3GPP TSG-RAN WG3 Meeting #119bis-e R3-231940

Electronic, 17 - 26 April 2023

**Agenda item: 26.2**

**Source: Nokia, Nokia Shanghai Bell, Others?**

**Title: (TP for TS 38.413 BL CR) RAN feedback for low latency communication**

**Document for: Discussion and Decision**

# 1 Introduction

At RAN#99, a new WID on NR Timing Resiliency and URLLC enhancements was approved in [1]. It includes the following objective:

|  |
| --- |
| 3. Adapting downstream and upstream scheduling based on RAN feedback for low latency communication [RAN3, RAN2]:  a. RAN enhancements in order for application to adapt scheduling based on RAN feedback (e.g., feedback regarding burst arrival time, periodicity) for low latency communication.  Note 3: Reactive RAN feedback for upstream scheduling is pending RAN2 conclusion on burst arrival time (BAT) offset derivation. |

A text proposal for TS 38.413 is provided in Annex A, reflecting the outcome of RAN3#119bis-e discussion as summarized in the SoD [2].

# References

1. RP-230754 *New WID on NR Timing Resiliency and URLLC enhancements*, Nokia, Nokia Shanghai Bell
2. R3-231899 Summary of Offline Discussion for CB # URLLC\_RANenh

# Annex A: Text Proposal for TS 38.413

*First Modification*

#### 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 |
| CHOICE *RAN feedback type* |  | *0..1* |  |  | YES | ignore |
| >*proactive* |  |  |  |  |  |  |
| >>Burst Arrival Time Window | M |  | 9.3.1.z1 |  | - |  |
| >>Periodicity Range | O |  | 9.3.1.z2 |  | - |  |
| >*reactive* |  |  |  |  |  |  |
| >>Capability for BAT Adaptation | M |  | 9.3.1.z3 |  | - |  |

*Next Modification*

#### 9.3.1.z1 Burst Arrival Time Window

This IE indicates the burst arrival time window of the TSC QoS flow as defined in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| [FFS] |  |  |  |  |

#### 9.3.1.z2 Periodicity Range

This IE indicates the periodicity range for the TSC QoS flow as defined in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| [FFS] |  |  |  |  |

#### 9.3.1.z3 Capability for BAT Adaptation

This IE indicates the capability for BAT adaptation for the TSC QoS flow as defined in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| [FFS] |  |  |  |  |

#### 9.3.1.z4 TSC Traffic Characteristics Feedback

This IE provides the TSC traffic characteristics feedback of a TSC QoS flow (see TS 23.501 [9].

Editor’s Note: Whether uplink is supported for reactive feedback is FFS pending RAN2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| TSC Feedback Information Downlink | O |  | TSC Feedback Information  9.3.1.z5 |  |
| TSC Feedback Information Uplink | O |  | TSC Feedback Information  9.3.1.z5 |  |

#### 9.3.1.z5 TSC Feedback Information

This IE provides the TSC feedback 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 |
| Burst Arrival Time Offset | M |  | [FFS] |  |
| Adjusted Periodicity | O |  | [FFS] | Not applicable to reactive RAN feedback. |

*Next Modification*

#### 9.3.2.13 QoS Flow List with Data Forwarding

This IE is used to provide a list of QoS flows with indication if forwarding is accepted.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| **QoS Flow Item with Data Forwarding** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >Data Forwarding Accepted | O |  | 9.3.1.62 | This IE is included for the QoS flows in the PDU session to be forwarded over the PDU session forwarding tunnel.  It may be included for the QoS flows in the PDU session to be forwarded over the DRB forwarding tunnel(s). | - |  |
| >Current QoS Parameters Set Index | O |  | Alternative QoS Parameters Set Index  9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set | YES | ignore |
| >TSC Traffic Characteristics Feedback | O |  | 9.3.1.z4 |  | YES | ignore |

