | - |  | Offending IE |

## 7.5 PFCP Session Related Messages

### 7.5.1 General

This subclause specifies the session related messages used over the Sxa, Sxb and Sxc reference points.

### 7.5.2 PFCP Session Establishment Request

#### 7.5.2.1 General

The PFCP Session Establishment Request shall be sent over the Sxa, Sxb, Sxc and N4 interface by the CP function to establish a new PFCP session context in the UP function.

Table 7.5.2.1-1: Information Elements in an PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | X | X | X | X | Node ID |
| CP F-SEID | M | This IE shall contain the unique identifier allocated by the CP function identifying the session. | X | X | X | X | F-SEID |
| Create PDR | M | This IE shall be present for at least one PDR to be associated to the PFCP session.  Several IEs with the same IE type may be present to represent multiple PDRs.  See Table 7.5.2.2-1. | X | X | X | X | Create PDR |
| Create FAR | M | This IE shall be present for at least one FAR to be associated to the PFCP session.  Several IEs with the same IE type may be present to represent multiple FARs.  See Table 7.5.2.3-1. | X | X | X | X | Create FAR |
| Create URR | C | This IE shall be present if a measurement action shall be applied to packets matching one or more PDR(s) of this PFCP session.  Several IEs within the same IE type may be present to represent multiple URRs.  See Table 7.5.2.4-1. | X | X | X | X | Create URR |
| Create QER | C | This IE shall be present if a QoS enforcement action shall be applied to packets matching one or more PDR(s) of this PFCP session.  Several IEs within the same IE type may be present to represent multiple QERs.  See Table 7.5.2.5-1. | - | X | X | X | Create QER |
| Create BAR | O | When present, this IE shall contain the buffering instructions to be applied by the UP function to any FAR of this PFCP session set with the Apply Action requesting the packets to be buffered and with a BAR ID IE referring to this BAR. See table 7.5.2.6-1. | X | - | - | X | Create BAR |
| Create Traffic Endpoint | C | This IE may be present if the UP function has indicated support of PDI optimization.  Several IEs within the same IE type may be present to represent multiple Traffic Endpoints.  See Table 7.5.2.7-1. | X | X | X | X | Create Traffic Endpoint |
| PDN Type | C | This IE shall be present if the PFCP session is setup for an individual PDN connection or PDU session (see subclause 5.2.1).  When present, this IE shall indicate whether this is an IP or non-IP PDN connection/PDU session or, for 5GC, an Ethernet PDU session. | X | X | - | X | PDN Type |
| SGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - |  | FQ-CSID |
| MME FQ-CSID | C | This IE shall be included when received on the S11 interface or on S5/S8 interface according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - | - | FQ-CSID |
| PGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - | - | FQ-CSID |
| ePDG FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - | - | FQ-CSID |
| TWAN FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - | - | FQ-CSID |
| User Plane Inactivity Timer | O | This IE may be present to request the UP function to send a User Plane Inactivity Report when no user plane packets are received for this PFCP session for a duration exceeding the User Plane Inactivity Timer.  When present, it shall contain the duration of the inactivity period after which a User Plane Inactivity Report shall be generated. | - | X | X | X | User Plane Inactivity Timer |
| User ID | O | This IE may be present, based on operator policy. It shall only be sent if the UP function is in a trusted environment.  See NOTE. | X | X | X | X | User ID |
| Trace Information | O | When present, this IE shall contain the trace instructions to be applied by the UP function for this PFCP session. | X | X | X | X | Trace Information |
| NOTE: This can be used for troubleshooting problems in the UP function affecting a subscriber. | | | | | | | |

#### 7.5.2.2 Create PDR IE within PFCP Session Establishment Request

The Create PDR grouped IE shall be encoded as shown in Figure 7.5.2.2-1.

Table 7.5.2.2-1: Create PDR IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Create PDR IE Type = 1(decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PDR ID | M | This IE shall uniquely identify the PDR among all the PDRs configured for that PFCP session. | X | X | X | X | PDR ID |
| Precedence | M | This IE shall indicate the PDR's precedence to be applied by the UP function among all PDRs of the PFCP session, when looking for a PDR matching an incoming packet. | - | X | X | X | Precedence |
| PDI | M | This IE shall contain the PDI against which incoming packets will be matched.  See Table 7.5.2.2-2. | X | X | X | X | PDI |
| Outer Header Removal | C | This IE shall be present if the UP function is required to remove one or more outer header(s) from the packets matching this PDR. | X | X | - | X | Outer Header Removal |
| FAR ID | C | This IE shall be present if the Activate Predefined Rules IE is not included or if it is included but it does not result in activating a predefined FAR.  When present this IE shall contain the FAR ID to be associated to the PDR. | X | X | X | X | FAR ID |
| URR ID | C | This IE shall be present if a measurement action shall be applied to packets matching this PDR.  When present, this IE shall contain the URR IDs to be associated to the PDR.  Several IEs within the same IE type may be present to represent a list of URRs to be associated to the PDR. | X | X | X | X | URR ID |
| QER ID | C | This IE shall be present if a QoS enforcement action shall be applied to packets matching this PDR.  When present, this IE shall contain the QER IDs to be associated to the PDR. Several IEs within the same IE type may be present to represent a list of QERs to be associated to the PDR. | - | X | X | X | QER ID |
| Activate Predefined Rules | C | This IE shall be present if Predefined Rule(s) shall be activated for this PDR. When present this IE shall contain one Predefined Rules name.  Several IEs with the same IE type may be present to represent multiple "Activate Predefined Rules" names. | - | X | X | X | Activate Predefined Rules |

Table 7.5.2.2-2: PDI IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | PDI IE Type = 2 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Source Interface | M | This IE shall identify the source interface of the incoming packet. | X | X | X | X | Source Interface |
| Local F-TEID | O | This IE shall not be present if Traffic Endpoint ID is present.  If present, this IE shall identify the local F-TEID to match for an incoming packet.  The CP function shall set the CHOOSE (CH) bit to 1 if the UP function supports the allocation of F-TEID and the CP function requests the UP function to assign a local F-TEID to the PDR. | X | X | - | X | F-TEID |
| Network Instance | O | This IE shall not be present if Traffic Endpoint ID is present.  If present, this IE shall identify the Network instance to match for the incoming packet. See NOTE 1, NOTE2. | X | X | X | X | Network Instance |
| UE IP address | O | This IE shall not be present if Traffic Endpoint ID is present.  If present, this IE shall identify the source or destination IP address to match for the incoming packet. | - | X | X | X | UE IP address |
| Traffic Endpoint ID | C | This IE may be present if the UP function has indicated the support of PDI optimization.  If present, this IE shall uniquely identify the Traffic Endpoint for that PFCP session. | X | X | X | X | Traffic Endpoint ID |
| SDF Filter | O | If present, this IE shall identify the SDF filter to match for the incoming packet. Several IEs with the same IE type may be present to provision a list of SDF Filters. The full set of applicable SDF filters, if any, shall be provided during the creation or the modification of the PDI.  See NOTE 3. | - | X | X | X | SDF Filter |
| Application ID | O | If present, this IE shall identify the Application ID to match for the incoming packet. | - | X | X | X | Application ID |
| Ethernet PDU Session Information | O | This IE may be present to identify all the (DL) Ethernet packets matching an Ethernet PDU session (see subclause 5.13.1). | - | - | - | X | Ethernet PDU Session Information |
| Ethernet Packet Filter | O | If present, this IE shall identify the Ethernet PDU to match for the incoming packet.  Several IEs with the same IE type may be present to represent a list of Ethernet Packet Filters.  The full set of applicable Ethernet Packet filters, if any, shall be provided during the creation or the modification of the PDI. | - | - | - | X | Ethernet Packet Filter |
| QFI | O | If present, this IE shall identify the QoS Flow Identifier to match for the incoming packet.  Several IEs with the same IE type may be present to provision a list of QFIs. When present, the full set of applicable QFIs shall be provided during the creation or the modification of the PDI. | - | - | - | X | QFI |
| Framed-Route | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe a framed route.  Several IEs with the same IE type may be present to provision a list of framed routes. | - | X | - | X | Framed-Route |
| Framed-Routing | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe a framed route. | - | X | - | X | Framed-Routing |
| Framed-IPv6-Route | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe a framed IPv6 route.  Several IEs with the same IE type may be present to provision a list of framed IPv6 routes. | - | X | - | X | Framed-IPv6-Route |
| NOTE 1: The Network Instance parameter is needed e.g. in the following cases:  - PGW/TDF UP function supports multiple PDNs with overlapping IP addresses;  - SGW UP function is connected to PGWs in different IP domains (S5/S8);  - PGW UP function is connected to SGWs in different IP domains (S5/S8);  - SGW UP function is connected to eNodeBs in different IP domains;  - UPF is connected to 5G-ANs in different IP domains.  NOTE 2: When a Local F-TEID is provisioned in the PDI, the Network Instance shall relate to the IP address of the F-TEID. Otherwise, the Network Instance shall relate to the UE IP address.  NOTE 3: SDF Filter IE(s) shall not be present if Ethernet Packet Filter IE(s) is present.  NOTE 4: When several SDF filter IEs are provisioned, the UP function shall consider that the packets are matched if matching any SDF filter. The same principle shall apply for Ethernet Packet Filters and QFIs. | | | | | | | |

Table 7.5.2.2-3: Ethernet Packet Filter IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Ethernet Packet Filter IE Type = 132 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Ethernet Filter ID | C | This shall be present if Bidirectional Ethernet filter is required. This IE shall uniquely identify an Ethernet Filter among all the Ethernet Filters provisioned for a given PFCP session. | - | - | - | X | Ethernet Filter ID |
| Ethernet Filter Properties | C | This IE shall be present when provisioning a bidirectional Ethernet Filter the first time (see subclause 5.x.4). | - | - | - | X | Ethernet Filter Properties |
| MAC address | O | If present, this IE shall identify the MAC address.  This IE may be present up to 16 times. | - | - | - | X | MAC address |
| Ethertype | O | If present, this IE shall identify the Ethertype. | - | - | - | X | Ethertype |
| C-TAG | O | If present, this IE shall identify the Customer-VLAN tag. | - | - | - | X | C-TAG |
| S-TAG | O | If present, this IE shall identify the Service-VLAN tag. | - | - | - | X | S-TAG |
| SDF Filter | O | If packet filtering is required, for Ethernet frames with Ethertype indicating IPv4 or IPv6 payload, this IE shall describe the IP Packet Filter Set.  Several IEs with the same IE type may be present to represent a list of SDF filters. | - | - | - | X | SDF Filter |

#### 7.5.2.3 Create FAR IE within PFCP Session Establishment Request

The Create FAR grouped IE shall be encoded as shown in Figure 7.5.2.3-1.

