**3GPP TSG-RAN WG3 Meeting #127bis R3-252363**

**Wuhan, China, 7th – 11th April 2025**

**Agenda item: 21.3**

**Source: NEC, Nokia, Nokia Shanghai Bell, CMCC, Huawei, CATT**

**Title: (TP to BL CR for TS 38.413) Support of PDU set based QoS handling enhancement**

**Document for: Discussion and Decision**

# 1 Introduction

This TP proposes NGAP enhancements to support DL PDU Set marking without PDU Set QoS, and Alternative PDU Set QoS with PSDB and PSER

* Add *DL PDU Set Information Marking Support Indication* IE in *QoS Flow Level QoS Parameters* IE.
* Add *PDU Set Delay Budget Downlink* IE, *PDU Set Delay Budget Uplink* IE, *PDU Set Error Rate Downlink* IE, and *PDU Set Error Rate Uplink* IE in *Alternative QoS Parameters Set List* IE.
* Add new codepoint in *Notification Cause* IE.

# TP to TS 38.413 BL CR to support DL PDU Set marking without PDU Set QoS, and Alternative PDU Set QoS with PSDB and PSER

***-----------------Start of the Changes-------------------***

### 8.2.1 PDU Session Resource Setup

#### 8.2.1.1 General

The purpose of the PDU Session Resource Setup procedure is to assign resources on Uu and NG-U for one or several PDU sessions and the corresponding QoS flows, and to setup corresponding DRBs for a given UE. The procedure uses UE-associated signalling.

#### 8.2.1.2 Successful Operation

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

If the *PDU Set QoS Parameters* IE or the *DL PDU Set Information Marking Support Indication* IE is included in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall, if supported, report in the PDU SESSION RESOURCE SETUP RESPONSE message the *PDU Set based Handling Indicator* IE in the *PDU Session Resource Setup Response Transfer* IE. If the *PDU Set based Handling Indicator* IE is included in the *PDU Session Resource Setup Response Transfer* IE in the PDU SESSION RESOURCE SETUP RESPONSE message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

***-----------------Next Changes-------------------***

### 8.2.3 PDU Session Resource Modify

#### 8.2.3.1 General

The purpose of the PDU Session Resource Modify procedure is to enable configuration modifications of already established PDU session(s) for a given UE. It is also to enable the setup, modification and release of the QoS flow for already established PDU session(s). The procedure uses UE-associated signalling.

#### 8.2.3.2 Successful Operation

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

If the *PDU Set QoS Parameters* IE or the *DL PDU Set Information Marking Support Indication* IE is included in the PDU SESSION RESOURCE MODIFY REQUEST message, the NG-RAN node shall, if supported, report in the PDU SESSION RESOURCE MODIFY RESPONSE message the *PDU Set based Handling Indicator* IE in the *PDU Session Resource Modify Response Transfer* IE. If the *PDU Set based Handling Indicator* IE is included in the *PDU Session Resource Modify Response Transfer* IE in the PDU SESSION RESOURCE MODIFY RESPONSE message, the SMF shall, if supported, handle this information as specified in TS 23.501 [9].

***-----------------Next Changes-------------------***

### 8.4.2 Handover Resource Allocation

#### 8.4.2.1 General

The purpose of the Handover Resource Allocation procedure is to reserve resources at the target NG-RAN node for the handover of a UE. The procedure uses UE-associated signalling.

#### 8.4.2.2 Successful Operation

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

Upon receiving the *PDU Session Resource Setup List* IE contained in the HANDOVER REQUEST message and the HANDOVER REQUEST message does not contain the *No PDU Session Indication* IE, the target NG-RAN node shall behave the same as defined in the PDU Session Resource Setup procedure. The target NG-RAN node shall report to the AMF in the HANDOVER REQUEST ACKNOWLEDGE message the result for each PDU session resource requested to be setup. In particular, for each PDU session resource successfully setup, it shall include the *Handover Request Acknowledge Transfer* IE containing the following information:

- The list of QoS flows which have been successfully established in the *QoS Flow Setup Response List* IE.

