**3GPP TSG-RAN WG3 Meeting #119bis-e *R3-231998***

**Electronic meeting, 17 Apr – 26 Apr, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.413** | **CR** | **0972** | **rev** | **1** | **Current version:** | 17.4.0 |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network | **x** |

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| ***Title:***  | Support of Timing Resiliency and URLLC |
|  |  |
| ***Source to WG:*** | Huawei, China Unicom, Nokia, Nokia Shanghai Bell, Samsung, Ericsson, ? |
| ***Source to TSG:*** | R3 |
|  |  |
| ***Work item code:*** | TRS\_URLLC-NR-Core |  | ***Date:*** | 2023-04-17 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | The WID on NR Timing Resiliency and URLLC enhancements was approved in RP-230754. This CR is to specify the necessary functions and procedures to support the objectives.  |
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| ***Summary of change:*** | * Support the 5GS network timing synchronization status and reporting
* Support adapting downstream and upstream scheduling based on RAN feedback for low latency communication

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| ***Consequences if not approved:*** | No support of the NR Timing Resiliency and URLLC enhancements. Misalignment between the RAN3 spec and SA2 spec.  |
|  |  |
| ***Clauses affected:*** | 9.3.1.131, 9.3.1.220, 9.3.1.x1, 9.3.1.x2, 9.3.1.x3, 9.3.1.x4, 9.3.1.x5, 9.3.1.z1, 9.3.1.z2, 9.3.1.z3, 9.3.1.z4, 9.3.1.z5, 9.3.4.2, 9.3.4.4, 9.3.4.5 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.423 CR1049TS 38.473 CR  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Rev0: R3-231413 Rev1: R3-231998 Revert the changes.Merge the agreed TPs in R3-231969 and R3-231970.  |

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| **Change Begins** |

#### 9.3.1.131 TSC Assistance Information

Editor’s Note: Encoding of IEs may be further refined.

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 |  | - |  |

**<Unchanged Text Omitted>**

#### 9.3.1.220 Time Synchronisation Assistance Information

This IE indicates 5G access stratum time distribution parameters as defined in TS 23.501 [9].

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Time Distribution Indication | M |  | ENUMERATED (enabled, disabled, …) |  | - |  |
| Uu Time Synchronisation Error Budget  | C-ifEnabled |  | INTEGER (1..1000000, …) | Expressed in units of 1ns. | - |  |
| Clock Quality Reporting Control Information | O |  | 9.3.1.x1 |  | Yes | ignore |

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| --- | --- |
| Condition | Explanation |
| C-ifEnabled | This IE shall be present if the *Time Distribution Indication* IE is set to “enabled”. |

**<Unchanged Text Omitted>**

#### 9.3.1.x1 Clock Quality Reporting Control Information

This IE indicates the clock quality reporting control information as defined in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *Clock Quality Detail Level* | M |  |  |  |
| >*clock quality metrics* |  |  |  |  |
| >>[FFS] |  |  |  |  |
| >*acceptance indication* |  |  |  |  |
| >>Clock Quality Acceptance Criteria | M |  | 9.3.1.x2 |  |

#### 9.3.1.x2 Clock Quality Acceptance Criteria

This IE indicates the clock quality acceptance criteria as defined in TS 23.501 [9].

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

#### 9.3.1.x3 RAN Timing Synchronisation Status Information

This IE indicates the RAN timing synchronisation status information provided towards the AMF as defined in TS 23.501 [9].

Editor’s Note: The non-UE associated NGAP procedure(s) used to convey this IE towards the AMF is FFS.

Editor’s Note: This IE may be further refined based on SA2 and RAN3 progress.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Synchronisation State | O |  | ENUMERATED (locked, holdover, freeRun, …) |  |
| Traceable to UTC | O |  | ENUMERATED (true, false, …) |  |
| Traceable to GNSS | O |  | ENUMERATED (true, false, …) |  |
| Clock Frequency Stability | O |  | 9.3.1.x4 |  |
| Clock Accuracy | O |  | 9.3.1.x5 |  |
| Parent Time Source | O |  | ENUMERATED (syncE, pTP, gNSS, atomicClock, terrestrialRadio, serialTimeCode, nTP, handSet, other, …) |  |

#### 9.3.1.x4 Clock Frequency Stability

This IE indicates the clock frequency stability as defined in TS 23.501 [9].

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

#### 9.3.1.x5 Clock Accuracy

This IE indicates the clock accuracy as defined in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE *Clock Accuracy* | M |  |  |  |
| >*choice1* |  |  |  |  |
| >>[FFS] |  |  |  |  |

Editor’s Note: Encoding of the *Clock Accuracy* IE is to be decided by RAN3 and should allow for different RAN implementations (e.g., CHOICE structure). Details FFS.

**<Unchanged Text Omitted>**

#### 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 Information9.3.1.z5 |  |
| TSC Feedback Information Uplink [FFS] | O |  | TSC Feedback Information9.3.1.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. |

**<Unchanged Text Omitted>**

#### 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 Information9.3.2.8 | 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 List9.3.2.1 | 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 Cause9.3.1.13 |  | - |  |
| Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information9.3.2.8 | 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 List9.3.2.1 | 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 Information9.3.1.136 |  | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O |  | Global RAN Node ID9.3.1.5 |  | 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 |  | - |  |

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

**<Unchanged Text Omitted>**

#### 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 Information9.3.2.2 | 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 Information9.3.2.2 | 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 Index9.3.1.152 | 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 List9.3.2.1 | 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 Cause9.3.1.13 |  | - |  |
| Additional NG-U UP TNL Information | O |  | UP Transport Layer Information Pair List9.3.2.11 | 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 Information9.3.2.2 | 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 Information9.3.2.2 | 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 List9.3.2.1 | 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 List9.3.2.11 | 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 |

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| 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 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.z4 |  | 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. |

###

**<ASN.1 to be added when the signalling is steady>**

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| **Change Ends** |