3GPP TSG-RAN WG1 Meeting #102-e Tdoc R1-20xxxxx

Online, August 17th- 28th 2020

Agenda Item: 5

Source: Moderator (Ericsson)

Title: Email discussion on 5G-ACIA LS

Document for: Discussion

# 1 Background

In R1-2006953[1], 5G-ACIA sent an LS to RAN and RAN1 asking the following questions related to performance evaluations of Rel-16 URLLC and asked the following:

ACTION: 5G-ACIA respectfully asks

* 3GPP TSG RAN and RAN-WG1 to consider the proposed performance evaluation scenarios during the Rel-16 maintenance work as well as potential re-scoping of Rel-17 work.
* Feedback to 5G-ACIA regarding clarification of open issues and performance results/gaps from the evaluations suggested by this LS.

During RAN#89e, the RAN plenary gave the following guidance:

* RAN1 to open this in August and if possible, make some initial determination how much work this request entails, and provide that information to RAN. To revisit in RAN#89e and make some decisions.

The goal of this email discussion is to provide this guidance. An LS will then be sent from RAN1 to RAN who will then discuss the reply to 5G-ACIA.

# 2 Discussion

## 2.1 Summary of input contributions

There was one contribution submitted on the topic [2] containing the following proposals:

*Proposal 1: Down-select one of the following ways for handling the work on performance evaluation in response to 5G-ACIA:*

* *Option 1: Handled in Rel-16 eURLLC maintenance;*
* *Option 2: Handled in Rel-17 URLLC/IIoT WI.*

*Proposal 2: In RAN1#102-e meeting, RAN1 can consider to send an LS reply to 5G-ACIA to inform about the plan of handling the simulation work in RAN1.*

*Proposal 3: For performance evaluation of motion control,*

* *The latency budget of the air interface is a half of the E2E latency budget;*
* *Only the reliability of air interface is considered during computing the packet error probability;*
* *A UE is said to satisfy the requirements if the achieved CSA computed from (1) is no more than the target requirement.*

*Proposal 4: For performance evaluation of motion control, take the simulation settings in Table 1 as the starting point, and for DL traffic modelling, Opt3 below is preferred.*

* *Opt3: All UEs in one service area are divided into several groups. DL messages of UEs in the same group will arrive at NG-RAN node in one burst.*

## 2.2 Company views

### 2.2.1 Work-load estimation

Based on the guidance from the plenary, the initial discussion will focus on providing an initial determination how much work this request entails. Companies to give inputs in the table below.

