3GPP TSG-RAN Meeting #92-eRP-21xxxx

Electronic Meeting, 14-18 June 2021

Agenda Item: 9.7.1.7

Source: Email discussion moderator (Intel)

Title: Report from Email Discussion [92-e-14-RedCap-WI]

Document for: Discussion and decision

# 1 Introduction

This document reports on the following email discussion during RAN#92-e:

**[92-e-14-RedCap-WI]**

Input contributions covered: RP-211038, RP-211070, RP-211153, RP-211219, RP-211360--> RP-211492

## 2 Proposed WID revisions

RP-211038 is a WID revision from the rapporteur. RP-211153, RP-211219 are discussion documents from Vivo and Nokia respectively that also propose updates to the wording of the objectives. In summary, the following WID updates are proposed:

1. RRM measurement relaxation updated to reflect recent RAN2 agreements (proposed by all 3 documents)
2. Update to the objective on early indication to reflect that indication in both Msg1 and Msg3 will be specified (proposed by RP-211219)
3. Update to the objective on camping restrictions to add "frequencies/PLMN" (proposed by RP-211219)
4. Update to the objective on eDRX to state that CN configures eDRX for Idle and RAN configures eDRX for RRC\_Inactive (proposed by RP-211219)

### 2.1 Initial Round

In the initial round of discussion companies are invited to provide feedback on each of the 4 proposed updates to the objectives. The initial focus should be on the necessity of the updates and the detailed wording can be refined in later stages of discussion.

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| **1/ Companies are invited to provide any comments related to the updates to RRM measurement relaxation objective:** |
| **Company** | **Comments** |
| Ericsson | We appreciate other companies for looking in to how to update this objective. We believe that our proposal RP-211038 accurately captures the RAN2 status to a sufficient level of detail.Some comments on the other proposals:RP-211153: This proposal, while not going beyond any RAN2 agreements, misses some relevant agreements in RAN2 which we think deserved being captured correctly such as that Rel-16 is baseline. And what happens when the criteria are fulfilled in IDLE vs. CONNECTED.RP-211219: Some RAN2 progress is not captured clearly in the proposal (e.g. that RAN2 has agreed to use Rel-16 as baseline). Also this proposal goes beyond RAN2 agreements w.r.t. beam measurements. That has not been agreed yet. There was a working-assumption in RAN2 for how it would be added, if added. But no agreement has been made so far w.r.t. whether it will be added or not: 1. Working Assumption: If beam-level criterion is adopted for Rel-17 stationary criterion in RRC\_IDLE/INACTIVE, it is configured separately with Rel-16 low mobility criterion reused
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| LG | In general, we agree that updates to RRM measurement relaxation objective is necessary. RP-211038 is a good baseline because it captures RAN2 progress properly and sufficiently. Detailed wording can be discussed at the next round.  |
| NordicSemi | We support an update. |
| Apple  | We think RP-211038 is a better wording, but with the below modifications.We think the details of stationary criterion are not needed to be captured in the WID, as RAN2 agreements/discussion already reflect this, but we still have FFS in RAN2 and adding the sub-bullets negates this. We can leave this to the WG discussion.We also do not prefer to add ‘measurement’ before relaxation. The details of this can be discussed in RAN2/4.* + Specify RSRP/RSRQ based stationary criterion, which is based on Rel-16 low mobility criterion, for RRM measurement relaxation [RAN2]
		- ~~For RRC\_Idle/Inactive, the stationary criterion allows the UE to perform RRM measurement relaxation when fulfilled.~~
		- ~~For RRC\_Connected, the stationary criterion triggers the UE to send a report to the gNB when fulfilled.~~
		- Enabling/disabling of RRM ~~measurement~~ relaxation should be under the network’s control. Specify both broadcast and dedicated signalling for enabling/disabling of RRM ~~measurement~~ relaxation.
	+ ~~Specify provision of thresholds for the Rel-16 not-at-cell-edge criterion, alternatively rely on the existing thresholds [RAN2]~~
	+ Specify RRM ~~measurement~~ relaxation [RAN4]
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| T-Mobile USA | Power savings for RRM relaxation are any technical discussion on relaxation criteria should be done in RAN2.  |
| Huawei, HiSilicon | In general fine, however we do not see RAN4 impact as RAN2’s agreement currently had not yet made clear whether new RAN4 requirements are needed. So if update, we prefer to have RAN2 impact only as what exactly proposed in RP-211038. Therefore we see RP-211038 can be a good starting point with following two comments:1) Beam-level criterion was agreed as FFS in RAN2. We can say “e.g. RSRP/RSRQ based xxx”.2) We need to specify Rel-17 not-at-cell-edge criterion, rather than Rel-16. Some clarification here is needed maybe.* Specify support for the following RRM measurement relaxations for neighbouring cells for RedCap devices: for RRC\_Idle/Inactive/Connected [RAN2, RAN4]:
	+ Specify stationary criterion, e.g. RSRP/RSRQ based on Rel-16 low mobility criterion, for RRM measurement relaxation [RAN2]
		- For RRC\_Idle/Inactive, the stationary criterion allows the UE to perform RRM measurement relaxation when fulfilled.
		- For RRC\_Connected, the stationary criterion triggers the UE to send a report to the gNB when fulfilled.
		- Enabling/disabling of RRM measurement relaxation should be under the network’s control. Specify both broadcast and dedicated signalling for enabling/disabling of RRM measurement relaxation.
	+ Specify provision of thresholds for the Rel-17 not-at-cell-edge criterion, alternatively rely on the existing thresholds [RAN2]
	+ ASpecify RRM measurement relaxation [RAN4]
	+ No RRM measurement relaxations are specified for the serving cell.
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| DOCOMO | We are generally fine with the update from the rapporteur (RP-211038), which is based on RAN2 agreements, while not OK to preclude beam-level criterion from RAN2 discussion at this stage. We are fine either to have conclusion on beam-level criterion at this RAN plenary or to continue RAN2 discussion. |
| DENSO | RP-211038 can be a baseline for the revision. We’re O.K to keep “RRM measurement relaxation” as proposed, since it is exactly what RAN2/RAN2 is aimed at specifying. The other RRM than measurement is not the target in this objective. The suggestion from Huawei saying “e.g. RSRP/RSRQ” sounds reasonable, given the other criterion is FFS. On the following reivisions,* + - For RRC\_Idle/Inactive, the stationary criterion allows the UE to perform RRM measurement relaxation when fulfilled.
		- For RRC\_Connected, the stationary criterion triggers the UE to send a report to the gNB when fulfilled.
		- Enabling/disabling of RRM measurement relaxation should be under the network’s control. Specify both broadcast and dedicated signalling for enabling/disabling of RRM measurement relaxation.