Table 7.5.2.3-1: Create FAR IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Create FAR IE Type = 3 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| FAR ID | M | This IE shall uniquely identify the FAR among all the FARs configured for that PFCP session. | X | X | X | X | FAR ID |
| Apply Action | M | This IE shall indicate the action to apply to the packets, See subclauses 5.2.1 and 5.2.3. | X | X | X | X | Apply Action |
| Forwarding Parameters | C | This IE shall be present when the Apply-Action requests the packets to be forwarded. It may be present otherwise.  When present, this IE shall contain the forwarding instructions to be applied by the UP function when the Apply-Action requests the packets to be forwarded.  See table 7.5.2.3-2. | X | X | X | X | Forwarding Parameters |
| Duplicating Parameters | C | This IE shall be present when the Apply-Action requests the packets to be duplicated. It may be present otherwise.  When present, this IE shall contain the forwarding instructions to be applied by the UP function for the traffic to be duplicated, when the Apply-Action requests the packets to be duplicated.  Several IEs with the same IE type may be present to represent to duplicate the packets to different destinations. See NOTE 1.  See table 7.5.2.3-3. | X | X | - | X | Duplicating Parameters |
| BAR ID | O | When present, this IE shall contain the BAR ID of the BAR defining the buffering instructions to be applied by the UP function when the Apply Action requests the packets to be buffered. See table 7.5.2.6-1. | X | - | - | X | BAR ID |
| NOTE 1: The same user plane packets may be required, according to operator's policy and configuration, to be duplicated to different SX3LIFs. | | | | | | | |

Editor's Note: Regarding duplication of parameters for interception is FFS on N4, needs confirmation from SA3.

Table 7.5.2.3-2: Forwarding Parameters IE in FAR

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Forwarding Parameters IE Type = 4 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Destination Interface | M | This IE shall identify the destination interface of the outgoing packet. | X | X | X | X | Destination Interface |
| Network Instance | O | When present, this IE shall identify the Network instance towards which to send the outgoing packet. See NOTE 1. | X | X | X | X | Network Instance |
| Redirect Information | C | This IE shall be present if the UP function is required to enforce traffic redirection towards a redirect destination provided by the CP function. | - | X | X | X | Redirect Information |
| Outer Header Creation | C | This IE shall be present if the UP function is required to add one or more outer header(s) to the outgoing packet. If present, it shall contain the F-TEID of the remote GTP-U peer when adding a GTP-U/UDP/IP header, or the Destination IP address and Port Number when adding a UDP/IP header. See NOTE 2. | X | X | - | X | Outer Header Creation |
| Transport Level Marking | C | This IE shall be present if the UP function is required to mark the IP header with the DSCP marking as defined by IETF RFC 2474 [22]. When present, it shall contain the value of the DSCP in the TOS/Traffic Class field set based on the QCI, and optionally the ARP priority level, of the associated EPS bearer, as described in sub-clause 4.7.3 of 3GPP TS 23.214 [2]. | X | X | - | X | Transport Level Marking |
| Forwarding Policy | C | This IE shall be present if a specific forwarding policy is required to be applied to the packets. It shall be present if the Destination Interface IE is set to SGi-LAN / N6-LAN. It may be present if the Destination Interface is set to Core, Access, or CP-Function. See NOTE 2.  When present, it shall contain an Identifier of the Forwarding Policy locally configured in the UP function. | - | X | X | X | Forwarding Policy |
| Header Enrichment | O | This IE may be present if the UP function indicated support of Header Enrichment of UL traffic. When present, it shall contain information for header enrichment. | - | X | X | X | Header Enrichment |
| Linked Traffic Endpoint ID | C | This IE may be present, if it is available and the UP function indicated support of the PDI optimisation feature, (see subclause 8.2.25). When present, it shall identify the Traffic Endpoint ID allocated for this PFCP session to receive the traffic in the reverse direction (see subclause 5.2.3.1). | X | X | - | X | Traffic Endpoint ID |
| Proxying | C | This IE shall be present if proxying is to be performed by the UP function.  When present, this IE shall contain the information that the UPF shall perfom ARP proxying as specified in IETF RFC 1027 [32] and / or IPv6 Neighbour Solicitation Proxying as specified in IETF RFC 4861 [33] functionality for the Ethernet PDUs. | - | - | - | X | Proxying |
| NOTE 1: The Network Instance parameter is needed e.g. in the following cases:  - PGW/TDF UP function supports multiple PDNs with overlapping IP addresses;  - SGW UP function is connected to PGWs in different IP domains (S5/S8);  - PGW UP function is connected to SGWs in different IP domains (S5/S8);  - SGW UP function is connected to eNodeBs in different IP domains;  - UPF is connected to 5G-ANs in different IP domains.  NOTE 2: If the Outer Header Creation and Forwarding Policy are present, the UP function shall put the user plane packets in the user plane tunnel by applying Outer Header Creation, after enforcing the required Forwarding Policy. | | | | | | | |

Table 7.5.2.3-3: Duplicating Parameters IE in FAR

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Duplicating Parameters IE Type = 5 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Destination Interface | M | This IE shall identify the destination interface of the outgoing packet. | X | X | - | X | Destination Interface |
| Outer Header Creation | C | This IE shall be present if the UP function is required to add one or more outer header(s) to the outgoing packet. If present, it shall contain the F-TEID of the remote GTP-U peer. See NOTE 1. | X | X | - | X | Outer Header Creation |
| Transport Level marking | C | This IE shall be present if the UP function is required to mark the IP header with the DSCP marking as defined by IETF RFC 2474 [22]. When present, it shall contain the value of the DSCP in the TOS/Traffic Class field. | X | X | - | X | Transport Level Marking |
| Forwarding Policy | C | This IE shall be present if a specific forwarding policy is required to be applied to the packets. When present, it shall contain an Identifier of the Forwarding Policy locally configured in the UP function. | X | X | - | X | Forwarding Policy |
| NOTE 1: If the Outer Header Creation and Forwarding Policy are present, the UP function shall put the user plane packets in the user plane tunnel by applying Outer Header Creation, after enforcing the required Forwarding Policy. | | | | | | | |

Editor's Note: Interception is FFS on N4, needs confirmation from SA3LI.

#### 7.5.2.4 Create URR IE within PFCP Session Establishment Request

The Create URR grouped IE shall be encoded as shown in Figure 7.5.2.4-1.

Table 7.5.2.4-1: Create URR IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Create URR IE Type = 6 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall uniquely identify the URR among all the URRs configured for this PFCP session. | X | X | X | X | URR ID |
| Measurement Method | M | This IE shall indicate the method for measuring the network resources usage, i.e. whether the data volume, duration (i.e. time), combined volume/duration, or event shall be measured. | X | X | X | X | Measurement Method |
| Reporting Triggers | M | This IE shall indicate the trigger(s) for reporting network resources usage to the CP function, e.g. periodic reporting or reporting upon reaching a threshold, or envelope closure. | X | X | X | X | Reporting Triggers |
| Measurement Period | C | This IE shall be present if periodic reporting is required. When present, it shall indicate the period for generating and reporting usage reports. | X | X | X | X | Measurement Period |
| Volume Threshold | C | This IE shall be present if volume-based measurement is used and reporting is required upon reaching a volume threshold. When present, it shall indicate the traffic volume value after which the UP function shall report network resources usage to the CP function for this URR. | X | X | X | X | Volume Threshold |
| Volume Quota | C | This IE shall be present if volume-based measurement is used and the CP function needs to provision a Volume Quota in the UP function (see subclause 5.2.2.2)  When present, it shall indicate the Volume Quota value. | - | X | X | X | Volume Quota |
| Time Threshold | C | This IE shall be present if time-based measurement is used and reporting is required upon reaching a time threshold. When present, it shall indicate the time usage after which the UP function shall report network resources usage to the CP function for this URR. | X | X | X | X | Time Threshold |
| Time Quota | C | This IE shall be present if time-based measurement is used and the CP function needs to provision a Time Quota in the UP function (see subclause 5.2.2.2)  When present, it shall indicate the Time Quota value | - | X | X | X | Time Quota |
| Quota Holding Time | C | This IE shall be present, for a time, volume or event-based measurement, if reporting is required and packets are no longer permitted to pass on when no packets are received during a given inactivity period.  When present, it shall contain the duration of the inactivity period. | - | X | X | X | Quota Holding Time |
| Dropped DL Traffic Threshold | C | This IE shall be present if reporting is required when the DL traffic being dropped exceeds a threshold.  When present, it shall contain the threshold of the DL traffic being dropped. | X | - | - | X | Dropped DL Traffic Threshold |
| Monitoring Time | O | When present, this IE shall contain the time at which the UP function shall re-apply the volume or time threshold. | X | X | X | X | Monitoring Time |
| Event Information | O | When present, this IE shall contain details for event detection.  Several IEs with the same IE type may be present to provision multiple Event Information for this URR ID. | - | X | X | X | Event Information |
| Subsequent Volume Threshold | O | This IE may be present if the Monitoring Time IE is present and volume-based measurement is used.  When present, it shall indicate the traffic volume value after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Volume Threshold |
| Subsequent Time Threshold | O | This IE may be present if the Monitoring Time IE is present and time-based measurement is used.  When present, it shall indicate the time usage after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Time Threshold |
| Subsequent Volume Quota | O | This IE may be present if Monitoring Time IE is present and volume-based measurement is used (see subclause 5.2.2.2).  When present, it shall indicate the Volume Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Volume Quota |
| Subsequent Time Quota | O | This IE may be present if Monitoring Time IE is present and time-based measurement is used (see subclause 5.2.2.2)  When present, it shall indicate the Time Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Time Quota |
| Inactivity Detection Time | C | This IE shall be present if time-based measurement is used and the time measurement need to be suspended when no packets are received during a given inactivity period. When present, it shall contain the duration of the inactivity period. | - | X | X | X | Inactivity Detection Time |
| Linked URR ID | C | This IE shall be present if linked usage reporting is required. When present, this IE shall contain the linked URR ID which is related with this URR (see subclause 5.2.2.4).  Several IEs with the same IE type may be present to represent multiple linked URRs which are related with this URR. | - | X | X | X | Linked URR ID |
| Measurement Information | C | This IE shall be included if any of the following flag is set to 1.  Applicable flags are:  - Measurement Before QoS Enforcement Flag: this flag shall be set to 1 if the traffic usage before any QoS Enforcement is requested to be measured.  - Inactive Measurement Flag: this flag shall be set to 1 if the measurement shall be paused (inactive). The measurement shall be performed (active) if the bit is set to 0 or if the Measurement Information IE is not present in the Create URR IE.  - Reduced Application Detection Information Flag: this flag may be set to 1, if the Reporting Triggers request to report the start or stop of application, to request the UP function to only report the Application ID in the Application Detection Information, e.g. for envelope reporting. | -  - | X  X | X  - | X  X | Measurement Information |
| Time Quota Mechanism | C | This IE shall be present if time-based measurement based on CTP or DTP is used. | - | X | - | - | Time Quota Mechanism |
| Aggregated URRs | C | This IE shall be included if the URR is used to support a Credit Pool.  Several IEs with the same IE type may be present to provide multiple aggregated URRs. | - | X | - |  | Aggregated URRs |
| FAR ID for Quota Action | C | This IE may be present if the Volume Quota IE and/or the Time Quota IE is provisioned in the URR and the UP Function indicated support of the Quota Action feature.  When present, it shall contain the identifier of the substitute FAR the UP function shall apply, for the traffic associated to this URR, when exhausting any of these quotas. See NOTE 1. | - | X | X | X | FAR ID |
| Ethernet Inactivity Timer | C | This IE shall be present if Ethernet traffic reporting is used and the SMF requests the UP function to also report inactive UE MAC addresses.  When present, it shall contain the duration of the Ethernet inactivity period. | - | - | - | X | Ethernet Inactivity Timer |
| Additional Monitoring Time | O | When present, this IE shall contain the time at which the UP function shall re-apply the volume or time threshold/quota provisioned in the IE.  Several IEs with the same IE type may be present to provide multiple Monitoring Times. | X | X | X | X | Additional Monitoring Time |
| NOTE 1: The substitute FAR used when exhausting a Volume Quota or Time Quota may be set to drop the packets or redirect the traffic towards a redirect destination as specified in subclause 5.4.7. | | | | | | | |

