3GPP RAN 5G-ACIA Evaluations Week 1

October 12th – 16th 2020

Source: Moderator (Ericsson)

Title: Agreements on URLLC features and simulation assumptions for 5G-ACIA

Document for: Discussion, Decision

# 1 Introduction

AT RAN#89, the following was agreed in [RP-202069](https://protect2.fireeye.com/v1/url?k=41a5db26-1f051960-41a59bbd-86fc6812c361-73f443258ff773bf&q=1&e=bc078f84-983d-45f3-ab31-19e60d911036&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FTSG_RAN%2FTSGR_89e%2FDocs%2FRP-202069.zip) on providing evaluations for 5G-ACIA:

* Start an offline email-based activity to provide evaluation results for 5G-ACIA
* One company volunteers as moderator
  + Proposes a work plan to follow
  + Ericsson is willing do this
* Discussions are on the RAN1\_NR reflector
  + Email activity only during short periods (< week) distributed across the time allocated to the activity
  + No email activity in weeks before/during/after RAN1 meetings or RAN defined inactive periods
  + All companies should strive to limit email activity as much as possible
  + Outcome of the offline discussion will directly go to RAN without need for discussion in RAN1 nor need for LS from RAN1 to RAN
* Target completion by RAN#91
* At RAN#91, RAN will decide on a response LS to 5G-ACIA

The moderator made the following proposal on a timeline:

1. 12-16 October 2020
   * Discussion on which URLLC features to include in the evaluations and simulation assumptions
2. 14-18 December 2020
   * First round of simulation results
3. 22-26 February 2021
   * Second round of simulation results
4. 8-12 March 2021
   * Finalization of the report to RAN#91

A summary of the inputs provided by companies with first proposals for agreements was provided with companies adding their proposals[9]. Updated proposals were provided in[11]. Final proposals were made in [12].

In this contribution the final agreements are listed.

# 2 Simulation assumptions

The final agreements each parameter is listed in the table.

|  |  |  |
| --- | --- | --- |
| Parameters | 5G-ACIA LS | **Agreement** |
| Factory hall size | 120x50 m | As in 5G-ACIA LS |
| Room height | 10 m | As in 5G-ACIA LS |
| Inter-BS/TRP distance | Depending on the number of TRPs, which are evenly deployed in the factory hall. Simulation company should provide the number of BSs/TRPs used in the simulation. | According to proposed layout below |
| BS/TRP antenna height | 1.5 m for InF-SL and InF-DL 8m for InF-SH and InF-DH | As in 5G-ACIA LS |
| Layout – BS/TRP deployment | Depending on the number of TRPs | 12 TRPs within area with the same 2D placement as in TR 38.901 and TR 38.824. |
| Channel model | UC-2: InF-DH > InD-DL > InF-SH > InF-SL | Mandatory: InF-DH  Optional: InD-DL, InF-SH, InF-SL |
| Carrier frequency and simulation bandwidth | TDD 4 GHz: 100 MHz 30 GHz: 160 MHz | As in 5G-ACIA LS |
| TDD DL-UL configuration | Simulation company should report the used DL-UL configuration. | Companies should report the used DL-UL configuration. 1:1 DL-UL configuration is recommended. |
| Number of UEs per service area | Up to 50 per service area, e.g., 10, 20, 40, and 50 | As in 5G-ACIA LS |
| UE distribution | All UEs randomly distributed within the respective service area. | As in 5G-ACIA LS |
| Message size | 48 bytes | 48 bytes |
| DL traffic model | DL traffic arrival with option-1, option-2, and option-3. | 5G-ACIA Option 1 is mandatory. Companies are also encouraged to provide results for option 3 |
| UL traffic model | UL traffic is symmetric with DL, and DL-UL traffic arrival time relationship with option-1 and option-2 | As in 5G-ACIA LS with Option 1 as mandatory |
| CSA requirements | UC-#2: 99.9999% | UC-#2: 99.9999% |
| Performance metrics | 1) CSA: single CDF of CSA distribution of all UEs in factory hall 2) Latency: single CDF of latency distribution of all UEs in factory hall 3) Percentage of UEs satisfying requirements  4) resource utilization | As in 5G-ACIA LS with 3) and 4) as low priority  Note: For metric 2) it is clarified that a packet transmission cannot be performed after the latency deadline. The collected statistics cannot exceed the latency requirement. The packets exceeding the deadline are visible in the UE packet error statistics |
| E2E latency & air interface latency | E2E latency: 1 ms for UC#2 | E2E latency: 1 ms for UC#2  Air interface latency: 1ms |
| UE speed | Linear movement | Linear movement: 75 km/h  No explicit UE mobility (nor handovers) are modeled in the evaluations. |
| BS antenna mount |  | Option 1 (1 sector per BS) from 38.824 is used |