The first and second bullets can be regarded as the details of the third bullet. Given that these are clear from the meeting note, there would not be necessary to be stated in the WID.On the not-at-cell-edge criterion, the original proposal in RP-211038 reflects two options agreed in the last RAN2 meeting. So, it is O.K to keep as proposed. |
| Deutsche Telekom | In general, we are fine with defining the related RRM measurement relaxation which might be mainly effective and relevant for stationary us cases. We remind the group that REDCAP also targets wearables which are to be used in medium (bicycles) and fast moving situation. Any impact on especially handover performance in such situations must be understood before agreeing on relaxations. The customer will not accept an increased HO failure rate due to relaxed RRM requirements. |
| Samsung | We prefer the updates in RP-211038 from the WI rapporteur among three alternatives. |
| Vodafone | In general fine with RP-212038: the important thing is that any RRM relaxation is under VPLMN control. |
| Nokia | We agree to update the RRM measurement relaxation objectives. Our view is that NW control is very important for RRM relaxations and NW should be able to control in dedicated manner the UE for all the RRC states. It is ok for us to use the proposal from the rapporteur as baseline for the updates but to help the progress both in RAN2 an RAN4 we see that some additional clarifications would be needed. In our view it would also be beneficial to confirm the RAN2 working assumptions as RAN4 also needs to work on its requirements. Below we have proposed updates on top of the WID update proposal from the rapporteur in RP-211038:* + Specify RSRP/RSRQ and beam-level based stationary criterion for RRM measurement relaxation, which is based on Rel-16 low mobility criterion, for RRM measurement relaxation [RAN2]
		- For RRC\_Idle/Inactive, the stationary entering/leaving criterion allows/disallows the UE to perform RRM measurement relaxation when fulfilled. For further network control, gNB should be able to allow RRM measurement relaxation in dedicated signalling.
		- For RRC\_Connected, the stationary entering and leaving criterion triggers the UE to send a indication to the gNB when fulfilled. Based on this indication gNB can enable/disable RRM measurement relaxation.
		- Enabling/disabling of RRM measurement relaxation should be under the network’s control. Specify both broadcast and dedicated signalling for enabling/disabling of RRM measurement relaxation.
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| **2/ Companies are invited to provide any comments related to the updates to the objective on early indication:** |
| **Company** | **Comments** |
| Ericsson | We agree to the change. |
| LG | We do not agree to the change. The removal of “or” from ‘Msg1 and/or Msg3’ is against RAN2#114 agreement that “either” Msg1 and/or Msg3 early identification will be supported. |
| NordicSemi | We see benefit from supporting early identification in both MSG1 and MSG3, but early indication shall not be in both MSG1 and MSG3 at the same time. This should be clarified in objectives. In addition, gNB may have option not to configure early identification in any of those.  |
| FUTUREWEI | We do not agree to the change. There is no need to support Msg 3, as evidenced by the working assumption in RAN1: “for 4-step RACH, support the early indication of RedCap UEs at least in Msg1”. Either we remove Msg 3, or let the WGs continue their work without update of the WID.  |
| Apple  | Same view as LG. we do not agree to removal of ‘or’.  |
| T-Mobile USA | T-Mobile USA doesn’t see the need for early indication, if we have to have the feature then it’s impact should be minimal. We agree with LG’s comment |
| Huawei, HiSilicon |  If the change means we need to support both Msg1 and Msg3 for early identification from specification point of view, we are fine. On the other hand we think when and whether to use Msg1 and Msg3 is up to the network configuration, i.e. the network can configure either Msg1, or Msg3, or both for early identification. So it is better to have a common understanding on whether “or” here allows flexibility of network configuration before removing it. |
| DOCOMO | We don’t agree with the update. Either Msg1 (which was agreed as working assumption in RAN1) or existing UE capability reporting based on NW configuration is enough for RedCap UE indication.  |
| DENSO | Same view as LG and Apple. Better not to discuss here and should be left to RAN WGs to decide. |
| Deutsche Telekom | Early indication was agreed as baseline in RAN#91e for operators accepting the relaxation down to 1 Rx (instead of 4). It seems that RAN2 has not (yet) defined the early indication. We co-signed an input to RAN#92e on this in [RP-211360]. We should not reopen the agreement from RAN#91e, otherwise we operator re-open the discussion if 1 Rx is allowed for REDCAP … 😉 |
| Telecom Italia | Same view as DT |
| Samsung | We don’t agree on the change. It can leave to WG discussion on whether both msg 3 and msg 1 can be used for early indication  |
| Vodafone | The network controlled capability to have an early indication of the UE’s RedCap capability in either Msg 1 or Msg 3 is sufficient for us. |
| BT | As explained by DT above, the early indication was part of the compromise agreement for accepting the relaxation to 1 Rx rather than 4 Rx. We consider that this agreement should be respected in the work in RAN2, otherwise we would support re-opening the discussion on the scope of RedCap, and in particular the question of permitting 1 Rx.  |
| Nokia | We agree to the change. It is also important to note that it has already agreed earlier and clearly defined in the WID objectives that the early indication is configurable by the network. Therefore, msg3 is needed when msg 1 is not configured. RAN1 has agreed that Msg1 indication should be configurable by the network. If network does not configure Msg1 indication, then Msg3 indication is clearly needed in order that the UE can be scheduled correctly before the RRC Connection is established.Regarding LG’s comments we have different view. In our understanding “either” Msg1 and/or Msg3 means "Msg1 and Msg3" or "Msg1 or Msg3". |