Table 7.5.2.4-2: Aggregated URRs

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Aggregated URRs = 118 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Aggregated URR ID | M | This IE shall be present for the aggregated URR ID of the URR sharing the credit pool. | - | X | - | - | Aggregated URR ID |
| Multiplier | M | This IE shall be included to measure the abstract service units the traffic of the corresponding aggregated URR consumes from the credit pool. | - | X | - | - | Multiplier |

Table 7.5.2.4-3: Additional Monitoring Time

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Additional Monitoring Time = 147 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Monitoring Time | M | This IE shall be present and contain the time at which the UP function shall re-apply the volume or time threshold/quota. | X | X | X | X | Monitoring Time |
| Subsequent Volume Threshold | O | This IE may be present if the Monitoring Time IE is present and volume-based measurement is used.  When present, it shall indicate the traffic volume value after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Volume Threshold |
| Subsequent Time Threshold | O | This IE may be present if the Monitoring Time IE is present and time-based measurement is used.  When present, it shall indicate the time usage after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Time Threshold |
| Subsequent Volume Quota | O | This IE may be present if Monitoring Time IE is present and volume-based measurement is used (see subclause 5.2.2.2).  When present, it shall indicate the Volume Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Volume Quota |
| Subsequent Time Quota | O | This IE may be present if Monitoring Time IE is present and time-based measurement is used (see subclause 5.2.2.2)  When present, it shall indicate the Time Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Time Quota |

Table 7.5.2.4-4: Event Information

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Aggregated URRs = 148 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Event ID | M | This IE shall be present for the Event ID identifying the Event. | - | X | X | X | Event ID |
| Event Threshold | M | This IE shall be present for the Event threshold. | - | X | X | X | Event Threshold |

#### 7.5.2.5 Create QER IE within PFCP Session Establishment Request

The Create QER grouped IE shall be encoded as shown in Figure 7.5.2.5-1.

Table 7.5.2.5-1: Create QER IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Create QER IE Type = 7 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| QER ID | M | This IE shall uniquely identify the QER among all the QER configured for that PFCP session | - | X | X | X | QER ID |
| QER Correlation ID | C | This IE shall be present if the UP function is required to correlate the QERs of several PFCP sessions, for APN-AMBR enforcement of multiple UE's PDN connections to the same APN. | - | X | - | X | QER Correlation ID |
| Gate Status | M | This IE shall indicate whether the packets are allowed to be forwarded (the gate is open) or shall be discarded (the gate is closed) in the uplink and/or downlink directions. | - | X | X | X | Gate Status |
| Maximum Bitrate | C | This IE shall be present if an MBR enforcement action shall be applied to packets matching this PDR. When present, this IE shall indicate the uplink and/or downlink maximum bit rate to be enforced for packets matching the PDR.  This IE may be set to the value of:  - the APN-AMBR, for a QER that is referenced by all the PDRs of the non-GBR bearers of a PDN connection;  - the TDF session MBR, for a QER that is referenced by all the PDRs of a TDF session;  - the bearer MBR, for a QER that is referenced by all the PDRs of a bearer;  - the QoS Flow MBR, for a QER that is referenced by all the PDRs of a QoS Flow (for 5GC);  - the SDF MBR, for a QER that is referenced by all the PDRs of a SDF. | - | X | X | X | MBR |
| Guaranteed Bitrate | C | This IE shall be present if a GBR has been authorized to packets matching this PDR. When present, this IE shall indicate the authorized uplink and/or downlink guaranteed bit rate.  This IE may be set to the value of:  - the aggregate GBR, for a QER that is referenced by all the PDRs of a GBR bearer;  - the QoS Flow GBR, for a QER that is referenced by all the PDRs of a QoS Flow (for 5GC);  - the SDF GBR, for a QER that is referenced by all the PDRs of a SDF. | - | X | X | X | GBR |
| Packet Rate | C | This IE shall be present if a Packet Rate enforcement action (in terms of number of packets per time interval) shall be applied to packets matching this PDR.  When present, this IE shall indicate the uplink and/or downlink maximum packet rate to be enforced for packets matching the PDR.  This IE may be set to the value of:  - downlink packet rate for Serving PLMN Rate Control, for a QER that is referenced by all PDRs of the UE belonging to the PDN connection using CIoT EPS Optimizations as described in 3GPP TS 23.401 [2])  - uplink and/or downlink packet rate for APN Rate Control, for a QER that is referenced by all the PDRs of the UE belonging to PDN connections to the same APN using CIoT EPS Optimizations as described in 3GPP TS 23.401 [2]). | - | X | - |  | Packet Rate |
| DL Flow Level Marking | C | This IE shall be set if the UP function is required to mark the packets for QoS purposes:  - by the TDF-C, for DL flow level marking for application indication (see subclause 5.4.5);  - by the PGW-C, for setting the GTP-U Service Class Indicator extension header for service indication towards GERAN (see subclause 5.4.12). | - | X | X | - | DL Flow Level Marking |
| QoS flow identifier | C | This IE shall be present if the QoS flow identifier shall be included by the UPF. | - | - | - | X | QFI |
| Reflective QoS | C | This IE shall be present if the UP function is required to set Reflective QoS Identifier to request reflective QoS for uplink traffic. | - | - | - | X | RQI |

#### 7.5.2.6 Create BAR IE within PFCP Session Establishment Request

The Create BAR grouped IE shall be encoded as shown in Figure 7.5.2.6-1.

Table 7.5.2.6-1: Create BAR IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Create BAR IE Type = 85 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| BAR ID | M | This IE shall uniquely identify the BAR provisioned for that PFCP session. | X | - | - | X | BAR ID |
| Downlink Data Notification Delay | C | This IE shall be present if the UP function indicated support of the Downlink Data Notification Delay parameter (see subclause 8.2.28) and the UP function has to delay the notification to the CP function about the arrival of DL data packets.  When present, it shall contain the delay the UP function shall apply between receiving a downlink data packet and notifying the CP function about it, when the Apply Action parameter requests to buffer the packets and notify the CP function. | X | - | - | - | Downlink Data Notification Delay |
| Suggested Buffering Packets Count | C | This IE may be present if the UP Function indicated support of the the feature UDBC.  When present, it shall contain the number of packets that are suggested to be buffered when the Apply Action parameter requests to buffer the packets. The packets that exceed the limit shall be discarded. |  | X | X | X | Suggested Buffering Packets Count |

#### 7.5.2.7 Create Traffic Endpoint IE within Sx Session Establishment Request

The Create Traffic Endpoint grouped IE shall be encoded as shown in Figure 7.5.2.7-1.

Table 7.5.2.7-1: Create Traffic Endpoint IE within PFCP Session Establishment Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 | Create Traffic Endpoint IE Type = 127(decimal) | | | | | | |
| Octets 3 and 4 | Length = n | | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Traffic Endpoint ID | M | This IE shall uniquely identify the Traffic Endpoint for that Sx session. | X | X | X | X | Traffic Endpoint ID |
| Local F-TEID | O | If present, this IE shall identify the local F-TEID to match for an incoming packet.  The CP function shall set the CHOOSE (CH) bit to 1 if the UP function supports the allocation of F-TEID and the CP function requests the UP function to assign a local F-TEID to the Traffic Endpoint. | X | X | - | X | F-TEID |
| Network Instance | O | If present, this IE shall identify the Network instance to match for the incoming packet. See NOTE 1, NOTE2. | X | X | X | X | Network Instance |
| UE IP address | O | If present, this IE shall identify the source or destination IP address to match for the incoming packet. | - | X | X | X | UE IP address |
| Ethernet PDU Session Information | O | This IE may be present to identify all the (DL) Ethernet packets matching an Ethernet PDU session (see subclause 5.13.1). | - | - | - | X | Ethernet PDU Session Information |
| Framed-Route | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe a framed route.  Several IEs with the same IE type may be present to provision a list of framed routes. | - | X | - | X | Framed-Route |
| Framed-Routing | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe the framed routing associated to a framed route. | - | X | - | X | Framed-Routing |
| Framed-IPv6-Route | O | This IE may be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25). If present, this IE shall describe a framed IPv6 route.  Several IEs with the same IE type may be present to provision a list of framed IPv6 routes. | - | X | - | X | Framed-IPv6-Route |
| NOTE 1: The Network Instance parameter is needed e.g. in the following cases:  - PGW/TDF UP function supports multiple PDNs with overlapping IP addresses;  - SGW UP function is connected to PGWs in different IP domains (S5/S8);  - PGW UP function is connected to SGWs in different IP domains (S5/S8);  - SGW UP function is connected to eNodeBs in different IP domains;  - UPF is connected to 5G-ANs in different IP domains.  NOTE 2: When a Local F-TEID is provisioned in the Traffic Endpoint, the Network Instance shall relate to the IP address of the F-TEID. Otherwise, the Network Instance shall relate to the UE IP address. | | | | | | | |

### 7.5.3 PFCP Session Establishment Response

#### 7.5.3.1 General

The PFCP Session Establishment Response shall be sent over the Sxa, Sxb, Sxc and N4 interface by the UP function to the CP function as a reply to the PFCP Session Establishment Request.

