

[94e-14-R18-MobEnh] - Version 0.0.9

RAN

3GPP TSG RAN Meeting #94-e

RP-213541

Electronic Meeting, December 6<sup>th</sup> – 17<sup>th</sup>, 2021

Source: MediaTek

Title: Moderator's summary of discussion for [94e-14-R18-MobEnh]

Agenda item: 8A.2

Document for: Report

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## 1 Introduction

As per guidance from the chairman, this discussion will take place during the first week of RAN#94-e. The discussion will take place on the revised draft WID uploaded to the Drafts Folder in sub-folder [94e-14-R18-MobEnh], showing changed compared to RP-212710 (October outcome).

Please note the deadlines for commenting for Initial, Intermediate, Final phase, as provided by the chairman in the "Draft RAN#94-e\_Timeplan".

Please also take note of the company contributions submitted to the meeting on this topic, listed below.

**Table 1:**

<u>RP-212950</u>	Mobility related CA/DC enhancements in Release 18	Nokia, Nokia Shanghai Bell
<u>RP-213009</u>	Discussion on the scope of Rel-18 Further NR mobility enhancements	Intel Corporation
<u>RP-213276</u>	Views on NR further mobility enhancement	vivo
<u>RP-213221</u>	Comments on Rel-18 mobility draft WID	Huawei, HiSilicon
<u>RP-213357</u>	L1/L2-based Mobility Enhancements in Rel-18	MediaTek Inc.
<u>RP-213374</u>	Views on Mobility Enhancement	Apple

<u>RP-213375</u>	WID modification for Rel-18 Mobility Enhancements	Apple
<u>RP-213463</u>	Discussion on Rel-18 Mobility enhancement	ZTE, Sanechips

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## 2 Initial Phase

### 2.1 Justification section

I made some minor wording updates to the Justification section, so please indicate if these are helpful.

Please also comment on any areas where you believe that the Justification is not aligned with the “existing” listed Objectives only. Please do NOT propose added justification for objectives that you would like to see but are not yet covered, as this will be handled in a later phase of the discussion.

#### **Feedback Form 1: Justification comments**

<p><b>1 – Apple Computer Trading Co. Ltd</b></p> <p>Agree that the justification description is aligned with the existing listed objective in general. But it needs to be further updated when the objective part is stable. In addition, the WI should also include the RAN4 work since the new cell change scheme and new measurement needs the new requirements defined in RAN4.</p>
<p><b>2 – MediaTek Inc.</b></p> <p>Yes, the updated wording is good for us.</p>
<p><b>3 – Intel Corporation (UK) Ltd</b></p> <p>In general, the changes from Moderator look good. Just small clarifications:  For MR-DC with selective activation of cell groups, the benefit is to reduce the signalling overhead and interruption time for SCG change instead of CPC/CPAC. See below changes:  This results in a reduction of the signalling overhead and interrupting time for SCG changeCPC/CPAC.</p>
<p><b>4 – HuaWei Technologies Co.</b></p> <p>Regarding the justification part of CHO and MR-DC, we understand the objective “3. To specify CHO including target MCG and target SCG if it cannot be completed in Rel-17 [RAN3, RAN2]” can be completed in Rel-17, thus the corresponding justification can be updated accordingly. But we are okay to wait for the conclusion of this email discussion. Other than that, we are in general fine with the revised justifications.</p>
<p><b>5 – ZTE Corporation</b></p> <p>We can keep current justification as it is and do the update based on the discussion on objectives (if necessary).</p>