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| **3/ Companies are invited to provide any comments related to the update to the objective on camping restrictions to add "frequencies/PLMN":** |
| **Company** | **Comments** |
| Ericsson | We do not understand why "frequencies" is added and what it implies.About adding "PLMN", would be reverting the following RAN2 agreement:The cell barring for RedCap UE is per cell (not per PLMN). Hence we do not agree with these changes. |
| LG | Agree with Ericsson.  |
| NordicSemi | Same opinion as Ericsson |
| Apple | Agree with Ericsson |
| T-Mobile USA | We don’t agree with adding the new language. Support Ericsson’s comment.  |
| Huawei, HiSilicon | Agree with Ericsson. |
| DOCOMO | We share the view with Ericsson on “PLMN” that it is precluded by the RAN2 agreement.Regarding “frequencies”, we would like to ask proponent to clarify the intention |
| DENSO | Agree with Ericsson |
| Deutsche Telekom | We disagree with the observation (RAN2 agreement?) that Cell barring for REDCAP is per cell … it needs to be (per cell) per PLMN – otherwise MOCN network sharing is not supported correctly, where different operator policies regarding REDCAP allowance might exist. This needs to be corrected in RAN2 |
| Telecom Italia | Same view as DT. Network sharing has to be taken into account when defining RedCap |
| Samsung | Agree with Ericsson |
| Vodafone | The “per PLMN” category raises security concerns that would need to be addressed to SA3. A NAS signalling reject would be more appropriate for PLMN/TA control (and would benefit from a NAS Capability Bit for ‘RedCap UE’). |
| BT | We support the comments from Deutsche Telekom and Telecom Italia. |
| Nokia | We agree with the update proposal. It seems that our proposal was unclear. Intention of our proposal was that the NW can signal frequencies supporting RedCap. Such information is available in in the network. It was discussed in RAN2 meeting whether cell barring or PLMN barring should be supported. We think that both can be supported. Information which frequencies and PLMNs supports RedCap would be useful for the UE for power saving purposes because UE can then skip scanning of the frequencies not supporting RedCap. In addition it was discussed in RAN2 that network could broadcast list of cells supporting RedCap. In our view, this would require unnecessary coordination between gNBs and would result in significant broadcast signaling overhead. Therefore, it would be better to broadcast frequencies supporting RedCap and in addition information whether RedCap is not supported on the whole PLMN. |