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| --- | --- |
| **Company** | **Input** |
| Nokia | We very much welcome 5G ACIA interest in the 3GPP URLLC specifications.  In what comes to estimating the needed RAN1 time allocation for the work asked, if RAN1 is to agree on a detailed simulation parameters beyond the ones provided by 5G ACIA, run at least a minimal level of calibration simulations before embarking into a simulation campaign, and collection of results, a TU allocation comparable to any study item over one or two meeting cycles would be called for. The TU management and effort estimation has traditionally been a RAN prerogative, but RAN1 could indicate that the effort and the expected TU allocation would comparable to an initial phase of a simulation-requiring study item and take 1-2 meeting cycles.  The work planning and task setting for the working groups is naturally up to RAN, but it seems evident that evaluation of 3GPP spec performance against scenarios received from outside is not maintenance work, and as it currently stands, Rel-17 URLLC/IIoT WID does not task any evaluation work for external purposes – something that would seem to be out of RAN1 scope in general. |
| Huawei, HiSilicon | Thank you very much for the inputs from 5G ACIA. We think that it is meaningful to consider more realistic scenarios (e.g., the new channel model, survival time, etc.) proposed by 5G-ACIA for further performance evaluations, in order to provide more reference values to players in the vertical industry, especially in the IIoT area.  As to the workload, it mainly includes two steps:   1. **Step 1** is to set up the simulation assumptions. We expect that this step 1 won’t take much time, since we already set good baseline for the simulation assumptions in Rel-16, and what need to do is to update it as what suggested in the LS. We think the LS provide sufficient information for us to quickly align the simulation assumptions. We provide some initial analysis as shown in R1-2006937. 2. **Step 2** is to do the simulation work based on the assumptions that we achieved in step 1. According to the experience in Rel-16, we may need ~3 meetings to get this work done, including the first 2 meetings for companies to provide the inputs on the simulation results and do some calibration if needed, and take about 1 meeting to get the observations/conclusions from the simulation results.   As to the TU required, share similar view it may depend on the discussion in RAN. Usually more TU we get, earlier we can get the work done. However, we can understand that it would be difficult to get much TU for this, if we can get 0.5 TU for each meeting, it would be good. Simultaneously, since the work is mainly on simulation results calibration and making observations and conclusions, email discussions would be helpful also.  As to where to treat this topic, as in our paper R1-2006937, we are fine with either to go with Rel-16 maintenance or Rel-17 URLLC/IIoT. This is up to RAN discussion also. |
| Ericsson | We support conducting simulation work in response to the recommendation in 5G-ACIA LS.  As mentioned in 5G-ACIA LS, RAN1 has carried out simulation work for factory automation (a major use of URLLC/IIoT), and the results were captured in TR 38.824. In the Rel-16 study item phase, the evaluation examined the achievable performance using Rel-15 features.  It is now useful to update the performance evaluation based on the assumptions and requirements from 5G-ACIA, and leveraging the Rel-16 features. Note that RAN1 should discuss what Rel-16 features to include in the evaluation, considering those introduced by Rel-16 URLLC/IIoT as well as the multi-TRP feature introduced by Rel-16 eMIMO. Thus this work is more demanding than a simple re-run of TR 38.824 simulation with new parameters.  In terms of work load in RAN1, we expect that it takes at least two meeting cycles (likely more): 1 meeting to discuss and agree on the simulation assumptions and methodology; >=1 meeting cycle for companies to generate simulation results; and possibly another meeting cycle to calibrate and draw conclusion.  In terms of TU, we suggest 0.5 TU per meeting, subject to the need to balance with other work load of RAN1.  In terms of categorizing this as Rel-16 maintenance or Rel-17 WI, we leave it to the wisdom of RAN. |
| QC | We welcome the valuable inputs from 5G ACIA. With respect to the question in terms of estimating the workload in RAN1, we think it would be equivalent to a new study item, which consists of Evaluation Methodolgy (EVM) assumptions discussions, performing simulations based on the EVM assumptions, discussing observations as well as EVM refinements for better alignments, and finally agreeing to a set of conclusions / obeservations, which is typically captured in a TR-type document. We think this requires at least 1-2 meetings for EVM each with ~0.5 TU plus ~3-4 meetings for discussing observations / refinments / conclusions each with ~0.5-1 TU.  Furtheremore, given that the simulations are not tied to a particular enhancement and are generally targeted for employing Rel-16 eURLLC/IIoT features for industry use cases, we anticipate some additional time is needed to align understanding on which set of Rel. 16 features are to be used for simulations as well as discussions on baseline features.  If RANP decides to progress on the evaluation work in 3GPP, RAN1 would prefer if this evaluation does not tie to Rel-17 ongoing work items, and is considered an independent study. |
| FUTUREWEI | The LS and interest from 5G ACIA is welcome, and we should endeavor to provide an informative reply to the evaluation request. The estimates of 0.5TU for ~four meetings seems reasonable for calibrated results; however, a subset of results or a summary of several loosely calibrated results (similar to the results in the Rel-16 TR) might be achievable over two meetings with email discussions before-during-after. This may be similar to the time/effort that went into gathering and including the results in the Rel-16 TR, and would be preferred to dismissing the request.  We already have the small XR study item for further evaluating another of the URLLC use cases in 38.824 TR, AR/VR. We could do the same for these further URLLC evaluations, but since this is an LS and related to the existing rel-16 TR, we also have the option of handling either as an LS response or as maintenance (for the TR, not for the specs). There is also nothing to prevent us from adding to the Rel-17 IIoT WI, which is already a bit of a catch all with the objective for compatibility with unlicensed.  So options for handling seem to include:   * New small SI, similar to the XR SI * Add into an existing SI or WI * Handle as an LS response * Handle as a CR for the TR38.824   We do not have a strong feeling of how it is handled, RAN can best decide. |
| Intel | We agree that this work could take 3-4 meetings with one email discussion per meeting to settle on the assumptions, calibrate, collect results, and draw conclusions.  We don’t see reasonable to treat it in Rel.16 maintenance. Thus, either Rel.17 URLLC/IIoT extension, or a new SI, or threating it in NR others/LS AI are more suitable, subject to approval in RAN plenary.  We see there is a huge interest in better understanding the NR URLLC/TSN system performance from players who could not easily invest into own deployment trials and simulations. In the same time, we think the inclusion to Rel-17 URLLC/IIoT or approval of a new SI is up to RAN plenary depending on the available time. |
| ZTE | We welcome the interest and inputs from 5G ACIA. It would be useful to evaluate how well standardized techniques are performed under the use cases with the parameters based on the inputs from 5G ACIA. We think that using email discussion for around 4 RAN1 meetings should be good enough. We prefer to treat this under Rel-17 URLLC/IIoT item instead of Rel-16 eURLLC maintenance but it is up to RAN plenary to decide. |

# 3 Conclusion

Based on the input given, the following conclusion is proposed:

* The work will consist of agreeing on evaluation methodology and simulation assumptions, companies to generate and present the simulation results with likely a second round for refinements before drawing the final conclusions
* From a time unit perspective, it is RAN1’s estimate is that the work will require 3-4 meetings with 0.5-1 TU per meeting.
* As for how to organize the work, if agreed to be started, options mentioned were to have the work as part of Rel-16 maintenance, included as part the Rel-17 URLLC/IIoT work item or as a separate study item. RAN1 leaves that decision to RAN.
* Send an LS to the RAN plenary with this conclusion

# References

[1] [R1-2006953](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Docs/R1-2006953.zip), “LS on 3GPP NR Rel-16 URLLC and IIoT performance evaluation”, 5G Alliance for Connected Industries and Automation (5G-ACIA), Bosch, Ericsson

[2] [R1-2006937](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Docs/R1-2006937.zip), “Discussion on URLLC and IIoT performance evaluation in response to 5G-ACIA”, Huawei, HiSilicon