**3GPP TSG RAN meeting #101 RP-231581**

**Bangalore, India, September 11-15, 2023**

## Status Report to TSG

**Agenda item:** 9.3.3.5

|  |  |
| --- | --- |
| **WI / SI Name** | NR Timing Resiliency and URLLC enhancements |
| included in this status report | Study Item: No | Core part: Yes | Performance part:No | Testing part:No |
| **Acronym** | TRS\_URLLC-NR-Core |
| **Unique ID** | 991136 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | [RP-231106](http://3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_100/Docs/RP-231106.zip) |
| **Target Completion Date****(indicate if changed)** | Study Item: N/A | Core part: 2023/12 | Performance part: N/A | Testing part: N/A |
| **Overall Completion level** | Study Item: N/A | Core part:60% | Performance Part: N/A | Testing part: N/A |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN3 |
| **Rapporteur** | **Name** | Sean Kelley |
| **Company** | Nokia |
| **Email** | sean.kelley@nokia.com |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

## 2.1 RAN1

## 2.2 RAN2

#### 2.2.1 Agreements

New agreements from **RAN2#123** meeting:

**5GS network timing synchronization status and reporting:**

- Confirm in RAN2 that no AS capability is needed for the UE to support clock quality information mechanisms.

- Confirm the gNB is always broadcasting Event ID in SIB9 if it supports the feature. Send LS to SA2 to inform in R2-2309264.

- *DLInformationTransfer* message is extended to include clock quality information reporting towards the UE (i.e., clock quality metrics or clock quality indication).

#### 2.2.2 Remaining Open issues

**5GS network timing synchronization status and reporting:**

- FFS if event ID is included in *DLInformationTransfer* message.

**RAN feedback for low latency communication:**

- Closed in May without RAN2 impact.

## 2.3 RAN3

#### 2.3.1 Agreements

New agreements from **RAN3#121** meeting:

**5GS network timing synchronization status and reporting:**

- In NGAP, two new procedures were agreed with some stage 3 details:

- Timing Synchronisation Status procedure (class 1) enables the AMF to initiate RAN TSS reporting by the gNB

- Timing Synchronisation Report procedure (class 2) enables the gNB to report RAN TSS to the AMF

- In F1AP, two new procedures were agreed with some stage 3 details:

- Timing Synchronisation Status procedure (class 1) enables gNB-CU to initiate RAN TSS reporting by gNB-DU

- Timing Synchronisation Report procedure (class 2) enables the gNB-DU to report RAN TSS to the gNB-CU

- The gNB is responsible for determining whether to provide clock quality information to the UE. In cases of CU/DU split, this decision is made by the gNB-CU.

- Turn working assumption to agreement: When *Clock Quality Detail Level* IE has value “clock quality metrics”, all clock quality metrics supported by the gNB implementation are delivered to the UE.

**Interworking with TSN network deployed in the transport network**

- No agreements.

**RAN feedback for low latency communication:**

- The encoding of the *Burst Arrival Time Window* IE, *Burst Arrival Time Offset* IE, *Adjusted Periodicity* IE, and *Capability for BAT Adaptation* IE were agreed.

Text proposals for TS 38.401 (R3-234598), NGAP (R3-234599), XnAP (R3-234601), and F1AP (R3-234731) were agreed, reflecting the above agreements.

#### 2.3.2 Open Issues

All objectives of the work item remain open.

Is proactive RAN feedback applicable/relevant after the initial establishment of the TSC QoS flow?

Does *Clock Accuracy* IE convey a single value (e.g., “worst case”), or does it convey a range (e.g., “best case to worst case”)?

## 2.4 RAN4

## 3. Detailed progress in SA WGs since last TSG meeting (for all involved WGs)

## 4. References

New references from the last RAN WG meetings.