**Agreements:**

* The simulation assumptions given in the table are agreed
* Additional simulation parameters are taken from TR 38.824.

# 3 Features to include in simulations

For the Rel-15 baseline, the following is agreed:

* Rel-15 URLLC features included in the baseline are as follows, while it is up to each proponent to decide which Rel-15 features are used, and detail this when providing the results:
  + UE Processing capability 2
  + UL Configured grant
  + DL Semi-persistent scheduling

Regarding Rel-16 features, the following is agreed:

* It is up to each proponent to decide on which Rel-16 features to provide simulations results for in addition to the Rel-15 baseline
* This can be revisited after the first round of simulations have been provided in December.

# 4 Conclusions

This contribution provides the outcome of the week 1 discussion for 5G-ACIA evaluations providing URLLC features and simulation assumptions

# References

1. [RP‑201279](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_88e/Docs/RP-201279.zip), “LS on 3GPP NR Rel-16 URLLC and IIoT performance evaluation”, 5G-ACIA
2. [RP-202069](https://protect2.fireeye.com/v1/url?k=41a5db26-1f051960-41a59bbd-86fc6812c361-73f443258ff773bf&q=1&e=bc078f84-983d-45f3-ab31-19e60d911036&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FTSG_RAN%2FTSGR_89e%2FDocs%2FRP-202069.zip), “Way forward on RAN work for 5G ACIA requested simulations“, Ericsson
3. “[Simulation Assumptions and URLLC Features for 5G-ACIA Performance Evaluation](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/Ericsson%205G-ACIA%20URLLC%20simulation%20assumptions%20%26%20features.docx)”, Ericsson
4. “[Discussion on URLLC and IIoT features for performance evaluation in response to 5G-ACIA”,](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/HWHiSi%20-%205G%20ACIA%20URLLC%20simulation%20assumptions%20and%20features.docx) Huawei, HiSilicon
5. “[5G-ACIA LS – Phase 1 input](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/INTEL%20-%205G-ACIA%20LS%20-%20Phase%201%20inputs.docx)”, Intel Corporation
6. “[Features and simulation assumption for 5G ACIA URLLC LS response](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/NOKIA%20-%205G-ACIA%20URLLC%20features%20and%20sim%20assumptions.zip)”, Nokia, Nokia Shanghai Bell
7. “[Features and simulation assumption for 5G ACIA URLLC LS response](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/QUALCOMM-5G-ACIA%20URLLC%20features%20and%20simulation%20assumptions%20.docx)”, Qualcomm CDMA Technologies
8. “[Views on URLLC features and simulation assumptions for 5G-ACIA evaluations](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/ZTE-Views%20on%20URLLC%20features%20and%20simulation%20assumptions%20for%205G-ACIA%20evaluations.docx)”, ZTE
9. “[5G-ACIA URLLC features and simulation assumptions](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Company%20Inputs/vivo-5G-ACIA%20URLLC%20features%20and%20simulation%20assumptions.docx)”, vivo
10. “[Summary of company inputs on URLLC features and simulation assumptions v6](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/First%20summary%20and%20proposals/Summary%205G-ACIA%20evaluations%20v006_Nokia_Moderator.docx)”, Moderator(Ericsson)

1. [“Updated proposals on URLLC features and simulation assumptions v8](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Updated%20proposals/Updated%20proposals%205G-ACIA%20evaluations%20v008%20Nokia_Moderator.docx)”, Moderator(Ericsson)
2. “[Final proposals on URLLC features and simulation assumptions](https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Inbox/Drafts/5G-ACIA%20October/Final%20proposals/Final%20proposals%205G-ACIA%20Moderator.docx)”, Moderator(Ericsson)