3GPP TSG-RAN WG3 #121 R3-234652

21st – 25th Aug 2023

Toulouse, France

**Agenda item: 25.2**

**Source: Nokia, Nokia Shanghai Bell**

**Title: (TP for TS38.413) Support for NR XR**

**Document for: Discussion & decision**

# 1 Introduction

This contribution proposes the TP for TS38.413 to support NR XR, including following

**Add the PDU Set QoS Parameters in the QoS Flow Level QoS Parameters IE over NGAP, XnAP, F1AP and E1AP.**

**The PDU Set QoS parameters includes:**

* **PDU Set Delay Budget (PSDB).**
* **PDU Set Error Rate (PSER).**
* **PDU Set Integrated Handling Information (PSIHI).**

**Enhance NGAP TSCAI to include the N6 Jitter information associated with DL Periodicity, and clarify TSCAI can also be used for non-GBR.**

**Enhance XnAP/F1AP/E1AP TSCAI to include the N6 Jitter information associated with DL Periodicity.**

**Proposal 1: Agree the TP**

# References

1. R3-234613, Summary of Offline Discussion on CB: # R18XR

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### 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



Figure 8.2.1.2-1: PDU session resource setup: successful operation

The AMF initiates the procedure by sending a PDU SESSION RESOURCE SETUP REQUEST message to the NG-RAN node.

\*\* Unchanged text skipped \*\*

For each QoS flow which has been successfully established, if the *QoS Monitoring Request* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall store this information, and, if supported, perform delay measurement and QoS monitoring, as specified in TS 23.501 [9]. If the *QoS Monitoring Reporting Frequency* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall store this information and, if supported, use it for RAN part delay reporting.

For each QoS flow requested to be setup, if the *PDU Set QoS Parameters* IE was included in the *QoS Flow Level QoS Parameters* IE contained in the PDU SESSION RESOURCE SETUP REQUEST message, the NG-RAN node shall, if supported, shall store the received PDU Set QoS Parameters in the UE context and use it as specified in TS 23.501 [9]. For each QoS flow requested to be setup the NG-RAN node shall take into account the received *QoS Flow Level QoS Parameters* IE. For each QoS flow the NG-RAN node shall establish or modify the resources according to the values of the *Allocation and Retention Priority* IE (priority level and pre-emption indicators) and the resource situation as follows:

\*\* Unchanged text skipped \*\*

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### 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



Figure 8.2.3.2-1: PDU session resource modify: successful operation

The AMF initiates the procedure by sending a PDU SESSION RESOURCE MODIFY REQUEST message to the NG-RAN node.

\*\* Unchanged text skipped \*\*

For each PDU session included in the *PDU Session Resource Modify Request List* IE:

- For each QoS flow included in the *QoS Flow Add or Modify Request List* IE, based on the *QoS Flow Level QoS Parameters* IE, the NG-RAN node may establish, modify or release the DRB configuration and may change allocation of resources on NG or Uu accordingly. The NG-RAN node shall associate each QoS flow accepted to setup or modify which is not associated with an MBS QoS flow with a DRB of the PDU session. The associated DRB for the QoS flow accepted to modify may not change. If a *PDU Set QoS Parameters* IE is received, the NG-RAN node shall, if supported, store the received PDU Set QoS Parameters in the UE context and use it as specified in TS 23.501 [9]. - For each QoS flow, if the *Redundant QoS Flow Indicator* IE is included, the NG-RAN node shall, if supported, store it and consider it for the redundant transmission as specified in TS 23.501 [9].

\*\* Unchanged text skipped \*\*

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### 8.3.1 Initial Context Setup

#### 8.3.1.1 General

The purpose of the Initial Context Setup procedure is to establish the necessary overall initial UE context at the NG-RAN node, when required, including PDU session context, the Security Key, Mobility Restriction List, UE Radio Capability and UE Security Capabilities, etc. The AMF may initiate the Initial Context Setup procedure if a UE-associated logical NG-connection exists for the UE or if the AMF has received the *RAN UE NGAP ID* IE in an INITIAL UE MESSAGE message or if the NG-RAN node has already initiated a UE-associated logical NG-connection by sending an INITIAL UE MESSAGE message via another NG interface instance. The procedure uses UE-associated signalling.