Table 7.5.3.1-1: Information Elements in a PFCP Session Establishment Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Node ID | M | This IE shall contain the unique identifier of the sending Node. | X | X | X | X | Node ID |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to a conditional or mandatory IE missing or faulty. | X | X | X | X | Offending IE |
| UP F-SEID | C | This IE shall be present if the cause is set to "Request accepted (success)". When present, it shall contain the unique identifier allocated by the UP function identifing the session. | X | X | X | X | F-SEID |
| Created PDR | C | This IE shall be present if the cause is set to "success" and the UP function was requested to allocate the local F-TEID for the PDR.  When present, this IE shall contain the PDR information associated to the PFCP session. There may be several instances of this IE.  See table 7.5.3.2-1. | X | X | - | X | Created PDR |
| Load Control Information | O | The UP function may include this IE if it supports the load control feature and the feature is activated in the network.  See Table 7.5.3.3-1. | X | X | X | X | Load Control Information |
| Overload Control Information | O | During an overload condition, the UP function may include this IE if it supports the overload control feature and the feature is activated in the network.  See Table 7.5.3.4-1. | X | X | X | X | Overload Control Information |
| SGW-U FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | - | - | - | FQ-CSID |
| PGW-U FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - | - | FQ-CSID |
| Failed Rule ID | C | This IE shall be included if the Cause IE indicates a rejection due to a rule creation or modification failure. | X | X | X | X | Failed Rule ID |
| Created Traffic Endpoint | C | This IE shall be present if the cause is set to "success" and the UP function was requested to allocate a local F-TEID in a Create Traffic Endpoint IE. When present, it shall contain the local F-TEID to be used for this Traffic Endpoint.  There may be several instances of this IE. | X | X | - | X | Created Traffic Endpoint |

#### 7.5.3.2 Created PDR IE within PFCP Session Establishment Response

The Created PDR grouped IE shall be encoded as shown in Figure 7.5.3.2-1.

Table 7.5.3.2-1: Created PDR IE within PFCP Session Establishment Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Created PDR IE Type = 8 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PDR ID | M |  | X | X | - | X | PDR ID |
| Local F-TEID | C | If the UP function allocates the F-TEID, this IE shall be present and shall contain the local F-TEID to be used for this PDR. | X | X | - | X | F-TEID |

#### 7.5.3.3 Load Control Information IE within PFCP Session Establishment Response

The Load Control Information grouped IE shall be encoded as shown in Figure 7.5.3.3-1.

Table 7.5.3.3-1: Load Control Information IE within PFCP Session Establishment Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Load Control Information IE Type = 51 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Load Control Sequence Number | M | See subclause 6.2.3.3.2 for the description and use of this parameter. | X | X | X | X | Sequence Number |
| Load Metric | M | See subclause 6.2.3.3.2 for the description and use of this parameter. | X | X | X | X | Metric |

#### 7.5.3.4 Overload Control Information IE within PFCP Session Establishment Response

The Overload Control grouped IE shall be encoded as shown in Figure 7.5.3.4-1.

Table 7.5.3.4-1: Overload Control Information IE within PFCP Session Establishment Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Overload Control Information IE Type = 54 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Overload Control Sequence Number | M | See subclause 6.2.4.3.2 for the description and use of this parameter. | X | X | X | X | Sequence Number |
| Overload Reduction Metric | M | See subclause 6.2.4.3.2 for the description and use of this parameter. | X | X | X | X | Metric |
| Period of Validity | M | See subclause 6.2.4.3.2 for the description and use of this parameter. | X | X | X | X | Timer |
| Overload Control Information Flags | C | This IE shall be included if any of flag in this IE is set. | X | X | X | X | OCI Flags |

#### 7.5.3.5 Created Traffic Endpoint IE within Sx Session Establishment Response

The Created Traffic Endpoint grouped IE shall be encoded as shown in Figure 7.5.3.5-1.

Table 7.5.3.5-1: Created Traffic Endpoint IE within Sx Session Establishment Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Created Traffic Endpoint IE Type = 128 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Traffic Endpoint ID | M | This IE shall uniquely identify the Traffic Endpoint for that Sx session. | X | X | - | X | Traffic Endpoint ID |
| Local F-TEID | C | If the UP function allocates the F-TEID, this IE shall be present and shall contain the local F-TEID to be used for this Traffic Endpoint. | X | X | - | X | F-TEID |

### 7.5.4 PFCP Session Modification Request

#### 7.5.4.1 General

The PFCP Session Modification Request is used over the Sxa, Sxb, Sxc and N4 interface by the CP function to request the UP function to modify the PFCP session.

Table 7.5.4.1-1: Information Elements in a PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| CP F-SEID | C | This IE shall be present if the CP function decides to change its F-SEID for the PFCP session. The UP function shall use the new CP F-SEID for subsequent PFCP Session related messages for this PFCP Session. See Note 2. | X | X | X | X | F-SEID |
| Remove PDR | C | When present, this IE shall contain the PDR Rule which is requested to be removed. See Table 7.5.4-8.  Several IEs within the same IE type may be present to represent a list of PDRs to remove. | X | X | X | X | Remove PDR |
| Remove FAR | C | When present, this IE shall contain the FAR Rule which is requested to be removed. See Table 7.5.4-9.  Several IEs within the same IE type may be present to represent a list of FARs to remove. | X | X | X | X | Remove FAR |
| Remove URR | C | When present, this shall contain the URR Rule which is requested to be removed. See Table 7.5.4-10.  Several IEs within the same IE type may be present to represent a list of URRs to remove. | X | X | X | X | Remove URR |
| Remove QER | C | When present, this IE shall contain the QER Rule which is requested to be removed. See Table 7.5.4-11.  Several IEs within the same IE type may be present to represent a list of QERs to remove. | - | X | X | X | Remove QER |
| Remove BAR | C | When present, this IE shall contain the BAR Rule which is requested to be removed. See Table 7.5.4.12-1. | X | - | - | X | Remove BAR |
| Remove Traffic Endpoint | C | When present, this IE shall contain the Traffic Endpoint ID identifying the traffic endpoint to be removed, if the UP function has indicated support of PDI optimization.  All the PDRs that refer to the removed Traffic Endpoint shall be deleted.  See Table 7.5.4.14-1. | X | X | X | X | Remove Traffic Endpoint |
| Create PDR | C | This IE shall be present if the CP function requests the UP function to create a new PDR.  See Table 7.5.2.2-1.  Several IEs within the same IE type may be present to represent a list of PDRs to create. | X | X | X | X | Create PDR |
| Create FAR | C | This IE shall be present if the CP function requests the UP function to create a new FAR.See Table 7.5.2.3-1.  Several IEs within the same IE type may be present to represent a list of FARs to create. | X | X | X | X | Create FAR |
| Create URR | C | This IE shall be present if the CP function requests the UP function to create a new URR. See Table 7.5.2.4-1.  Several IEs within the same IE type may be present to represent a list of URRs to create. | X | X | X | X | Create URR |
| Create QER | C | This IE shall be present if the CP function requests the UP function to create a new QER. See Table 7.5.2.5-1.  Several IEs within the same IE type may be present to represent a list of QERs to create. | - | X | X | X | Create QER |
| Create BAR | C | This IE shall be present if the CP function requests the UP function to create a new BAR.  See Table 7.5.2.2-1. | X | - | - | X | Create BAR |
| Create Traffic Endpoint | C | When present this IE shall contain the information associated with the Traffic Endpoint to be created, if the UP function has indicated support of PDI optimization. See Table 7.5.2.7-1. | X | X | X | X | Create Traffic Endpoint |
| Update PDR | C | This IE shall be present if a PDR previously created for the PFCP session need to be modified. See Table 7.5.4.6-1.  Several IEs within the same IE type may be present to represent a list of PDRs to update. | X | X | X | X | Update PDR |
| Update FAR | C | This IE shall be present if a FAR previously created for the PFCP session need to be modified. See Table 7.5.4.7-1. Several IEs within the same IE type may be present to represent a list of FARs to update. | X | X | X | X | Update FAR |
| Update URR | C | This IE shall be present if URR(s) previously created for the PFCP session need to be modified.  Several IEs within the same IE type may be present to represent a list of modified URRs. Previously URRs that are not modified shall not be included. See Table 7.5.4.8-1. | X | X | X | X | Update URR |
| Update QER | C | This IE shall be present if QER(s) previously created for the PFCP session need to be modified.  Several IEs within the same IE type may be present to represent a list of modified QERs.  Previously created QERs that are not modified shall not be included.  See Table 7.5.4.9-1. | - | X | X | X | Update QER |
| Update BAR | C | This IE shall be present if a BAR previously created for the PFCP session needs to be modified.  A previously created BAR that is not modified shall not be included.  See Table 7.5.4.3-3. | X | - | - | X | Update BAR |
| Update Traffic Endpoint | C | When present this IE shall contain the information associated with the traffic endpoint to be updated, if the UP function has indicated support of PDI optimization.  All the PDRs that refer to the Traffic Endpoint shall use the updated Traffic Endpoint information.  See Table 7.5.4.13-1. | X | X | X | X | Update Traffic Endpoint |
| PFCPSMReq-Flags | C | This IE shall be included if at least one of the flags is set to 1.  - DROBU (Drop Buffered Packets): the CP function shall set this flag if the UP function is requested to drop the packets currently buffered for this PFCP session (see NOTE 1).  - QAURR (Query All URRs): the CP function shall set this flag if the CP function requests immediate usage report(s) for all the URRs previously provisioned for this PFCP session (see NOTE 3). | X  X | -  X | -  X | X  X | PFCPSMReq-Flags |
| Query URR | C | This IE shall be present if the CP function requests immediate usage report(s) to the UP function.  Several IEs within the same IE type may be present to represent a list of URRs for which an immediate report is requested.  See Table 7.5.4.10-1.  See NOTE 3. | X | X | X | X | Query URR |
| PGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - | - | FQ-CSID |
| SGW-C FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - | - | FQ-CSID |
| MME FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | X | X | - | - | FQ-CSID |
| ePDG FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - | - | FQ-CSID |
| TWAN FQ-CSID | C | This IE shall be included according to the requirements in clause 23 of 3GPP TS 23.007 [24]. | - | X | - | - | FQ-CSID |
| User Plane Inactivity Timer | C | This IE shall be present if it needs to be changed. | - | X | X | X | User Plane Inactivity Timer |
| Query URR Reference | O | This IE may be present if the Query URR IE is present or the QAURR flag is set to "1". When present, it shall contain a reference identifying the query request, which the UP function shall return in any usage report sent in response to the query. | X | X | X | X | Query URR Reference |
| Trace Information | O | When present, this IE shall contain the trace instructions to be applied by the UP function for this PFCP session.  A Trace Information with a null length indicates that the trace session shall be deactivated. | X | X | X | X | Trace Information |
| NOTE 1: The CP function may request the UP function to drop the packets currently buffered for the PFCP session when using extended buffering of downlink data packets, buffering is performed in the UP function and the DL Data Buffer Expiration Time is handled by the CP function. In this case, when the DL Data Buffer Expiration Time expires, the CP function shall send an PFCP Session Modification Request including the DROBU flag (to drop the downlink data packets currently buffered in the UP function) and updating the Apply Action within the FARs of this PFCP session to request the UP function to start buffering the downlink data packets with notifying the arrival of subsequent downlink data packets. See subclause 5.9.3 of 3GPP TS 23.214 [2].  NOTE 2: When changing the CP F-SEID of an established PFCP Session, the CP function shall be able to handle any incoming PFCP Session related messages sent by the UP function with the previous CP F-SEID for a duration at least longer than twice the PFCP retransmission timer (N1xT1).  NOTE 3: The QAURR (Query All URRs) flag in the PFCPSMReq-Flags IE and the Query URR IE are exclusive from each other in a PFCP Session Modification Request. | | | | | | | |

#### 7.5.4.2 Update PDR IE within PFCP Session Modification Request

The Update PDR grouped IE shall be encoded as shown in Figure 7.5.4.2-1.