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| **4/ Companies are invited to provide any comments related to the update to the objective on eDRX:** |
| **Company** | **Comments** |
| Ericsson | This is in-line with RAN2 agreements and is fine. |
| LG | The change properly captures RAN2 agreement. However, it seems true that current objective has no problem, i.e. no strong need to update WID on this aspect.  |
| NordicSemi | We do not see that RAN2 agreements are against current objectives. No need for any update. |
| Apple | The current objective seems to be fine. |
| Huawei, HiSilicon | OK, aligned with RAN2 agreement. |
| DOCOMO | We are fine with the update, which is aligned with RAN2 agreement |
| DENSO | Whilst the update is aligned with RAN2 agreement, we’re not sure if the WID objective has to be updated to reflect what to do for that objective… The original objective seems sufficient to work on this objective. |
| Samsung | RAN 2 already made clear agreement. We don’t see the need to update WID.  |
| Vodafone | OK, it seems to be aligned with RAN2 agreement. |
| Nokia | We agree with the update proposal. |

## 3 RP-211070

RP-211070 discusses some of the WG discussions on RedCap and makes the following proposals:

* **Proposal 1**: WGs shall follow the approved WID and the related compromised discussion together with the approved WID. If necessary, it is recommended that all companies or Rapporteurs or Feature leaders should track the RAN discussion procedure and the implied meanings of WID to avoid unnecessary discussion in WGs.
* **Proposal 2**: If deemed necessary, a joint GTW or joint email discussion can be considered among different WGs in future to assist the standardization of R17 RedCap.