- The *Data Forwarding Accepted* IE if the data forwarding for the QoS flow is accepted.

- The list of QoS flows which have failed to be established, if any, in the *QoS Flow Failed to Setup List* IE.

- The UP transport layer information to be used for the PDU session.

- The security result associated to the PDU session.

- The redundant UP transport layer information to be used for the redundant transmission for the PDU session.

- The PDU Set based Handling Indicator if the HANDOVER REQUEST message includes the *PDU Set QoS Parameters* IE or the *DL PDU Set Information Marking Support Indication* IE.

- The ECN Marking or Congestion Information Reporting Status if the HANDOVER REQUEST message includes the *ECN Marking or Congestion Information Reporting Request* IE.

***-----------------Next Changes-------------------***

#### 9.3.1.12 QoS Flow Level QoS Parameters

This IE defines the QoS parameters to be applied to a QoS flow.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| CHOICE *QoS Characteristics* | M |  |  |  | - |  |
| *>Non-dynamic 5QI* |  |  |  |  |  |  |
| >>Non Dynamic 5QI Descriptor | M |  | 9.3.1.28 |  | - |  |
| *>Dynamic 5QI* |  |  |  |  |  |  |
| >>Dynamic 5QI Descriptor | M |  | 9.3.1.18 |  | - |  |
| Allocation and Retention Priority | M |  | 9.3.1.19 |  | - |  |
| GBR QoS Flow Information | O |  | 9.3.1.10 | This IE shall be present for GBR QoS flows and is ignored otherwise. | - |  |
| Reflective QoS Attribute | O |  | ENUMERATED (subject to, …) | Details in TS 23.501 [9]. This IE may be present in case of Non-GBR QoS flows and is ignored otherwise. | - |  |
| Additional QoS Flow Information | O |  | ENUMERATED (more likely, …) | This IE indicates that traffic for this QoS flow is likely to appear more often than traffic for other flows established for the PDU session.This IE may be present in case of Non-GBR QoS flows and is ignored otherwise. | - |  |
| QoS Monitoring Request | O |  | ENUMERATED (UL, DL, Both, …, stop) | Indicates to measure UL, or DL, or both UL/DL delays for the associated QoS flow or stop the corresponding QoS monitoring. | YES | ignore |
| QoS Monitoring Reporting Frequency | O |  | INTEGER (1.. 1800, …) | Indicates the reporting frequency for RAN part delay for QoS monitoring.Units: second | YES | ignore |
| **PDU Set QoS Parameters** |  | *0..1* |  |  | YES | ignore |
| >UL PDU Set QoS Information | O |  | PDU Set QoS Information9.3.1.264 |  | - |  |
| >DL PDU Set QoS Information | O |  | PDU Set QoS Information9.3.1.264 |  | - |  |
| DL PDU Set Information Marking Support Indication | O |  | ENUMERATED (true, …) |  | YES | ignore |

***-----------------Next Changes-------------------***

#### 9.3.1.151 Alternative QoS Parameters Set List

This IE contains alternative sets of QoS parameters which the NG-RAN node can indicate to be fulfilled when notification control is enabled and it cannot fulfil the requested list of QoS parameters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **Alternative QoS Parameters Set Item** |  | *1..<maxnoofQoSparaSets>* |  |  |  |  |
| >Alternative QoS Parameters Set Index | M |  | 9.3.1.152 |  | - |  |
| >Guaranteed Flow Bit Rate Downlink | O |  | Bit Rate 9.3.1.4 |  | - |  |
| >Guaranteed Flow Bit Rate Uplink | O |  | Bit Rate 9.3.1.4 |  | - |  |
| >Packet Delay Budget  | O |  | 9.3.1.80 |  | - |  |
| >Packet Error Rate  | O |  | 9.3.1.81 |  | - |  |
| >Maximum Data Burst Volume  | O |  | 9.3.1.83 | Maximum Data Burst Volume is specified in TS 23.501 [9]. This IE is included if the *Delay Critical* IE is set to "delay critical" and is ignored otherwise. | YES | ignore |
| >PDU Set Delay Budget Downlink | O |  | 9.3.1.135 |  | - |  |
| >PDU Set Delay Budget Uplink | O |  | 9.3.1.135 |  | - |  |
| >PDU Set Error Rate Downlink | O |  | 9.3.1.81 |  | - |  |
| >PDU Set Error Rate Uplink | O |  | 9.3.1.81 |  | - |  |