Table 7.5.4.2-1: Update PDR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update PDR IE Type = 9 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PDR ID | M | This IE shall uniquely identify the PDR among all the PDRs configured for that PFCP session. | X | X | X | X | PDR ID |
| Outer Header Removal | C | This IE shall be present if it needs to be changed. | X | X | - | X | Outer Header Removal |
| Precedence | C | This IE shall be present if there is a change in the PDR's precedence to be applied by the UP function among all PDRs of the PFCP session, when looking for a PDR matching an incoming packet. | - | X | X | X | Precedence |
| PDI | C | This IE shall be present if there is a change within the PDI against which incoming packets will be matched. When present, this IE shall replace the PDI previously stored in the UP function for this PDR. See Table 7.5.2.2-2. | X | X | X | X | PDI |
| FAR ID | C | This IE shall be present if it needs to be changed | X | X | X | X | FAR ID |
| URR ID | C | This IE shall be present if a measurement action shall be applied or no longer applied to packets matching this PDR.  When present, this IE shall contain the list of all the URR IDs to be associated to the PDR. | X | X | X | X | URR ID |
| QER ID | C | This IE shall be present if a QoS enforcement action shall be applied or no longer applied to packets matching this PDR.  When present, this IE shall contain the list of all the QER IDs to be associated to the PDR. | - | X | X | X | QER ID |
| Activate Predefined Rules | C | This IE shall be present if new Predefined Rule(s) needs to be activated for the PDR. When present this IE shall contain one Predefined Rules name.  Several IEs with the same IE type may be present to represent multiple "Activate Predefined Rules" names. | - | X | X | X | Activate Predefined Rules |
| Deactivate Predefined Rules | C | This IE shall be present if Predefined Rule(s) needs to be deactivated for the PDR. When present this IE shall contain one Predefined Rules name.  Several IEs with the same IE type may be present to represent multiple "Activate Predefined Rules" names. | - | X | X | X | Deactivate Predefined Rules |
| NOTE: The IEs which do not need to be modified shall not be included in the Update PDR IE. The UP function shall continue to behave according to the values previously received for IEs not present in the Update PDR IE. | | | | | | | |

#### 7.5.4.3 Update FAR IE within PFCP Session Modification Request

The Update FAR grouped IE shall be encoded as shown in Figure 7.5.4.3-1.

Table 7.5.4.3-1: Update FAR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update FAR IE Type = 10 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| FAR ID | M | This IE shall identify the FAR to be updated. | X | X | X | X | FAR ID |
| Apply Action | C | This IE shall be present if it is changed. | X | X | X | X | Apply Action |
| Update Forwarding parameters | C | This IE shall be present if it is changed.See table 7.5.4.3-2. | X | X | X | X | Update Forwarding Parameters |
| Update Duplicating Parameters | C | This IE shall be present if it is changed. See table 7.5.4.3-3.  Several IEs with the same IE type may be present to request to duplicate the packets to different destinations. | X | X | - | X | Update Duplicating Parameters |
| BAR ID | C | This IE shall be present if the BAR ID associated to the FAR needs to be modified. See Table 7.5.4.11-1. | X | - | - | X | BAR ID |
| NOTE: The IEs which do not need to be modified shall not be included in the Update FAR IE. The UP function shall continue to behave according to the values previously received for IEs not present in the Update FAR IE. | | | | | | | |

Editor's Note: Interception (e.g. Update Duplicating Parameters) needs final confirmation form SA3LI.

Table 7.5.4.3-2: Update Forwarding Parameters IE in FAR

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update Forwarding Parameters IE Type = 11 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Destination Interface | C | This IE shall only be provided if it is changed.  When present, it shall indicate the destination interface of the outgoing packet. | X | X | X | X | Destination Interface |
| Network instance | C | This IE shall only be provided if it is changed. | X | X | X | X | Network Instance |
| Redirect Information | C | This IE shall be present if the instructions regarding the redirection of traffic by the UP function need to be modified. | - | X | X | X | Redirect Information |
| Outer Header Creation | C | This IE shall only be provided if it is changed. See NOTE 1. | X | X | - | X | Outer Header Creation |
| Transport Level Marking | C | This IE shall only be provided if it is changed | X | X | - | X | Transport Level Marking |
| Forwarding Policy | C | This IE shall only be provided if it is changed. See NOTE 1. | - | X | X | X | Forwarding Policy |
| Header Enrichment | C | This IE shall only be provided if it is changed | - | X | X | X | Header Enrichment |
| PFCPSMReq-Flags | C | This IE shall be included if at least one of the flags is set to 1.  - SNDEM (Send End Marker Packets): this IE shall be present if the CP function modifies the F-TEID of the downstream node in the Outer Header Creation IE and the CP function requests the UP function to construct and send GTP-U End Marker messages towards the old F-TEID of the downstream node. | X | X | - | X | PFCPSMReq-Flags |
| Linked Traffic Endpoint ID | C | This IE may be present, if it is changed and the UP function indicated support of the PDI optimization feature, (see subclause 8.2.25). When present, it shall identify the Traffic Endpoint ID allocated for this PFCP session to receive the traffic in the reverse direction (see subclause 5.2.3.1). | X | X | - | X | Traffic Endpoint ID |
| NOTE 1: If the Outer Header Creation and Forwarding Policy are present, the UP function shall put the user plane packets in the user plane tunnel by applying Outer Header Creation, after enforcing the required Forwarding Policy. | | | | | | | |

Table 7.5.4.3-3: Update Duplicating Parameters IE in FAR

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update Duplicating Parameters IE Type = 105 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Destination Interface | C | This IE shall only be provided if it is changed.  When present, it shall indicate the destination interface of the outgoing packet. | X | X | - | X | Destination Interface |
| Outer Header Creation | C | This IE shall only be provided if it is changed. See NOTE 1. | X | X | - | X | Outer Header Creation |
| Transport Level Marking | C | This IE shall only be provided if it is changed. | X | X | - | X | Transport Level Marking |
| Forwarding Policy | C | This IE shall only be provided if it is changed. See NOTE 1. | - | X | - | X | Forwarding Policy |
| NOTE 1: If the Outer Header Creation and Forwarding Policy are present, the UP function shall put the user plane packets in the user plane tunnel by applying Outer Header Creation, after enforcing the required Forwarding Policy. | | | | | | | |

Editor's Note: Interception (e.g. Update Duplicating Parameters) needs final confirmation form SA3LI.

#### 7.5.4.4 Update URR IE within PFCP Session Modification Request

The Update URR grouped IE shall be encoded as shown in Figure 7.5.4.4-1.

