3GPP TSG-RAN WG1 Meeting #109-e R1-22xxxxx

e-Meeting, 9th – 20th May 2022

**Agenda Item: 9.6**

**Title: FL summary for TR skeleton for Rel-18 SI on further NR RedCap UE complexity reduction**

**Source: Moderator (Ericsson)**

**Document for: Discussion, Decision**

# 1 Introduction

This feature lead (FL) summary (FLS) concerns the Rel-18 study item (SI) on further NR RedCap UE complexity reduction [1, 2, 3]. This Rel-18 study item was preceded by a Rel-17 study item [4] and a Rel-17 work item [5].

This document captures the email discussion for the TR skeleton for the new study item:

|  |
| --- |
| [109-e-R18-RedCap-01] Email discussion and approval of TR skeleton for Rel-18 SI on further NR RedCap (reduced capability) UE complexity reduction by May 13 – Johan (Ericsson) |

The issues in this document are tagged and color coded with High Priority or Medium Priority. The issues that are in the focus of this round of the discussion are furthermore tagged FL2.

Follow the naming convention in this example:

* *eRedCapSkeletonFLS-v000.docx*
* *eRedCapSkeletonFLS-v001-CompanyA.docx*
* *eRedCapSkeletonFLS-v002-CompanyA-CompanyB.docx*
* *eRedCapSkeletonFLS-v003-CompanyB-CompanyC.docx*

If needed, you may “lock” a discussion document for 30 minutes by creating a checkout file, as in this example:

* Assume CompanyC wants to update *eRedCapSkeletonFLS-v002-CompanyA-CompanyB.docx*.
* CompanyC uploads an empty file named *eRedCapSkeletonFLS-v003-CompanyB-CompanyC.checkout*
* CompanyC checks that no one else has created a checkout file simultaneously, and if there is a collision, CompanyC tries to coordinate with the company who made the other checkout (see, e.g., contact list below).
* CompanyC then has 30 minutes to upload *eRedCapSkeletonFLS-v003-CompanyB-CompanyC.docx*
* If no update is uploaded in 30 minutes, other companies can ignore the checkout file.
* Note that the file timestamps on the server are in UTC time.

In file names, please use the hyphen character (not the underline character) and include ‘v’ in front of the version number, as in the examples above and in line with the general recommendation (see slide 16 in [R1-2203012](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203012.zip)), otherwise the sorting of the files will be messed up (which can only be fixed by the RAN1 secretary).

To avoid excessive email load on the RAN1 email reflector, please note that there is NO need to send an info email to the reflector just to inform that you have uploaded a new version of this document. Companies are invited to enter the contact info in the table below.

**FL2 Question 1-1a: Please consider entering contact info below for the points of contact for this email discussion.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Point of contact** | **Email address** |
| FUTUREWEI | Vip Desai | vipul.desai@futurewei.com |
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# 2 Discussion

A draft skeleton for TR 38.865 (“Study on further NR RedCap UE complexity reduction”) has been provided in [3]. To a large extent, the structure of the draft TR skeleton follows the structure of TR 38.875 [4].