***-----------------Next Changes-------------------***

#### 9.3.4.5 PDU Session Resource Notify Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **QoS Flow Notify List** |  | *0..1* |  |  | - |  |
| **>QoS Flow Notify Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Notification Cause | M |  | ENUMERATED (fullfilled, not fulfilled, …, not fulfilled DL, not fulfilled UL) |  | - |  |
| >>Current QoS Parameters Set Index | O |  | Alternative QoS Parameters Set Notify Index9.3.1.153 | Index to the currently fulfilled alternative QoS parameters set. Value 0 indicates that NG-RAN cannot even fulfil the lowest alternative parameters set. | YES | Ignore |
| >>TSC Traffic Characteristics Feedback | O |  | 9.3.1.257 |  | YES | ignore |
| QoS Flow Released List  | O |  | QoS Flow List with Cause9.3.1.13 |  | - |  |
| Secondary RAT Usage Information | O |  | 9.3.1.114 |  | YES | ignore |
| **QoS Flow Feedback List** |  | *0..1* |  |  | YES | ignore |
| **>QoS Flow Feedback Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Update Feedback  | O |  | BIT STRING {CN PDB DL(0),CN PDB UL(1)}(SIZE(8, …)) | Each position in the bitmap represents a QoS parameter. If a bit is set to "1", the respective parameter was not updated.If a bit is set to "0", the respective parameter was successfully updated.Bits 2-7 reserved for future use. | - |  |
| >>CN Packet Delay Budget Downlink | O |  | Extended Packet Delay Budget9.3.1.135 | Indicates when the packet delay budget downlink was not updated in path switch that NG-RAN can offer this value | - |  |
| >>CN Packet Delay Budget Uplink | O |  | Extended Packet Delay Budget9.3.1.135 | Indicates when the packet delay budget uplink was not updated in path switch that NG-RAN can offer this value | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |

***-----------------Next Changes-------------------***

### 9.4.5 Information Element Definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Information Element Definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NGAP-IEs {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-Access (22) modules (3) ngap (1) version1 (1) ngap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

 id-AdditionalDLForwardingUPTNLInformation,

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

 id-QoERVQoEReportingPaths,

 id-UserLocationInformationN3IWF-without-PortNumber,

 id-PduSetDelayBudgetDownlink,

 id-PduSetDelayBudgetUplink,

 id-PduSetErrorRateDownlink,

 id-PduSetErrorRateUplink,

 id-DLPDUSetInformationMarkingSupportIndication,

 maxnoofAllowedAreas,

 maxnoofAllowedCAGsperPLMN,

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

AlternativeQoSParaSetItem ::= SEQUENCE {

 alternativeQoSParaSetIndex AlternativeQoSParaSetIndex,

 guaranteedFlowBitRateDL BitRate OPTIONAL,

 guaranteedFlowBitRateUL BitRate OPTIONAL,

 packetDelayBudget PacketDelayBudget OPTIONAL,

 packetErrorRate PacketErrorRate OPTIONAL,

 iE-Extensions ProtocolExtensionContainer { {AlternativeQoSParaSetItem-ExtIEs} } OPTIONAL,

 ...