Table 7.5.4.4-1: Update URR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update URR IE Type = 13 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall uniquely identify the URR among all the URRs configured for that PFCP session | X | X | X | X | URR ID |
| Measurement Method | C | This IE shall be present if the measurement method needs to be modified.  When present, this IE shall indicate the method for measuring the network resources usage, i.e. whether the data volume, duration (i.e. time), combined volume/duration, or event shall be measured. | X | X | X | X | Measurement Method |
| Reporting Triggers | C | This IE shall be present if the reporting triggers needs to be modified.  When present, this IE shall indicate the trigger(s) for reporting network resources usage to the CP function, e.g. periodic reporting or reporting upon reaching a threshold, or envelope closure. | X | X | X | X | Reporting Triggers |
| Measurement Period | C | This IE shall be present if the Measurement Period needs to be modified.  When present, it shall indicate the period for generating and reporting usage reports. | X | X | X | X | Measurement Period |
| Volume Threshold | C | This IE shall be present if the Volume Threshold needs to be modified. When present, it shall indicate the traffic volume value after which the UP function shall report network resources usage to the CP function for this URR. | X | X | X | X | Volume Threshold |
| Volume Quota | C | This IE shall be present if the Volume Quota needs to be modified.  When present, it shall indicate the Volume Quota value. | - | X | X | X | Volume Quota |
| Time Threshold | C | This IE shall be present if the Time Threshold needs to be modified. When present, it shall indicate the time usage after which the UP function shall report network resources usage to the CP function for this URR. | X | X | X | X | Time Threshold |
| Time Quota | C | This IE shall be present if the Time Quota needs to be modified.  When present, it shall indicate the Time Quota value. | - | X | X | X | Time Quota |
| Quota Holding Time | C | This IE shall be present if the Quota Holding Time needs to be modified.  When present, it shall contain the duration of the Quota Holding Time. | - | X | X | X | Quota Holding Time |
| Dropped DL Traffic Threshold | C | This IE shall be present if the Dropped DL Threshold needs to be modified.  When present, it shall contain the threshold of the DL traffic being dropped. | X | - | - | X | Dropped DL Traffic Threshold |
| Monitoring Time | C | This IE shall be present if the Monitoring Time needs to be modified. When present, this IE shall contain the time at which the UP function shall re-apply the volume or time threshold. | X | X | X | X | Monitoring Time |
| Event Information | C | This IE shall be present, if Event Threshold needs to be modified. When present it shall contain the Number of events after which the measurement report shall be generated.  Several IEs with the same IE type may be present to provision multiple Event Information for this URR ID. | - | X | X | X | Event Information |
| Subsequent Volume Threshold | C | This IE shall be present if the Subsequent Volume Threshold needs to be modified and volume-based measurement is used.  When present, it shall indicate the traffic volume value after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Volume Threshold |
| Subsequent Time Threshold | C | This IE shall be present if the Subsequent Time Threshold needs to be modified. When present, it shall indicate the time usage value after which the UP function shall report network resources usage to the CP function for this URR for the period after the Monitoring Time. | X | X | X | X | Subsequent Time Threshold |
| Subsequent Volume Quota | C | This IE shall be present if the Subsequent Volume Quota needs to be modified.  When present, it shall indicate the Volume Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Volume Quota |
| Subsequent Time Quota | C | This IE shall be present if the Subsequent Time Quota needs to be modified.  When present, it shall indicate the Time Quota value which the UP function shall use for this URR for the period after the Monitoring Time. | - | X | X | X | Subsequent Time Quota |
| Inactivity Detection Time | C | This IE shall be present if the Inactivity Detection Time needs to be modified.  When present, it shall indicate the duration of the inactivity period after which time measurement needs to be suspended when no packets are received during this inactivity period. | - | X | X | X | Inactivity Detection Time |
| Linked URR ID | C | This IE shall be present if linked usage reporting is required. When present, this IE shall contain the linked URR ID which is related with this URR (see subclause 5.2.2.4).  Several IEs with the same IE type may be present to represent multiple linked URRs which are related with this URR. | - | X | X | X | Linked URR ID |
| Measurement Information | C | This IE shall be included if any of the following flag is set to 1.  Applicable flags are:  - Inactive Measurement Flag: this flag shall be set to 1 if the measurement shall be paused (inactive). The measurement shall be performed (active) if the bit is set to 0 or if the Measurement Information IE is not present in the Update URR IE.  - Reduced Application Detection Information Flag: this flag may be set to 1, if the Reporting Triggers request to report the start or stop of application, to request the UP function to only report the Application ID in the Application Detection Information, e.g. for envelope reporting. | - | X | - | X | Measurement Information |
| Time Quota Mechanism | C | This IE shall be present if time-based measurement based on CTP or DTP needs to be modified. | - | X | - | - | Time Quota Mechanism |
| Aggregated URRs | C | This IE shall be included if the Aggregated URRs IE needs to be modified. See Table 7.5.2.4-1.  Several IEs with the same IE type may be present to provision multiple aggregated URRs.  When present, this IE shall provide the complete list of the aggregated URRs. | - | X | - |  | Aggregated URRs |
| FAR ID for Quota Action | C | This IE shall be present if the FAR ID for Quota Action IE needs to be modified. This IE may be present if the Volume Quota IE or the Time Quota IE is newly provisioned in the URR and the UP Function indicated support of the Quota Action.  When present, it shall contain the identifier of the substitute FAR the UP function shall apply, for the traffic associated to this URR, when exhausting any of these quotas. See NOTE 1. | - | X | X | X | FAR ID |
| Ethernet Inactivity Timer | C | This IE shall be present if the Ethernet Inactivity Timer needs to be modified. When present, it shall contain the duration of the Ethernet inactivity period. | - | - | - | X | Ethernet Inactivity Timer |
| Additional Monitoring Time | O | This IE shall be present if the additional Monitoring Time needs to be modified. When present, this IE shall contain the time at which the UP function shall re-apply the volume or time threshold/quota. See Table 7.5.2.4-3.  The CP function shall provide the full set of Additional Monitoring Times IE(s).  The UP function shall replace any Additional Monitoring Times IE(s) provisioned earlier by the new set of received IE(s). | X | X | X | X | Additional Monitoring Time |
| NOTE 1: The substitute FAR used when exhausting a Volume Quota or Time Quota may be set to drop the packets or redirect the traffic towards a redirect destination as specified in subclause 5.4.7. | | | | | | | |

#### 7.5.4.5 Update QER IE within PFCP Session Modification Request

The Update QER grouped IE shall be encoded as shown in Figure 7.5.4.5-1.

Table 7.5.4.5-1: Update QER IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update QER IE Type = 14 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| QER ID | M | This IE shall uniquely identify the QER among all the QRs configured for that PFCP session | - | X | X | X | QER ID |
| QER Correlation ID | C | This IE shall be present if the QER correlation ID in this QER needs to be modified.  See NOTE 1. | - | X | - | X | QER Correlation ID |
| Gate Status | C | This IE shall be present if the Gate Status needs to be modified. When present, it shall indicate whether the packets are allowed to be forwarded (the gate is open) or shall be discarded (the gate is closed) in the uplink and/or downlink directions.  See NOTE 1. | - | X | X | X | Gate Status |
| Maximum Bitrate | C | This IE shall be present if an MBR enforcement action applied to packets matching this PDR need to be modified.  When present, this IE shall indicate the uplink and/or downlink maximum bit rate to be enforced for packets matching the PDR.  This IE may be set to the value of:  - the APN-AMBR, for a QER that is referenced by all the PDRs of the non-GBR bearers of a PDN connection;  - the TDF session MBR, for a QER that is referenced by all the PDRs of a TDF session;  - the bearer MBR, for a QER that is referenced by all the PDRs of a bearer;  - the QoS Flow MBR, for a QER that is referenced by all the PDRs of a QoS Flow (for 5GC);  - the SDF MBR, for a QER that is referenced by all the PDRs of a SDF.  See NOTE 1. | - | X | X | X | MBR |
| Guaranteed Bitrate | C | This IE shall be present if a GBR authorization to packets matching this PDR needs to be modified. When present, this IE shall indicate the authorized uplink and/or downlink guaranteed bit rate.  This IE may be set to the value of:  - the aggregate GBR, for a QER that is referenced by all the PDRs of a GBR bearer;  - the QoS Flow GBR, for a QER that is referenced by all the PDRs of a QoS Flow (for 5GC);  - the SDF GBR, for a QER that is referenced by all the PDRs of a SDF.  See NOTE 1. | - | X | X | X | GBR |
| Packet Rate | C | This IE shall be present if a Packet Rate enforcement action (in terms of number of packets per time interval) need to be modified for packets matching this PDR. | - | X | - |  | Packet Rate |
| DL Flow Level Marking | C | This IE shall be set if the DL Flow Level Marking IE needs to be modified.  See NOTE 1. | - | X | X | - | DL Flow Level Marking |
| QoS flow identifier | C | This IE shall be present if it needs to be modified. | - | - | - | X | QFI |
| Reflective QoS | C | This IE shall be present if it needs to be modified. | - | - | - | X | RQI |
| NOTE 1: The IEs which do not need to be modified shall not be included in the Update QER IE. The UP function shall continue to behave according to the values previously received for IEs not present in the Update QER IE. | | | | | | | |

#### 7.5.4.6 Remove PDR IE within PFCP Session Modification Request

The Remove PDR grouped IE shall be encoded as shown in Figure 7.5.4.6-1.

Table 7.5.4.6-1: Remove PDR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove PDR IE Type = 15 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PDR ID | M | This IE shall identify the PDR to be deleted. | X | X | X | X | PDR ID |

#### 7.5.4.7 Remove FAR IE within PFCP Session Modification Request

The Remove FAR grouped IE shall be encoded as shown in Figure 7.5.4.7-1.

Table 7.5.4.7-1: Remove FAR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove FAR IE Type = 16 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| FAR ID | M | This IE shall identify the FAR to be deleted. | X | X | X | X | FAR ID |

#### 7.5.4.8 Remove URR IE within PFCP Session Modification Request

The Remove URR grouped IE shall be encoded as shown in Figure 7.5.4.7-1.

Table 7.5.4.8-1: Remove URR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove URR IE Type = 17 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall identify the URR to be deleted. | X | X | X | X | URR ID |

#### 7.5.4.9 Remove QER IE PFCP Session Modification Request

The Remove QER grouped IE shall be encoded as shown in Figure 7.5.4.9-1.

Table 7.5.4.9-1: Remove QER IE PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove QER IE Type = 18 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| QER ID | M | This IE shall identify the QER to be deleted. | - | X | X | X | QER ID |

#### 7.5.4.10 Query URR IE within PFCP Session Modification Request

The Query URR grouped IE shall be encoded as shown in Figure 7.5.4.10-1.

Table 7.5.4.10-1: Query URR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Query URR IE Type = 77 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall identify the URR being queried. | X | X | X | X | URR ID |

#### 7.5.4.11 Update BAR IE within PFCP Session Modification Request

The Update BAR grouped IE shall be encoded as shown in Figure 7.5.4.11-1.

Table 7.5.4.11-1: Update BAR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update BAR IE Type = 86 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| BAR ID | M | This IE shall identify the BAR Rule to be modified. | X | - | - | X | BAR ID |
| Downlink Data Notification Delay | C | This IE shall be present if the UP function indicated support of the Downlink Data Notification Delay parameter (see subclause 8.2.28) and the Downlink Data Notification Delay needs to be modified.  When present, it shall contain the delay the UP function shall apply between receiving a downlink data packet and notifying the CP function about it, when the Apply Action parameter requests to buffer the packets and notify the CP function. | X | - | - | X | Downlink Data Notification Delay |
| Suggested Buffering Packets Count | C | This IE may be present if the UP Function indicated support of the the feature UDBC.  When present, it shall contain the number of packets that are suggested to be buffered when the Apply Action parameter requests to buffer the packets. The packets that exceed the limit shall be discarded. |  | X | X | X | Suggested Buffering Packets Count |

#### 7.5.4.12 Remove BAR IE within PFCP Session Modification Request

The Remove BAR grouped IE shall be encoded as shown in Figure 7.5.4.12-1.

Table 7.5.4.12-1: Remove BAR IE within PFCP Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove BAR IE Type = 87 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| BAR ID | M | This IE shall identify the BAR to be deleted. | X | - | - | X | BAR ID |

#### 7.5.4.13 Update Traffic Endpoint IE within Sx Session Modification Request

The Update Traffic Endpoint grouped IE shall be encoded as shown in Figure 7.5.4.13-1.