**FL1 High Priority Question 2-1a: Can the draft TR skeleton be approved? Please provide any comments you might have on the TR skeleton in the Comments field.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Y/N** | **Comments** |
| FUTUREWEI | N | Though we appreciate the rapporteur efforts to add explanatory notes, any aspects that don’t have consensus should be removed for now. For example, network capacity and spectral efficiency are not part of the SID and should be removed (6.3, 9). For coverage aspects, there is no *recovery* objective in the SID, so if RAN1 decides in 9.6.1 or 9.6.2 to do a link budget for say 5MHz RF devices, relevant sections should use a term like analysis rather than recovery. For performance aspects, at this point the subheadings should all be removed. Finally, we would suggest that the “Analysis of coexistence with legacy UEs” subsections be updated to “Analysis of network and coexistence aspects” to better align with the SID.  |
| Spreadtrum |  | **Comments 1:** Share the similar views as FUTUREWEI, it seems that “coverage recovery” is out of SID scope. For coverage part, we just need to identify the performance loss for each solution, and compare the advantages and disadvantages, and then make decisions (specify it or not in WI) for the solution. **Question 1:** If the impact of memory cost can be captured in the TR (e.g., qualitative description, without any update for the current methodology), which chapter is suitable to collect the information, e.g., 7.x.2 Analysis of UE complexity reduction? |
| Ericsson |  | What headings to keep/remove can be revisited once the email discussions under agenda items 9.6.1 and 9.6.2 have progressed further.It is important that the study includes evaluation of the potential coverage impacts, but it is fine to rename the section from “Coverage recovery” to “Coverage impact” if there is no intent to capture anything regarding potential coverage recovery techniques. However, in that case there will be higher uncertainty in the RAN plenary regarding the feasibility and scope of a potential subsequent WI.Regarding Spreadtrum’s question above, we are open to capture impact on memory cost/complexity/size qualitatively in the 7.x.2 sections. |
| ZTE, Sanechips |  | Considering the TU is limited in the SI stage and no significant impacts are foreseen, evaluation for network capacity and spectral efficiency can be deprioritized. |
| DOCOMO |  | We think it is not necessary to include the network capacity and spectral efficiency related parts, i.e., section 6.3 and 9, so far. In addition to the current subsections for section 7, other complexity reduction features, e.g., reduction of HARQ process number etc., can be included depending on the discussion in AI 9.6.1. |
| Intel |  | In the current TR skeleton, only BW reduction, peak rate reduction and relaxed processing time are captured in section 7.2/7.3/7.4. Since multiple companies are still discussing other features including lower modulation order, HD-FDD type B and reduced maximum number of HARQ processes, we would like to how such study will be reflected in the TR.  |
| LGE |  | In our view, the section 8 and 9 can be removed. For Section 9, the analysis results of the network impact can be captured in Section 7 per each technique. For Section 8, provided there is a coverage loss for a specific technique, the results can also be captured in Section 7 per each technique under the Analysis of performance impacts. |
| Qualcomm | N | First, section 9 and 6.3 need to be removed as some companies mentioned above.Also, there are still discussions in agenda 9.6.1 regarding which complexity reduction features will be studied. So, it is too early to list up the schemes (7.2, 7.3, 7.4) in the skeleton TR at this time and it is suggested to remove them and come back to the list after we reach an agreement on the candidate complexity reduction schemes. Alternative way is to put a placeholder section 7.5 for other potential complexity reduction candidates and make the “Combinations of UE complexity reduction features” section as 7.6.  |
| Xiaomi |  | For Section 6, evaluation methodology for PDCCH blocking rate may also need to be included if control channel or RF BW reduction is selected as one of candidate solutions.For Section 8, share the same view as FUTUREWEI that coverage recovery is out of the scope of this SID.Overall, the TR skeleton can be made after the discussions under agenda items 9.6.1 and 9.6.2 make further progress. |
| Huawei, HiSilicon | N | Thank you for your efforts on the TR. In our understanding, in the rule of 3GPP documentation management, once a section is endorsed in a TR, it cannot be removed completely from the TR in a later version. Therefore, similar views as FutureWei and other companies that any aspects that don’t have consensus should be removed for now.According to the SID, coverage recovery is out of scope, so is network capacity and efficiency evaluation. Suggest to remove section 6.2, 6.3, section 8 and section 9. For section 7.4, in our view, relaxed UE processing timeline will be only considered in combination with other techniques according to the SID. Any evaluation results for the combinations can be captured in section 7.5. Therefore, compared to Rel-17 TR, there is nothing new to be captured into this section. The section 7.4 can be removed. |