For signalling only connections and if the *UE Context Request* IE is not received in the Initial UE Message, the AMF may be configured to trigger the procedure for all NAS procedures or on a per NAS procedure basis depending on operator’s configuration.

#### 8.3.1.2 Successful Operation



Figure 8.3.1.2-1: Initial context setup: successful operation

In case of the establishment of a PDU session the 5GC shall be prepared to receive user data before the INITIAL CONTEXT SETUP RESPONSE message has been received by the AMF. If no UE-associated logical NG-connection exists, the UE-associated logical NG-connection shall be established at reception of the INITIAL CONTEXT SETUP REQUEST message.

The INITIAL CONTEXT SETUP REQUEST message shall contain the *Index to RAT/Frequency Selection Priority* IE, if available in the AMF.

If the *NAS-PDU* IE is included in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall pass it transparently towards the UE.

If the *Masked IMEISV* IE is contained in the INITIAL CONTEXT SETUP REQUEST message the target NG-RAN node shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

Upon receipt of the INITIAL CONTEXT SETUP REQUEST message the NG-RAN node shall

- attempt to execute the requested PDU session configuration;

- store the received UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for Non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9];

- store the received Mobility Restriction List in the UE context;

- store the received UE Radio Capability in the UE context;

- store the received Index to RAT/Frequency Selection Priority in the UE context and use it as defined in TS 23.501 [9];

- store the received UE Security Capabilities in the UE context;

- store the received Security Key in the UE context and, if the NG-RAN node is required to activate security for the UE, take this security key into use;

- if supported, store the received SRVCC Operation Possible in the UE context and use it as defined in TS 23.216 [31];

- store the received NR V2X Services Authorization information, if supported, in the UE context;

- store the received LTE V2X Services Authorization information, if supported, in the UE context;

- store the received NR UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE’s sidelink communication in network scheduled mode for NR V2X services;

- store the received LTE UE Sidelink Aggregate Maximum Bit Rate, if supported, in the UE context, and use it for the concerned UE’s sidelink communication in network scheduled mode for LTE V2X services;

- store the received PC5 QoS Parameters, if supported, in the UE context and use it as defined in TS 23.287 [33];

- store the received Management Based MDT PLMN List information, if supported, in the UE context;

- if supported, store the received IAB Authorization information in the UE context, and use it accordingly for the IAB-MT;

- store the received 5G ProSe Authorization information in the UE context, if supported, and use it for the concerned UE’s sidelink communication in network scheduled mode for 5G ProSe services;

- store the 5G ProSe UE PC5 Aggregate Maximum Bit Rate in the UE context, if supported, and use it for the concerned UE’s sidelink communication in network scheduled mode for 5G ProSe services;

- store the 5G ProSe PC5 QoS Parameters, if supported, in the UE context and use it as defined in TS 23.304 [47].

- store the received PDU Set QoS parameters, if supported, in the UE context and use it as specified in TS 23.501 [9].

For the Initial Context Setup an initial value for the Next Hop Chaining Count is stored in the UE context.

If the *PDU Session Resource Setup Request List* IE is contained in the INITIAL CONTEXT SETUP REQUEST message, the NG-RAN node shall behave the same as defined in the PDU Session Resource Setup procedure. The NG-RAN node shall report to the AMF in the INITIAL CONTEXT SETUP RESPONSE message the result for each PDU session resource requested to be setup as defined in the PDU Session Resource Setup procedure.

\*\* Unchanged text skipped \*\*

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### 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



Figure 8.4.2.2-1: Handover resource allocation: successful operation

The AMF initiates the procedure by sending the HANDOVER REQUEST message to the target NG-RAN node.