Table 7.5.4.13-1: Update Traffic Endpoint IE within Sx Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 | Update Traffic Endpoint Type = 129 (decimal) | | | | | | |
| Octets 3 and 4 | Length = n | | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Traffic Endpoint ID | M | This IE shall uniquely identify the Traffic Endpoint to be modified for that Sx session. | X | X | X | X | Traffic Endpoint ID |
| Local F-TEID | C | This IE shall be present if it needs to be changed.  The CP function shall set the CHOOSE (CH) bit to 1 if the UP function supports the allocation of F-TEID and the CP function requests the UP function to assign a local F-TEID to the PDR.  See NOTE. | X | - | - | X | F-TEID |
| Network Instance | O | If present, this IE shall identify the Network instance to match for the incoming packet. See NOTE. | X | X | X | X | Network Instance |
| UE IP address | C | This IE shall be present if it needs to be changed.  See NOTE. | - | X | X | X | UE IP address |
| Framed-Route | C | This IE shall be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25) and it needs to be changed. If present, this IE shall describe a framed route.  Several IEs with the same IE type may be present to provision a list of framed routes. | - | X | - | X | Framed-Route |
| Framed-Routing | C | This IE shall be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25) and it needs to be changed. If present, this IE shall describe the framed routing associated to a framed route. | - | X | - | X | Framed-Routing |
| Framed-IPv6-Route | C | This IE shall be present for a DL PDR if the UPF indicated support of Framed Routing (see subclause 8.2.25) and it needs to be changed. If present, this IE shall describe a framed IPv6 route.  Several IEs with the same IE type may be present to provision a list of framed IPv6 routes. | - | X | - | X | Framed-IPv6-Route |
| NOTE: The IEs which do not need to be modified shall not be included in the Update Traffic Endpoint IE. The UP function shall continue to behave according to the values previously received for IEs not present in the Update Traffic Endpoint IE. F-TEID may be changed if the SGW-C has received the "Change F-TEID support Indication" over the S11/S4 interface (for an IDLE state UE initiated TAU/RAU procedure to allow the SGW changing the GTP-U F-TEID). | | | | | | | |

#### 7.5.4.14 Remove Traffic Endpoint IE within Sx Session Modification Request

The Remove Traffic Endpoint grouped IE shall be encoded as shown in Figure 7.5.4.14-1.

Table 7.5.4.14-1: Remove Traffic Endpoint IE within Sx Session Modification Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Remove Traffic Endpoint IE Type = 130 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Traffic Endpoint ID | M | This IE shall identify the Traffic Endpoint to be deleted. | X | X | X | X | Traffic Endpoint ID |

### 7.5.5 PFCP Session Modification Response

#### 7.5.5.1 General

The PFCP Session Modification Response shall be sent over the Sxa, Sxb, Sxc and N4 interface by the UP function to the CP function as a reply to the PFCP Session Modification Request.

Table 7.5.5.1-1: Information Elements in a PFCP Session Modification Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to a conditional or mandatory IE missing or faulty. | X | X | X | X | Offending IE |
| Created PDR | C | This IE shall be present if the cause is set to "success", new PDR(s) were requested to be created and the UP function was requested to allocate the local F-TEID for the PDR(s).  When present, this IE shall contain the PDR information associated to the PFCP session.  See Table 7.5.3-2. | X | X | - | X | Created PDR |
| Load Control Information | O | The UP function may include this IE if it supports the load control feature and the feature is activated in the network.  See Table 7.5.3-3. | X | X | X | X | Load Control Information |
| Overload Control Information | O | During an overload condition, the UP function may include this IE if it supports the overload control feature and the feature is activated in the network. | X | X | X | X | Overload Control Information |
| Usage Report | C | This IE shall be present if:  - the Query URR IE was present or the QAURR flag was set to "1" in the PFCP Session Modification Request,  - traffic usage measurements for that URR are available at the UP function, and  - the UP function decides to return some or all of the requested usage reports in the PFCP Session Modification Response.  This IE shall be also present if:  - a URR or the last PDR associated to a URR has been removed, or if usage measurement has been deactivated via the Inactive Measurement flag,  - non-null traffic usage measurements for that URR are available in the UP function, and  - the UP function decides to return some or all of the related usage reports in the PFCP Session Modification Response (see subclause 5.2.2.3.1).  Several IEs within the same IE type may be present to represent a list of Usage Reports. | X | X | X | X | Usage Report |
| Failed Rule ID | C | This IE shall be included if the Cause IE indicates a rejection due to a rule creation or modification failure. | X | X | X | X | Failed Rule ID |
| Additional Usage Reports Information | C | This IE shall be included if the Query URR IE was present or the QAURR flag was set to "1" in the PFCP Session Modification Request, and usage reports need to be sent in additional PFCP Session Report Request messages (see subclause 5.2.2.3.1).  When present, this IE shall either indicate that additional usage reports will follow, or indicate the total number of usage reports that need to be sent in PFCP Session Report Request messages. | X | X | X | X | Additional Usage Reports Information |
| Created/Updated Traffic Endpoint | C | This IE shall be present if the cause is set to "success", Traffic Endpoint(s) were requested to be created or updated, and the UP function was requested to allocate the local F-TEID for the Traffic Endpoint(s).  When present, this IE shall contain the Traffic Endpoint information associated to the PFCP session.  See Table 7.5.3.5-1. | X | X | - | X | Created Traffic Endpoint |

#### 7.5.5.2 Usage Report IE within PFCP Session Modification Response

The Usage Report grouped IE shall be encoded as shown in Figure 7.5.5.2-1.

Table 7.5.5.2-1: Usage Report IE within PFCP Session Modification Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Usage Report IE Type = 78 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall identify the URR for which usage is reported. | X | X | X | X | URR ID |
| UR-SEQN | M | This IE shall uniquely identify the Usage Report for the URR (see subclause 5.2.2.3). | X | X | X | X | UR-SEQN |
| Usage Report Trigger | M | This IE shall identify the trigger for this report. | X | X | X | X | Usage Report Trigger |
| Start Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or 'MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was started. | X | X | X | X | Start Time |
| End Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or 'MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was generated. | X | X | X | X | End Time |
| Volume Measurement | C | This IE shall be present if a volume measurement needs to be reported. | X | X | X | X | Volume Measurement |
| Duration Measurement | C | This IE shall be present if a duration measurement needs to be reported. | X | X | X | X | Duration Measurement |
| Time of First Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of First Packet |
| Time of Last Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of Last Packet |
| Usage Information | C | This IE shall be present if the UP function reports Usage Reports before and after a Monitoring Time or before and after QoS enforcement. When present, it shall indicate whether the usage is reported for the period before or after that time, or before or after QoS enforcement. | X | X | X | X | Usage Information |
| Query URR Reference | C | This IE shall be present if this usage report is sent as a result of a query URR received in an PFCP Session Modification Request and the Query URR Reference IE was present in the PFCP Session Modification Request.  When present, it shall be set to the Query URR Reference value received in the PFCP Session Modification Request. | X | X | X | X | Query URR Reference |
| Ethernet Traffic Information | C | This IE shall be present if Ethernet Traffic Information needs to be reported. | - | - | - | X | Ethernet Traffic Information |

### 7.5.6 PFCP Session Deletion Request

The PFCP Session Deletion Request shall be sent over the Sxa, Sxb, Sxc and N4 interface by the CP function to request the UP function to delete the PFCP session.

Table 7.5.6-1: Information Elements in a PFCP Session Deletion Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
|  |  |  |  |  |  |  |  |

### 7.5.7 PFCP Session Deletion Response

#### 7.5.7.1 General

The PFCP Session Deletion Response shall be sent over the Sxa, Sxb, Sxc and N4 interface by the UP function to the CP function as a reply to the PFCP Session Deletion Request.

Table 7.5.7.1-1: Information Elements in a PFCP Session Deletion Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to an conditional or mandatory IE missing or faulty. | X | X | X | X | Offending IE |
| Load Control Information | O | The UP function may include this IE if it supports the load control feature and the feature is activated in the network.  See Table 7.5.3.3-1. | X | X | X | X | Load Control Information |
| Overload Control Information | O | During an overload condition, the UP function may include this IE if it supports the overload control feature and the feature is activated in the network.  See Table 7.5.3.4-1. | X | X | X | X | Overload Control Information |
| Usage Report | C | This IE shall be present if a URR had been provisioned in the UP function for the PFCP session being deleted and traffic usage measurements for that URR are available at the UP function.  Several IEs within the same IE type may be present to represent a list of Usage Reports. | X | X | X | X | Usage Report |

#### 7.5.7.2 Usage Report IE within PFCP Session Deletion Response

The Usage Report grouped IE shall be encoded as shown in Figure 7.5.7.2-1.

Table 7.5.7.2-1: Usage Report IE within PFCP Session Deletion Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Usage Report IE Type = 79 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall identify the URR for which usage is reported. | X | X | X | X | URR ID |
| UR-SEQN | M | This IE shall uniquely identify the Usage Report for the URR (see subclause 5.2.2.3). | X | X | X | X | UR-SEQN |
| Usage Report Trigger | M | This IE shall identify the trigger for this report. | X | X | X | X | Usage Report Trigger |
| Start Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or 'MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was started. | X | X | X | X | Start Time |
| End Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or 'MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was generated. | X | X | X | X | End Time |
| Volume Measurement | C | This IE shall be present if a volume needs to be reported. | X | X | X | X | Volume Measurement |
| Duration Measurement | C | This IE shall be present if a duration measurement needs to be reported. | X | X | X | X | Duration Measurement |
| Time of First Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of First Packet |
| Time of Last Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of Last Packet |
| Usage Information | C | This IE shall be present if the UP function reports Usage Reports before and after a Monitoring Time, or before and after QoS enforcement. When present, it shall indicate whether the usage is reported for the period before or after that time, or before or after QoS enforcement. | X | X | X | X | Usage Information |
| Ethernet Traffic Information | C | This IE shall be present if Ethernet Traffic Information needs to be reported. See Table 7.5.8.3-3. | - | - | - | X | Ethernet Traffic Information |

### 7.5.8 PFCP Session Report Request

#### 7.5.8.1 General

The PFCP Session Report Request shall be sent over the Sxa, Sxb, Sxc and N4 interface by the UP function to report information related to an PFCP session to the CP function.

Table 7.5.8-1: Information Elements in a PFCP Session Report Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Report Type | M | This IE shall indicate the type of the report. | X | X | X | X | Report Type |
| Downlink Data Report | C | This IE shall be present if the Report Type indicates a Downlink Data Report. | X | - | - | X | Downlink Data Report |
| Usage Report | C | This IE shall be present if the Report Type indicates a Usage Report.  Several IEs within the same IE type may be present to represent a list of Usage Reports. | X | X | X | X | Usage Report |
| Error Indication Report | C | This IE shall be present if the Report Type indicates an Error Indication Report. | X | X | - | X | Error Indication Report |
| Load Control Information | O | The UP function may include this IE if it supports the load control feature and the feature is activated in the network.  See Table 7.5.3.3-1. | X | X | X | X | Load Control Information |
| Overload Control Information | O | During an overload condition, the UP function may include this IE if it supports the overload control feature and the feature is activated in the network.  See Table 7.5.3.4-1. | X | X | X | X | Overload Control Information |
| Additional Usage Reports Information | C | This IE shall be included in one additional PFCP Session Report Request message, if the PFCP Session Modification Response indicated that more reports would follow (i.e. if the AURI flag was set to 1) (see subclause 5.2.2.3.1).  When present, this IE shall indicate the total number of usage reports that need to be sent in PFCP Session Report Request messages. | X | X | X | X | Additional Usage Reports Information |

#### 7.5.8.2 Downlink Data Report IE within PFCP Session Report Request

The Downlink Data Report grouped IE shall be encoded as shown in Figure 7.5.8.2-1.