### 3.1 Initial Round

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| **Companies are invited to provide any comments related to the proposals in RP-211070** |
| **Company** | **Comments** |
| Ericsson | P1: We already think it is established that WGs should follow the WIDs.P2: We do not think a joint session between WGs will be fruitful. |
| LG | We agree with P1. On P2, We do not think a joint session between WGs is really necessary.  |
| NordicSemi | We do not think joint sessions between WGs are of any benefit, it is typically difficult to find common language between WGs. However, RAN should discuss how to handle overlaps between WIDs, for example for Early identification of RedCap UE and Early identification of UE requiring coverage enhancements. |
| FUTUREWEI | P1. The WID directs the work, and RAN conclusions (if there are any) are followed along with the WID. Unclear what we need to agree to here, we are uncomfortable formalizing a new tracking procedure or including feature leads in the working procedures.P2. We do not think a joint GTW / email discussion is necessary |
| Apple  | Similar views as Ericsson. P1: Our view is that the approved WID has been tightly followed by working grouping. P2: We did not identify specific Redcap topic that motivates the joint session. We had separate agenda in RAN1 to handle RAN2-Led topics/issues and many of them were concluded to leave to RAN2 decision unless RAN1-relevant context was clearly identified.  |
| T-Mobile USA | No new process is needed, RAN requires each project to provide a status report and if the WG’s aren’t following the WID then that is the time to flag the SR and have a discussion at plenary.  |
| Huawei, HiSilicon | Proposal 1 should already be the existing way that delegates work, Proposal 2 can be done in an alternative way, that WGs do their leading topics and if coordination is required, measures like LSs can be triggered. We think the current way works well. So in summary we see no need to agree these proposals. |
| DOCOMO | P1: No agreement is necessary as it is common understanding among companiesP2: We don’t think joint GTW or email discussion is necessary |
| DENSO | Agree with the others commented so far. P1 is the existing and conventional procedure delegates have been working so far. Based on the past history, the joint session does not always bring the useful outcome, whilst it requires the longer discussion than expected originally.  |
| Deutsche Telekom | (strange discussion) It is obvious that the WG SHALL follow the guidance of the RAN plenary and not reopen or repeat discussion which have let to a RAN plenary decision. If guidance is not clear it is the responsibility of the WG chair together with the WI rapporteur to collect input to the topic and provide guidance to fine an agreeable WF. If further RAN plenary guidance is needed, either the WG chair reports this or a LS is sent to RAN* No further discussion needed on this document -
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| Samsung | Current working procedure is clear, and we don’t see motivation to have joint session.  |
| Nokia | We do not see need for a joint GTW or email discussion. It is of course important that all WGs follow the agreed WID objectives. |

## 4 RP-211492 (revision of RP-211360) - Early indication of number of Rx branches

RP-211492 (revision of RP-211360) discusses the need for early indication of number of Rx branches and makes the following proposals:

* **Proposal 1**: include the information on the number of Rx branches supported by a RedCap UE within the early indication during the initial access
* **Proposal 1b**: if Proposal 1 is agreed, RAN to send a LS to RAN1 and RAN2 to take the agreement into account for their normative work
* **Proposal 2**: if Proposal 1 is not agreed, RAN to task RAN1 to identify pros and cons of having the information on the number of Rx branches supported by a RedCap UE within the early indication during the initial access for the purpose of RACH procedure efficiency; RAN1 will then liaise with RAN2 so that RAN2 agreement from RAN2#104-e meeting can be revisited accordingly (if needed)

### 4.1 Initial Round

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| **Companies are invited to provide any comments related to the proposals in RP-211492** |
| **Company** | **Comments** |
| Ericsson | For Msg1-indication: The issue with this proposal is that it will cause even more partitioning of the preambles. Already now RAN2 are discussing partitioning of preambles for: Coverage enhancements, RedCap vs. non-RedCap, Slicing, and SDT. To partition even further would cause twice as many partitions. It is perhaps not a feasible way forward to partition too much.For Msg3-indication: perhaps it would be possible to indicate the nrof Rx branches. |
| LG | In RAN2#114, RAN2 concluded that there is no need to support Rx branch-specific early identification from RAN2 perceptive (final decision up to RAN1). In RAN1#105e (May), there was a RAN1 conclusion declaring no consensus to support early identification of the number of Rx branches in Msg1/Msg3/MsgA for Redcap UE in Rel-17. So, from procedural point of view, we think RX branch-specific early indication is not well justified.  |
| NordicSemi | We agree with Ericsson that there cannot be early identification for everything. Moreover, MSG2 repetitions could be bundled with MSG3 repetitions and could be discussed under CovEnh WID? |
| FUTUREWEI | Early identification is useful to address the resulting performance degradation due to a reduced number of Rx branches.There is no critical problem with allowing the *possibility* of RX branches by configuration. The motivation should be clear from RAN discussion, where early identification was included as part of the discussion to allow 1RX. If an operator does not see the benefit, then they won’t configure it.Note: regardless of 1RX early identification, the WGs can design RSRP thresholds for ROs which could differently handle “poor” RedCap UEs. |
| Apple  | Like what LG mentioned, RAN2 does not see the need to differentiate. In RAN1, this issue (i.e., early indication of Rx branches number) was also extensively discussed in RAN1 105 e-meeting under Agenda 8.6.1.2. The detailed pros/cons analysis for each option was conducted and documented in Table 1 of FL summary R1-2106125. Based on two rounds debating, the following was concluded in GTW session based on majority companies’ views:  Conclusion* No consensus to support early identification of the number of Rx branches in Msg1/Msg3/MsgA for Redcap UE in Rel-17