<p><b>6 – New H3C Technologies Co.</b></p> <p>We are fine with current justification with updated wording.</p>
<p><b>7 – LG Electronics France</b></p> <p>Fine</p>
<p><b>8 – China Mobile Com. Corporation</b></p> <p>We are fine with the current version.</p>
<p><b>9 – Ericsson LM</b></p> <p>Fine in general. Polishing needed once the scope of the WI is settled.</p>
<p><b>10 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine with the modified justification.</p>
<p><b>11 – Nokia Corporation</b></p> <p>Generally the justification section looks ok. Small clarifications could still be done but all the justification updates can be done once the objectives are agreed.</p>
<p><b>12 – InterDigital France R&amp;D</b></p> <p>We are fine with the modified justification.</p>
<p><b>13 – TURKCELL</b></p> <p>We're fine with the modified version.</p>
<p><b>14 – VODAFONE Group Plc</b></p> <p>We are fine with the modified justification (v00 reviewed).</p>
<p><b>15 – Spreadtrum Communications</b></p> <p>We are fine with the modified justification.</p>

## 2.2 Objective 1: L1/2 mobility-related

The proposed objective 1 is the following below:

*To specify mechanism and procedures of L1/L2 based inter-cell mobility for mobility latency reduction:*

- *Configuration and maintenance for multiple candidate cells to allow fast application of configurations for candidate cells [RAN2, RAN3]*
- *Dynamic switch mechanism among candidate serving cells (including SpCell and SCell) for the potential applicable scenarios based on L1/L2 signalling [RAN2, RAN1]*
- *L1 enhancements, including inter-cell beam management, L1 measurement and reporting, beam*

indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]

- Note: early RAN2 involvement is necessary, including the possibility of further clarifying the interaction between this bullet with the previous bullet.
- CU-DU interface signaling to support L1/L2 mobility, if needed [RAN3]

Note 1: FR2 specific enhancements are not precluded, if any.

Note 2: The procedure of L1/L2 based inter-cell mobility are applicable to the following scenarios:

- Standalone, CA and NR-DC case with serving cell change within one CG
- Intra-DU case and intra-CU inter-DU case (applicable for Standalone and CA; no new RAN interfaces are expected)
- Both intra-frequency and inter-frequency
- Both FR1 and FR2

## 2.2.1 All sub-objectives "except" L1 enhancements sub-objective

Please indicate, using the feedback form below, if you have any critical comments on the above RAN2 and RAN3-led components of these objectives and the points in Note 1 and Note 2. Note that these aspects have only received minor corrective updates by the RAN Chairman since the October email discussion, and no input documents, so I hope companies agree that they can be considered stable.

### Feedback Form 2: Comments on L1/2 mobility "except" L1 enhancements

<p><b>1 – Apple Computer Trading Co. Ltd</b></p> <p>Agree that the justification description is aligned with the existing listed objective in general. But it needs to be further updated when the objective part is stable. In addition, the WI should also include the RAN4 work since the new cell change scheme and new measurement needs the new requirements defined in RAN4.</p>
<p><b>2 – MediaTek Inc.</b></p> <p>Yes, we think this can be considered stable.</p>
<p><b>3 – Intel Corporation (UK) Ltd</b></p> <p>Current scope Looks ok.</p>
<p><b>4 – Samsung Research America</b></p> <p>For CU-DU interface signaling, we see a clear signaling enhancement over F1. Thus, we would like to suggest to remove the term "if needed" in the following objective:</p> <ul style="list-style-type: none"><li>– CU-DU interface signaling to support L1/L2 mobility, <del>if needed</del> [RAN3]</li></ul>