}

AlternativeQoSParaSetItem-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 { ID id-MaximumDataBurstVolume CRITICALITY ignore EXTENSION MaximumDataBurstVolume PRESENCE optional }|

 { ID id-PduSetDelayBudgetDownlink CRITICALITY ignore EXTENSION ExtendedPacketDelayBudget PRESENCE optional }|

 { ID id-PduSetDelayBudgetUplink CRITICALITY ignore EXTENSION ExtendedPacketDelayBudget PRESENCE optional }|

 { ID id-PduSetErrorRateDownlink CRITICALITY ignore EXTENSION PacketErrorRate PRESENCE optional }|

 { ID id-PduSetErrorRateUplink CRITICALITY ignore EXTENSION PacketErrorRate PRESENCE optional },

 ...

}

AssistanceInformationQoE-Meas ::= INTEGER (1..16, ...)

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

DL-CP-SecurityInformation ::= SEQUENCE {

 dl-NAS-MAC DL-NAS-MAC,

 iE-Extensions ProtocolExtensionContainer { { DL-CP-SecurityInformation-ExtIEs} } OPTIONAL,

 ...

}

DL-CP-SecurityInformation-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 ...

}

DL-Signalling ::= ENUMERATED {true, ...}

DL-NAS-MAC ::= BIT STRING (SIZE (16))

DLForwarding ::= ENUMERATED {

 dl-forwarding-proposed,

 ...

}

DL-NGU-TNLInformationReused ::= ENUMERATED {

 true,

 ...

}

DLPDUSetInformationMarkingSupportIndication ::= ENUMERATED {true, ...}

DirectForwardingPathAvailability ::= ENUMERATED {

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

NotAllowedTACs ::= SEQUENCE (SIZE(1..maxnoofAllowedAreas)) OF TAC

NotificationCause ::= ENUMERATED {

 fulfilled,

 not-fulfilled,

 ...,

 not-fulfilled-DL,

 not-fulfilled-UL

}

NotificationControl ::= ENUMERATED {

 notification-requested,

 ...

}

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

QosFlowLevelQosParameters ::= SEQUENCE {

 qosCharacteristics QosCharacteristics,

 allocationAndRetentionPriority AllocationAndRetentionPriority,

 gBR-QosInformation GBR-QosInformation OPTIONAL,

 reflectiveQosAttribute ReflectiveQosAttribute OPTIONAL,

 additionalQosFlowInformation AdditionalQosFlowInformation OPTIONAL,

 iE-Extensions ProtocolExtensionContainer { {QosFlowLevelQosParameters-ExtIEs} } OPTIONAL,

 ...

}

QosFlowLevelQosParameters-ExtIEs NGAP-PROTOCOL-EXTENSION ::= {

 {ID id-QosMonitoringRequest CRITICALITY ignore EXTENSION QosMonitoringRequest PRESENCE optional}|

 {ID id-QosMonitoringReportingFrequency CRITICALITY ignore EXTENSION QosMonitoringReportingFrequency PRESENCE optional}|

 {ID id-PDUsetQoSParameters CRITICALITY ignore EXTENSION PDUsetQoSParameters PRESENCE optional}|

 {ID id-DLPDUSetInformationMarkingSupportIndication CRITICALITY ignore EXTENSION DLPDUSetInformationMarkingSupportIndication PRESENCE optional },

 ...

}

***-----------------Next Changes-------------------***

### 9.4.7 Constant Definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- Constant definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

<<<<<<<<<<<<<<<<<<<< Unaffected part is skipped >>>>>>>>>>>>>>>>>>>>

 id-UserLocationInformationN3IWF-without-PortNumber ProtocolIE-ID ::= 439

 id-AUN3DeviceAccessInfo ProtocolIE-ID ::= 440

 id-PduSetDelayBudgetDownlink ProtocolIE-ID ::= a1

 id-PduSetDelayBudgetUplink ProtocolIE-ID ::= a2 id-PduSetErrorRateDownlink ProtocolIE-ID ::= a3

 id-PduSetErrorRateUplink ProtocolIE-ID ::= a4

 id-DLPDUSetInformationMarkingSupportIndication ProtocolIE-ID ::= a5

END

-- ASN1STOP

***-----------------End of the Changes-------------------***