Given the fact that this issue has been extensively discussed and explicitly concluded in RAN1/RAN2, as commented by LG, we did not see the need of any of these proposals.  |
| T-Mobile USA | T-Mobile USA doesn’t support early indication; thus we agree with Ericsson, LG and Apple’s comments.  |
| Huawei, HiSilicon | This has already been discussed in RAN1/RAN2 and not agreed, thus we do not see need to reopen this discussion. According to the study in TR 38.875, the DL coverage of 1Rx could be similar as the case of 2Rx and thus early identification seems not essential. On the other hand more early identification would make the situation worse for RACH partitioning as REDCAP and non-REDCAP UEs has already required early identification via Msg1.if the intention is to bar UEs differently for 2Rx and 1Rx, it is already agreed to support such differentiation in SIB1 as “SIB1 (not MIB) indicates cell barring for 1 Rx branch and 2 Rx branches separately for RedCap UEs.”. |
| DOCOMO | We don’t support the proposals. Corresponding WGs already have made following conclusions and thus no further discussion is necessary:[RAN1]**Conclusion:*** No consensus to support early identification of the number of Rx branches in Msg1/Msg3/MsgA for Redcap UE in Rel-17

[RAN2]AgreementThere is no need to support Rx branches specific early identification from RAN2 perceptive (final decision up to RAN1). |
| DENSO | As agreed by RAN2, it is reasonable to make the final decision by RAN1. Since RAN1 didn’t agree on not supporting the early indication in Rel-17, but it was concluded as “no consensus”, it could be discussed by RAN1 based on company contributions, if time is permitted.  |
| Deutsche Telekom | This also relates to the clear process which is established in 3GPP and not followed by the WGs. It is the responsibility of the WG chair to make clear that the groups follow the RAN plenary guidance.Early indication of the number of Rx branches has been agreed as part of the “compromise” in RAN#91e allowing to go down to 1 Rx. The document clearly lists the agreement from RAN#91e.If early indication (no preference for msg 1 or 3 from our point – can be left to RAN1/2 decision) is not defined in RAN2 than we re-open the discussion on the number of Rx for REDCAP and request limiting it to 2 Rx, where 4 Rx are mandatory for none-REDCAP devices. |
| Telecom Italia | We of course support the proposal. The current RAN1 and RAN2 assumptions are reverting the RAN plenary guidance. As clearly stated in the contribution, if there is no differentiation, a further inefficiency is introduced in the network, which has to plan for the worst case scenario (1 Rx antenna) |
| Samsung | RAN 1 and RAN 2 had studied and discussed the early indication of the number of RX branches. There is no consensus in RAN 1 on the support of early identification of the number of Rx branches. No need to discuss it again in RAN.  |
| Vodafone | If the UE was in RRC Inactive then the existing Rel 15 UE Capability handling framework would seem to provide the RAN with the number of UE rx antennas at Msg 3. We are also concerned about the number of features proposing PRACH resource partitioning.RAN 1 has already evaluated many of the pros and cons. |
| BT | We support the proposal as we believe that early indication of the number of Rx branches is essential for efficient operation of our network.  |
| Nokia | We do not see need for the WID updates but we see that it would be important to urge RAN2 to progress its work on Rx branch specific barring per frequencies and dedicated control for RRM measurements for all RRC states, especially as so far RAN2 has not been able to confirm these objectives although the objectives should be clear. |

## Annex: Contacts

Please provide a company contact that the email discussion moderator can contact if required.

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| **Company** | **Contact name and email** |
| Ericsson | Mattias Bergström (mattias.a.bergstrom@ericsson.com) |
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