<p><b>5 – HuaWei Technologies Co.</b></p> <p>We are fine with the current objectives of L1/L2 mobility from the moderator.</p>
<p><b>6 – ZTE Corporation</b></p> <p>We are fine with current objective in general, but we think there may be some changes needed depending on the outcome of the discussion for Objective 2 below.</p>
<p><b>7 – Guangdong OPPO Mobile Telecom.</b></p> <p>We think the current objectives are clear and prefer to keep it as it is.</p>
<p><b>8 – New H3C Technologies Co.</b></p> <p>we are fine with current objective</p>
<p><b>9 – LG Electronics France</b></p> <p>Fine</p>
<p><b>10 – China Unicom</b></p> <p>We are fine with the L1/L2 mobility objectives summarized by the moderator.</p>
<p><b>11 – Verizon UK Ltd</b></p> <p>Agree with the moderator’s summary.</p>
<p><b>12 – China Mobile Com. Corporation</b></p> <p>Agree.</p>
<p><b>13 – Ericsson LM</b></p> <p>Fine</p>
<p><b>14 – Nokia Corporation</b></p> <p>We are fine with the description of this objective</p>
<p><b>15 – InterDigital France R&amp;D</b></p> <p>We are fine with this current objective.</p>
<p><b>16 – HuaWei Technologies Co.</b></p> <p>RAN4 Chair: To Apple, no matter whether it is an explicit indication that RAN4 should be involved for a certain objective, RAN4 will do the normative work to specify the requirements based on RAN1/2 design to ensure the good performance of new techniques in the practical network. If the objective explicitly involves RAN4, it means the design needs the special input from RAN4. So it depends on expertise consensus whether the special input from RAN4 is needed or not.</p>

**17 – HuaWei Technologies Co.**

RAN4 Chair: in section 4.2 of draft WID, the core part is placed in the wrong place. It is better to have a dedicated objective to make clear whether and what RAN4 requirement (RF core, RRM core, RRM perf) are needed. For example, RAN4 RF core requirement is needed for objective #xxx, RAN4 RRM core requirement is needed for objective #yy.

**18 – TURKCELL**

It looks stable. We're fine with the objective.

**19 – Spreadtrum Communications**

We are fine with the current objectives.

### 2.2.2 L1 enhancements sub-objective

I would like to make the L1 enhancements sub-objective (copied below) clearer if possible in terms of what is intended to be addressed, in order to avoid parallel discussions in RAN1/2 on improving the same protocol stack functions.

- *L1 enhancements, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]*
  - *Note: early RAN2 involvement is necessary, including the possibility of further clarifying the interaction between this bullet with the previous bullet.*

Contributions [RP-213276](#) and [RP-213357](#) propose to address aspects with this sub-objective. In particular, please address the following points:

- Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?
- Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.

#### **Feedback Form 3: L1 enhancements sub-objective comments**

**1 – vivo Mobile Communication Co.**

1. Our understanding on "L1 enhancement" is what mentioned after "including", e.g. inter-cell beam management, L1 measurement/reporting, etc. Thus, we think we should NOT remove "including". Whether the L1 functions could replace L2/3 functions could be further discussed during WI phase in WG.
2. We think non-synchronized scenario are not just related to TA handling, but also related to measurement and measurement report, etc. We think measurement and corresponding report for both synchronized and non-synchronized scenarios should be considered for L1/L2 based inter-cell mobility. There is no reason to exclude any of them for now. It is better to indicate non-synchronized scenario as separately. So we suggest to update it as:

**L1 enhancements for both synchronized and non-synchronized scenarios, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]**

## **2 – DOCOMO Communications Lab.**

Please find NTT Docomo comments in bold.

*Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?*

**==> We're okay with current L1 enhancements in the WID. We believe we're optimizing existing L1 functions, which can be applied on top of existing L2/L3 functions.**

**==> Keeping 'including' would be better. Otherwise, it is not clear what the 'L1 enhancements' refer to without 'including'.**

*Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.*

**==> TA enhancement is important for un-sync. scenario. Whether TA management is a L1 enhancement or higher layer enhancement depends on the detailed design. For example, TAG like enhancement involves higher layer enhancement, while TA adjustment is more like L1 enhancement. For this TA enhancement for un-sync. scenario, we're open to list it as a separate item to consider potential different levels of enhancement.**

## **3 – Apple Computer Trading Co. Ltd**

1. On whether or not keep 'including' in the first bullet, our preference is to keep it as in current draft WID to make the L1 enhancement direction/areas as concrete as possible.

2. On the TA management, we think it depends on the exact designs, which should be part of discussion in normative WI phase. This bullet should be formulated to open for both L1-based (e.g. inter-cell TA adjustment) and higher layers (e.g. RACH-skip during the cell change) solution as well. The need to separate TA is not very clear since it would involve both RAN1 and RAN2.