**RAN2#123**

1. R2-2307051 Response to Reply LS on Proposed method for Time Synchronization status reporting to UE(s) (S1-231285; contact: Nokia) SA1
2. R2-2307791 Stage 2 running CR on timing resiliency and URLLC Nokia, Nokia Shanghai Bell
3. R2-2308531 Introduction of URLLC and Timing Resiliency Ericsson
4. R2-2307114 Discussion on Timing Synchronization Status Monitoring vivo
5. R2-2307352 RAN2 Impact of 5GS network timing synchronization status and reporting CATT
6. R2-2307502 Remaining issues for NR Timing Resiliency Ericsson
7. R2-2307560 Discussion on remaining issues for TRS Huawei, Hisilicon, China Southern Power Grid
8. R2-2307600 Remaining issues of time synchronization status and reporting ZTE Corporation, Sanechips
9. R2-2307759 Open Issues on Timing Synchronization Samsung
10. R2-2307782 5GS network timing synchronization status and reporting Xiaomi
11. R2-2307792 5GS network timing synchronization status and reporting Nokia, Nokia Shanghai Bell
12. R2-2307838 UE Access for 5GS Network Timing Synchronization Apple
13. R2-2308308 Discussion on the network timing synchronization status monitoring CMCC
14. R2-2308658 Discussion on Time Synchronization Status and Reporting China Telecom

**RAN3#121**

1. R3-233723 Response to Reply LS on Proposed method for Time Synchronization status reporting to UE(s) (SA1(Nokia))
2. R3-233755 (BLCR to 38.413) Introduction of 5G Timing Resiliency and URLLC enhancements (Huawei, China Unicom, Nokia, Nokia Shanghai Bell, Samsung, Ericsson, ZTE, CATT)
3. R3-233764 (BL CR for TS 38.423) Introduction of 5G Timing Resiliency and URLLC enhancements (Ericsson, Huawei, Nokia, Nokia Shanghai Bell, Samsung, ZTE, CATT)
4. R3-233770 (BLCR to 38.473) Introduction of 5G Timing Resiliency and URLLC enhancements (ZTE, Huawei, Ericsson, Nokia, Nokia Shanghai Bell, Samsung)
5. R3-233814 Work plan for Timing Resiliency and URLLC enhancements (Nokia (rapporteur))
6. R3-233816 (TP for TS 38.413 BL CR) Further stage 3 details for timing resiliency (Nokia, Nokia Shanghai Bell)
7. R3-233815 (TP for TS 38.401 BL CR) Stage 2 for timing resiliency and URLLC (Nokia, Nokia Shanghai Bell, Samsung, Qualcomm, CATT)
8. R3-234023 (TP to TRS\_URLLC BLCR for TS 38.413, TS 38.423 and TS 38.473) Support of 5G Timing Resiliency enhancements (Huawei, China Unicom)
9. R3-234428 Discussion and TPs for timing synchronization status and reporting (ZTE)
10. R3-234321 Discussion on NR Timing Resiliency and URLLC enhancements (Ericsson)
11. R3-233904 Interworking with TSN network and RAN feedback (Nokia, Nokia Shanghai Bell)
12. R3-234429 Discussion on TSN integration and RAN feedback (ZTE)
13. R3-234025 (TP to TRS\_URLLC BLCR for TS 38.413) Support of TSN enabled transport network (Huawei, China Unicom, China Telecommunication)
14. R3-233986 Discussion on Open Issues in Timing Resiliency and uRLLC (Qualcomm Incorporated)
15. R3-234024 (TP to TRS\_URLLC BLCR for TS 38.413, TS 38.423 and TS 38.473) Support of RAN feedback enhancements (Huawei, China Unicom)
16. R3-234322 Text Proposals on Support NR Timing Resiliency and URLLC enhancements (Ericsson)
17. R3-234396 Discussion on Network timing synchronization status and reporting (CATT)
18. R3-234397 TP for BLCR to TS38.413 Adapting downstream and upstream scheduling (CATT)