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

*Next Modification*

#### 9.3.4.2 PDU Session Resource Setup Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL QoS Flow per TNL Information | M |  | QoS Flow per TNL Information  9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer for delivery of DL PDUs, together with associated QoS flows. | - |  |
| Additional DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows and corresponding to the *Additional UL NG-U UP TNL Information* IE in the *PDU Session Resource Setup Request Transfer* IE. | - |  |
| Security Result | O |  | 9.3.1.59 |  | - |  |
| QoS Flow Failed to Setup List | O |  | QoS Flow List with Cause  9.3.1.13 |  | - |  |
| Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information  9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer(s) for delivery of DL PDUs of the indicated Redundant QoS Flow(s) and corresponding to the *Redundant UL NG-U UP TNL Information* IE in the *PDU Session Resource Setup Request Transfer* IE. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of redundant DL PDUs for split PDU session, together with associated QoS flows and corresponding to the *Additional Redundant UL NG-U UP TNL Information* IE in the *PDU Session Resource Setup Request Transfer* IE. | YES | ignore |
| Used RSN Information | O |  | Redundant PDU Session Information  9.3.1.136 |  | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O |  | Global RAN Node ID  9.3.1.5 |  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.210 |  | YES | ignore |
| MBS Session Setup Response List | O |  | 9.3.1.213 |  | YES | ignore |
| MBS Session Failed to Setup List | O |  | 9.3.1.214 |  | YES | ignore |
| **QoS Flow TSC Feedback List** |  | *0..1* |  |  | YES | ignore |
| **>QoS Flow TSC Feedback Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>TSC Traffic Characteristics Feedback | M |  | 9.3.1.z4 |  | - |  |

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

*Next Modification*

#### 9.3.4.4 PDU Session Resource Modify Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. | - |  |
| UL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | Identifies the NG-U transport bearer at the 5GC node. | - |  |
| **QoS Flow Add or Modify Response List** |  | *0..1* |  |  | - |  |
| **>QoS Flow Add or Modify Response Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Current QoS Parameters Set Index | O |  | Alternative QoS Parameters Set Index  9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set | YES | Ignore |
| >>TSC Traffic Characteristics Feedback | O |  | 9.3.1.z4 |  | YES | Ignore |
| Additional DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows. | - |  |
| QoS Flow Failed to Add or Modify List | O |  | QoS Flow List with Cause  9.3.1.13 |  | - |  |
| Additional NG-U UP TNL Information | O |  | UP Transport Layer Information Pair List  9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer corresponding to the modified UPF endpoint received in the *PDU Session Resource Modify Request Transfer* IE in case of PDU session split. | YES | ignore |
| Redundant DL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs for the redundant transmission. | YES | ignore |
| Redundant UL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | Identifies the NG-U transport bearer at the 5GC node for the redundant transmission. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Additional Redundant NG-U UP TNL Information | O |  | UP Transport Layer Information Pair List  9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer for delivery of redundant DL PDUs corresponding to the modified UPF endpoint(s) received in the *UL NG-U UP TNL Modify List* IE of the *PDU Session Resource Modify Request Transfer* IE in case of PDU session split. | YES | ignore |
| Secondary RAT Usage Information | O |  | 9.3.1.114 |  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.210 |  | YES | ignore |
| MBS Session Setup or Modify Response List | O |  | MBS Session Setup Response List  9.3.1.213 |  | YES | ignore |
| MBS Session Failed to Setup or Modify List | O |  | MBS Session Failed to Setup List  9.3.1.214 |  | YES | ignore |

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

#### 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, …) |  | - |  |
| >>Current QoS Parameters Set Index | O |  | Alternative QoS Parameters Set Notify Index  9.3.1.153 | 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.z4 |  | YES | ignore |
| QoS Flow Released List | O |  | QoS Flow List with Cause  9.3.1.13 |  | - |  |
| 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 Budget  9.3.1.135 | 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 Budget  9.3.1.135 | 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 Modification*

#### 9.3.4.8 Path Switch Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL NG-U UP TNL Information | M |  | UP Transport Layer Information  9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. | - |  |
| DL NG-U TNL Information Reused | O |  | ENUMERATED (true, …) | Indicates that DL NG-U TNL Information has been reused. | - |  |
| User Plane Security Information | O |  | 9.3.1.60 |  | - |  |
| **QoS Flow Accepted List** |  | *1* |  | QoS flows associated with the *DL NG-U UP TNL Information* IE. | - |  |
| **>QoS Flow Accepted Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Current QoS Parameters Set Index | O |  | Alternative QoS Parameters Set Index  9.3.1.152 | Index to the currently fulfilled alternative QoS parameters set. | YES | ignore |
| >>TSC Traffic Characteristics Feedback [FFS] | O |  | 9.3.1.z4 |  | YES | ignore |
| Additional DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Redundant DL NG-U UP TNL Information | O |  | UP Transport Layer Information  9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of redundant DL PDUs. | YES | ignore |
| Redundant DL NG-U TNL Information Reused | O |  | ENUMERATED (true, …) | Indicates that Redundant DL NG-U TNL Information has been reused. | YES | ignore |
| Additional Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List  9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of Redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Used RSN Information | O |  | Redundant PDU Session Information  9.3.1.136 |  | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O |  | Global RAN Node ID  9.3.1.5 |  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.210 |  | YES | ignore |

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

*End Modification*