If the *Masked IMEISV* IE is contained in the HANDOVER REQUEST message the target NG-RAN node shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

Upon receipt of the HANDOVER REQUEST message the target NG-RAN node shall

- attempt to execute the requested PDU session configuration and associated security;

- store the received UE Aggregate Maximum Bit Rate in the UE context, and use the received UE Aggregate Maximum Bit Rate for all Non-GBR QoS flows for the concerned UE as specified in TS 23.501 [9];

- store the received Mobility Restriction List in the UE context;

- store the received UE Security Capabilities in the UE context;

- store the received Security Context in the UE context and take it into use as defined in TS 33.501 [13];

- if supported, store the received UE Slice Maximum Bit Rate List in the UE context and use the received UE Slice Maximum Bit Rate List for each S-NSSAI for the concerned UE as specified in TS 23.501 [9].

- if supported, store the received PDU Set QoS parameters in the UE context and use it as specified in TS 23.501 [9].

Upon reception of the *UE History Information* IE, which is included within the *Source to Target Transparent Container* IE of the HANDOVER REQUEST message, the target NG-RAN node shall collect the information defined as mandatory in the *UE History Information* IE and shall, if supported, collect the information defined as optional in the *UE History Information* IE, for as long as the UE stays in one of its cells, and store the collected information to be used for future handover preparations.

\*\* Unchanged text skipped \*\*

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#### 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 | O |  | 9.3.1.x |  | YES | ignore |

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#### 9.3.1.131 TSC Assistance Information

This IE provides the TSC assistance information for a TSC QoS flow in the uplink or downlink (see TS 23.501 [9]).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Periodicity | M |  | 9.3.1.132 |  | - |  |
| Burst Arrival Time | O |  | 9.3.1.133 |  | - |  |
| Survival Time | O |  | 9.3.1.221 |  | YES | ignore |
| N6 Jitter | O |  | 9.3.1.y |  | YES | ignore |

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#### 9.3.1.x PDU Set QoS Parameters

This IE defines the PDU Set QoS Parameters to be applied to a QoS flow.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| PDU Set Packet Delay Budget | O |  | Extended Packet Delay Budget 9.3.1.135 | PDU Set Delay Budget as specified in TS 23.501 [9]. |
| PDU Set Error Rate | O |  | Packet Error Rate  9.3.1.81 | PDU Set Error Rate as specified in TS 23.501 [9]. |
| PDU Set Integrated Handling Information | O |  | ENUMERATED (true, false, …) | PDU Set Integrated Handling Information as specified in TS 23.501 [9]. |

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9.3.1.y N6 Jitter Information

This IE indicates the jitter information associated with the Periodicity in downlink.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| N6 Jitter Information | O |  | **FFS** | **FFS** |

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### 9.3.4 SMF Related IEs

#### 9.3.4.1 PDU Session Resource Setup Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| PDU Session Aggregate Maximum Bit Rate | O |  | 9.3.1.102 | This IE shall be present when at least one Non-GBR QoS flow is being setup and is ignored otherwise. | YES | reject |
| UL NG-U UP TNL Information | M |  | UP Transport Layer Information  9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs. | YES | reject |
| Additional UL NG-U UP TNL Information | O |  | UP Transport Layer Information List  9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s), for delivery of UL PDUs for split PDU session. | YES | reject |
| Data Forwarding Not Possible | O |  | 9.3.1.63 | This IE may be present in case of HANDOVER REQUEST message and is ignored otherwise. | YES | reject |
| PDU Session Type | M |  | 9.3.1.52 |  | YES | reject |
| Security Indication | O |  | 9.3.1.27 |  | YES | reject |
| Network Instance | O |  | 9.3.1.113 | This IE is ignored if the *Common Network Instance* IE is included. | YES | reject |
| **QoS Flow Setup Request List** |  | *1* |  |  | YES | reject |
| **>QoS Flow Setup Request Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>QoS Flow Level QoS Parameters | M |  | 9.3.1.12 |  | - |  |
| >>E-RAB ID | O |  | 9.3.2.3 |  | - |  |
| >>TSC Traffic Characteristics | O |  | 9.3.1.130 | Traffic pattern information associated with the QFI. Details in TS 23.501 [9]. | YES | ignore |
| >>Redundant QoS Flow Indicator | O |  | 9.3.1.134 | This IE indicates whether this QoS flow is requested for the redundant transmission. | YES | ignore |
| Common Network Instance | O |  | 9.3.1.120 |  | YES | ignore |
| Direct Forwarding Path Availability | O |  | 9.3.1.64 | This IE may be present in case of inter-system handover and intra-system handover. | YES | ignore |
| Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs for the redundant transmission. | YES | ignore |
| Additional Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information List  9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s), for delivery of redundant UL PDUs for split PDU session. | YES | ignore |
| Redundant Common Network Instance | O |  | Common Network Instance  9.3.1.120 |  | YES | ignore |
| Redundant PDU Session Information | O |  | 9.3.1.136 |  | YES | ignore |
| MBS Session Setup Request List | O |  | 9.3.1.211 |  | YES | ignore |