| Vivo |  | Share with other companies’ views to remove at least the section 6.3 and 9. About Coverage aspect section 6.2 and 8, better to keep it as placeholder and modify it after the decision is made in AI 9.6.2.  |
| MediaTek | N | While we support to evaluate coverage loss, we share most companies’ view that Network Capacity (Section 6.3 and 9) and Coverage Recovery (Section 8) should be removed. For Section 6.2, we suggest changing to “Evaluation methodology for coverage performance” or “Methodology for coverage evaluation.”Coverage evaluation results can be captured under each subsection of “Analysis of Performance Impacts.” In the end of the study phase, we should be able to conclude how significant coverage performance loss is under each scheme. Depending on the evaluation results, whether/which coverage recovery enhancements are needed can be discussed in the work item phase.  |
| OPPO |  | We think the coverage part is related to the reduction candidate scheme. It is unclear if we remove coverage section like 6.2 and 8, does it mean we will not be care of the impact by some candidate scheme? Thus, at they can be kept. There are already note for dependency of the outcome of RAN1.The network capacity and spectral efficiency would not be bound to any specific candidate scheme. We are OK to remove. |
| FL2 | Based on the received responses, the following proposal can be considered.**High Priority Proposal 2-1b: Endorse the draft TR skeleton R1-2205432 (**[**Inbox**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Inbox/R1-2205432.zip)**,** [**Docs**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205432.zip)**).** |
| Huawei, HiSilicon |  | Regarding section 7.4 (Relaxed UE processing time), there is nothing new to be captured into it according to the agreement below. All studies related to relaxed UE processing time are only about combinations. As commented before, we suggest to remove section 7.4. If we miss anything, please let us know.Agreement* **UE complexity reduction is studied for the following combinations:**
	1. **Reference case (Rel-17 RedCap UE)**
	2. **BW1 + PT1 + PT2**
	3. **BW3 + PT1 + PT2**
	4. **PR1 + PT1 + PT2**
	5. **PR3 + PT1 + PT2**
* **In addition, optional results for the following combinations can also be reported:**
1. **BW1 + PT1**
2. **BW3 + PT1**
3. **PR1 + PT1**
4. **PR3 + PT1**
5. **BW2 + PT1 + PT2**
6. **PR2 + PT1 + PT2**
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| Ericsson | Y | Regarding Huawei’s comment above, we think that a separate section 7.4 describing the UE processing timeline relaxation techniques has value, since at least the descriptions of the techniques and perhaps some of the impacts will be the same regardless of whether the techniques are combined with reduced bandwidth or reduced peak rate. The cost estimates for the combinations will anyway be in section 7.5. |
| Xiaomi | Y | Share the same view as Ericsson that a separate section 7.4 is needed. |
| Huawei, HiSilicon |  | Thank Ericsson and Xiaomi very much for responses.If its impact is independent of whether its is combined with reduced bandwidth or reduced peak rate, then would it be the same as what we have for Rel-17 RedCap?Similarly, it is unclear what the difference is between spec impacts being captured in 7.4.5 and that in Rel-17, what else that cannot be captured in 7.5.5 is.In our understanding, at least, the S7.4.2 can be removed, because of the following agreement,Agreement* The following options for relaxed UE processing timeline will be studied:
	+ Option PT1: Relaxation of UE processing time for PDSCH/PUSCH in terms of N1 and N2
	+ Option PT2: Relaxation of UE processing time for CSI in terms of Z and Z’
* UE complexity reduction estimates for relaxed UE processing timeline are only reported for combinations with UE bandwidth reduction or UE peak rate reduction.
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# References

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| [1] | [RP-213661](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_94e/Docs/RP-213661.zip) | New SID on Study on further NR RedCap UE complexity reduction | Ericsson |
| [2] | [R1-2204058](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2204058.zip) | Work plan for Study on further NR RedCap UE complexity reduction | Rapporteur (Ericsson) |
| [3] | [R1-2203121](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_109-e/Docs/R1-2203121.zip) | Draft skeleton for TR 38.865 Study on further NR RedCap UE complexity reduction | Rapporteur (Ericsson) |
| [4] | [TR 38.875 V17.0.0](https://www.3gpp.org/ftp/Specs/archive/38_series/38.875/38875-h00.zip) | Study on support of reduced capability NR devices (Release 17) | 3GPP |
| [5] | [RP-220966](https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_95e/Docs/RP-220966.zip) | Revised WID on support of reduced capability NR devices | Ericsson |