Table 7.5.8.2-1: Downlink Data Report IE within PFCP Session Report Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Downlink Data Report IE Type = 83 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| PDR ID | M | This IE shall identify the PDR for which downlink data packets have been received at the UP function.  More than one IE with this type may be included to represent multiple PDRs having received downlink data packets. | X | - | - | X | PDR ID |
| Downlink Data Service Information | C | This IE shall be included for an PFCP session with an IP PDN type, if the UP function supports the Paging Policy Differentiation feature (see subclause 4.9 of 3GPP TS 23.401 [14]).  When present, for each PDR and for each packet that triggers a Downlink Data Notification, the UP function 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 [13]).  For 5GC, this IE shall also be included over N4, for each PDR and for each packet that triggers a Downlink Data Notification, if the QFI of the downlink data packet is available.  One IE with this type shall be included per PDR ID reported in the message. When multiple PDR ID IEs are present in the message, the Downlink Data Service Information IEs shall be reported according to the order of the PDR ID IEs. | X | - | - | X | Downlink Data Service Information |

#### 7.5.8.3 Usage Report IE within PFCP Session Report Request

The Usage Report grouped IE shall be encoded as shown in Figure 7.5.8.3-1.

Table 7.5.8.3-1: Usage Report IE within PFCP Session Report Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Usage Report IE Type = 80 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| URR ID | M | This IE shall identify the URR for which usage is reported. | X | X | X | X | URR ID |
| UR-SEQN | M | This IE shall uniquely identify the Usage Report for the URR (see subclause 5.2.2.3). | X | X | X | X | UR-SEQN |
| Usage Report Trigger | M | This IE shall identify the trigger for this report. | X | X | X | X | Usage Report Trigger |
| Start Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or 'MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was started. | X | X | X | X | Start Time |
| End Time | C | This IE shall be present, except if the Usage Report Trigger indicates 'Start of Traffic', 'Stop of Traffic' or ' MAC Addresses Reporting'.  When present, this IE shall provide the timestamp when the collection of the information in this report was generated. | X | X | X | X | End Time |
| Volume Measurement | C | This IE shall be present if a volume measurement needs to be reported. | X | X | X | X | Volume Measurement |
| Duration Measurement | C | This IE shall be present if a duration measurement needs to be reported. | X | X | X | X | Duration Measurement |
| Application Detection Information | C | This IE shall be present if application detection information needs to be reported. | - | X | X | X | Application Detection Information |
| UE IP address | C | This IE shall be present if the start or stop of an application has been detected and no UE IP address was provisioned in the PDI. See NOTE 1. | - | - | X | X | UE IP address |
| Network Instance | C | This IE shall be present if the start or stop of an application has been detected, no UE IP address was provisioned in the PDI and multiple PDNs with overlapping IP addresses are used in the UP function. See NOTE 1. | - | - | X | X | Network Instance |
| Time of First Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of First Packet |
| Time of Last Packet | C | This IE shall be present if available for this URR. | X | X | X | X | Time of Last Packet |
| Usage Information | C | This IE shall be present if the UP function reports Usage Reports before and after a Monitoring Time, or before and after QoS enforcement. When present, it shall indicate whether the usage is reported for the period before or after that time, or before or after QoS enforcement. | X | X | X | X | Usage Information |
| Query URR Reference | C | This IE shall be present if this usage report is sent as a result of a query URR received in an PFCP Session Modification Request and the Query URR Reference IE was present in the PFCP Session Modification Request.  When present, it shall be set to the Query URR Reference value received in the PFCP Session Modification Request. | X | X | X | X | Query URR Reference |
| Event Reporting | C | This IE shall be present, if the report is related to an event.  Several IEs with the same IE type may be present to report multiple Events for this URR ID. | - | X | X | X | Event Reporting |
| Ethernet Traffic Information | C | This IE shall be present if Ethernet Traffic Information needs to be reported. See Table 7.5.8.3-3. | - | - | - | X | Ethernet Traffic Information |
| NOTE 1: This is the case for unsolicited application reporting by the TDF. The Network instance is required when the UE IP address cannot be used to determine the corresponding PDN connection. | | | | | | | |

Table 7.5.8.3-2: Application Detection Information IE within Usage Report IE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Application Detection Information IE Type = 68 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Application ID | M | This IE shall identify the Application ID for which a start or stop of traffic is reported. | - | X | X | X | Application ID |
| Application Instance ID | C | When present, this IE shall identify the Application Instance Identifier for which a start or stop of traffic is reported. It shall be present, when reporting the start of an application, if the Reduced Application Detection Information flag was not set in the Measurement Information and if the flow information for the detected application is deducible. It shall be present, when reporting the stop of an application, if the Reduced Application Detection Information flag was not set in the Measurement Information and if it was provided when reporting the start of the application. | - | X | X | X | Application Instance ID |
| Flow Information | C | When present, this IE shall contain the flow information for the detected application. It shall be present, when reporting the start of an application, if the Reduced Application Detection Information flag was not set in the Measurement Information and if the flow information for the detected application is deducible. | - | X | X | X | Flow Information |

Table 7.5.8.3-2A: Event Reporting IE within Usage Report IE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Application Detection Information IE Type = 149 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Event ID | M | This IE shall identify the Event which triggered the report. | - | X | X | X | Event ID |

Table 7.5.8.3-3: Ethernet Traffic Information IE within Usage Report IE

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Ethernet Traffic Information IE Type = 143 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| MAC Addresses Detected | C | This IE shall be present if one or more new MAC addresses have been detected.  When present, it shall identify the MAC (Ethernet) addresses newly detected as source address of frames sent UL by the UE. | - | - | - | X | MAC Addresses Detected |
| MAC Addresses Removed | C | This IE shall be present if one or more new MAC addresses have been removed.  When present, it shall identify the MAC (Ethernet) addresses that have been inactive for a duration exceeding the Ethernet inactivity Timer. | - | - | - | X | MAC Addresses Removed |

#### 7.5.8.4 Error Indication Report IE within PFCP Session Report Request

The Error Indication Report grouped IE shall be encoded as shown in Figure 7.5.8.4-1.

Table 7.5.8.4-1: Error Indication Report IE within PFCP Session Report Request

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Error Indication Report IE Type = 99 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Remote F-TEID | M | This IE shall identify the remote F-TEID of the GTP-U bearer for which an Error Indication has been received at the UP function.  More than one IE with this type may be included to represent multiple remote F-TEID for which an Error Indication has been received. | X | X | - | X | F-TEID |

### 7.5.9 PFCP Session Report Response

#### 7.5.9.1 General

The PFCP Session Report Response shall be sent over the Sxa, Sxb, Sxc and N4 interface by the CP function to the UP function as a reply to the PFCP Session Report Request.

Table 7.5.9.1-1: Information Elements in a PFCP Session Report Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| Cause | M | This IE shall indicate the acceptance or the rejection of the corresponding request message. | X | X | X | X | Cause |
| Offending IE | C | This IE shall be included if the rejection is due to an conditional or mandatory IE missing or faulty. | X | X | X | X | Offending IE |
| Update BAR | C | This IE shall be present if a BAR previously created for the PFCP session needs to be modified.  A previously created BAR that is not modified shall not be included.  See Table 7.5.9.2-1. | X | - | - | X | Update BAR |
| SxSRRsp-Flags | C | This IE shall be included if at least one of the flags is set to 1.  - DROBU (Drop Buffered Packets): the CP function shall set this flag if the UP function needs to drop the packets currently buffered for this PFCP session (see NOTE 1). | X | - | - | X | SxSRRsp-Flags |
| NOTE 1: The CP function may request the UP function to drop the packets currently buffered for the PFCP session, when buffering is performed in the UP function, upon receipt of an PFCP Session Report Request notifying the CP function about the arrival of downlink data packets for which the CP function decides to throttle the corresponding Downlink Data Notification message over S11/S4 and. See subclause 5.9.3 of 3GPP TS 23.214 [2]. | | | | | | | |

#### 7.5.9.2 Update BAR IE within PFCP Session Report Response

The Update BAR grouped IE shall be encoded as shown in Figure 7.5.9.2-1.

Table 7.5.9.2-1: Update BAR IE in PFCP Session Report Response

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Octet 1 and 2 |  | Update BAR IE Type = 12 (decimal) | | | | | |
| Octets 3 and 4 |  | Length = n | | | | | |
| Information elements | P | Condition / Comment | Appl. | | | | IE Type |
| Sxa | Sxb | Sxc | N4 |
| BAR ID | M | This IE shall identify the BAR Rule to be modified. | X | - | - | X | BAR ID |
| Downlink Data Notification Delay | C | This IE shall be present if the UP function indicated support of the Downlink Data Notification Delay parameter (see subclause 8.2.25) and the Downlink Data Notification Delay needs to be modified.  When present, it shall contain the delay the UP function shall apply between receiving a downlink data packet and notifying the CP function about it, when the Apply Action parameter requests to buffer the packets and notify the CP function. | X | - | - | X | Downlink Data Notification Delay |
| DL Buffering Duration | C | This IE shall be present if the UP function indicated support of the DL Buffering Duration parameter (see subclause 8.2.25) and extended buffering of downlink data packet is required in the UP function.  When present, this IE shall indicate the duration during which the UP function shall buffer the downlink data packets without sending any further notification to the CP function about the arrival of DL data packets. | X | - | - | X | DL Buffering Duration |
| DL Buffering Suggested Packet Count | O | This IE may be present if extended buffering of downlink data packet is required in the UP function.  When present, this IE shall indicate the maximum number of downlink data packets suggested to be buffered in the UP function. | X | - | - | X | DL Buffering Suggested Packet Count |
| Suggested Buffering Packets Count | C | This IE may be present if the UP Function indicated support of the feature UDBC.  When present, it shall contain the number of packets that are suggested to be buffered when the Apply Action parameter requests to buffer the packets. The packets that exceed the limit shall be discarded. |  | X | X | X | Suggested Buffering Packets Count |
| NOTE 1: If the Apply Action requests the UP function to buffer and notify the CP function and the DL Buffering Duration is set, the UP function shall not notify the CP function for the duration indicated by the DL Buffering Duration. | | | | | | | |