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

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#### 9.3.4.3 PDU Session Resource Modify Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| PDU Session Aggregate Maximum Bit Rate | O |  | 9.3.1.102 |  | YES | reject |
| **UL NG-U UP TNL Modify List** |  | *0..1* |  |  | YES | reject |
| **>UL NG-U UP TNL Modify Item** |  | *1..<maxnoofMultiConnectivity>* |  | This IE(s) are included only for modification of an existing tunnel. | - |  |
| >>UL NG-U UP TNL Information | M |  | UP Transport Layer Information  9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs. | - |  |
| >>DL NG-U UP TNL Information | M |  | UP Transport Layer Information  9.3.2.2 | Identifies the NG-U transport bearer at the NG-RAN node. | - |  |
| >>Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs for the redundant transmission. | YES | ignore |
| >>Redundant DL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | Identifies the NG-U transport bearer at the NG-RAN node for the redundant transmission. | YES | ignore |
| Network Instance | O |  | 9.3.1.113 | This IE is ignored if the *Common Network Instance* IE is included. | YES | reject |
| **QoS Flow Add or Modify Request List** |  | *0..1* |  |  | YES | reject |
| **>QoS Flow Add or Modify Request Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>QoS Flow Level QoS Parameters | O |  | 9.3.1.12 |  | - |  |
| >>E-RAB ID | O |  | 9.3.2.3 |  | - |  |
| >>TSC Traffic Characteristics | O |  | 9.3.1.130 | Traffic pattern information associated with the QFI. Details in TS 23.501 [9]. | YES | ignore |
| >>Redundant QoS Flow Indicator | O |  | 9.3.1.134 | This IE indicates whether this QoS flow is requested for the redundant transmission. | YES | ignore |
| QoS Flow to Release List | O |  | QoS Flow List with Cause  9.3.1.13 |  | YES | reject |
| Additional UL NG-U UP TNL Information | O |  | UP Transport Layer Information List  9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s) proposed for delivery of UL PDUs for split PDU session. | YES | reject |
| Common Network Instance | O |  | 9.3.1.120 |  | YES | ignore |
| Additional Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information List  9.3.2.12 | UPF endpoint of the additional NG-U transport bearer(s) proposed for delivery of redundant UL PDUs for split PDU session. | YES | ignore |
| Redundant Common Network Instance | O |  | Common Network Instance  9.3.1.120 |  | YES | ignore |
| Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs for the redundant transmission of the Redundant QoS Flow(s). | YES | ignore |
| Security Indication | O |  | 9.3.1.27 |  | YES | ignore |
| MBS Session Setup or Modify Request List | O |  | 9.3.1.212 |  | YES | ignore |
| MBS Session To Release List | O |  | 9.3.1.215 |  | YES | ignore |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofMultiConnectivity | Maximum no. of connectivity allowed for a UE. Value is 4. The current version of the specification supports up to 2 connectivity. |

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ASN.1 to be provided later.

<<<<<<<<<<<<<<<<<<<< End of Changes >>>>>>>>>>>>>>>>>>>>