## **4 – MediaTek Inc.**

MODERATOR CLARIFICATION: The term "Including" suggests that other areas not mentioned are not necessarily excluded. By removing "including", my intention was not to remove detail, but instead to make it clear that it only includes the areas that we state.

## **5 – Lenovo (Beijing) Ltd**

We suggest to explicitly indicate that both sync and non-sync cases are included.

## **6 – KDDI Corporation**

1. we are not sure whether we can list up all L1 features, so we prefer to keep it as it is.

2. In our understanding, TA enhancement can be used for both sync and un-sync case, so we prefer to have sentences to which can cover both cases.

## **7 – MediaTek Inc.**

- We think that the "beam management" and "beam indication" mentioned in this sub-bullet overlap with "dynamic switch" in previous sub-bullet. These are likely to be enhancements for Rel-17 inter-cell beam management (i.e., ICBM with serving cell change), and for UE-initiated beam failure

recovery/beam selection. While RAN1 involvement is needed, we should avoid parallel discussions in RAN1 and RAN2. Our suggestion is that the work starts from RAN2 since inter-cell mobility is the focus, and RAN2 triggers corresponding RAN1 discussions.

- L1 measurement and reporting may be considered as L1 enhancements and started directly in RAN1, considering e.g., CSI-RS (for mobility) as measurement resources in L1/L2-based inter-cell mobility
- TA management for non-synchronized scenario should also start from RAN2.

## **8 – SHARP Corporation**

We think that the L1 enhancements should be discussed assuming "including". The roll of L1 and L2/L3 function should be discussed during the work. About the TA management, this also should be discussed during the work.

## **9 – Intel Corporation (UK) Ltd**

We believe current scope captured potential RAN1 enhancements well although we may identify other impacts during the discussion. Regarding the TA management for non-synchronized scenario, the required discussion/work is whether existing TA management is sufficient for non-synchronized scenario and what enhancement should be made for TA management. Of course, it is a kind of TA management is cross layer feature between PHY and MAC. In addition, some RRC parameter will be required. We do not see the need to discuss whether it is L1 or high layer TA management since anyway both RAN1 and RAN2 are listed as responsible WGs.

## **10 – China Telecommunications**

1. We prefer to keep the "including" as it can give the guidance on what we should focus on when designing the L1 enhancements functions, as for the L1 enhancements is refer to optimize existing L1 functions or replace L2/3 function, it depends on the detailed design during the normative WI phase.
2. We think both L1 and high layer solutions for TA management should be studied during the WI phase, so we are open to list TA management as a separate item.

## **11 – CATT**

1. we think the part after 'including' should be kept as it gives important info as to what is going to be enhanced.
2. we agree TA management impacts both ran1 and ran2. no strong view regarding whether to use a separate bullet or not, as long as the impacted WGs are listed.

## **12 – Samsung Research America**

Regarding L1 enhancements, we are fine to keep the enhancements listed: inter-cell beam management which includes L1 measurement and reporting, and beam indication.

Furthermore, we would like to add "power control handling" because it's a fundamental L1 functionality. TA management for non-synchronized scenarios can be kept as part of the L1 enhancement. This doesn't preclude L2 enhancements on top of the L1 enhancements because RAN2 is already listed a secondary WG.

Hence, we suggest the following update:

*- L1 enhancements, including for inter-cell beam management, including L1 measurement and reporting, beam*



*indication, power control handling, and for non-synchronized scenario to handle TA management [RAN1, RAN2]*

### **13 – HuaWei Technologies Co.**

1) We think the current L1 objective is clear enough. Rel-18 L1/L2 mobility is targeting at “dynamic serving cell change”. Thus L1 measurement, reporting and beam indication should be designed to facilitate such “dynamic serving cell change”, which is quite different from R17 where the serving cell remains unchanged. In addition, the RAN2-led objectives are mainly to address the procedure of “dynamic serving cell change” for various applicable scenarios, which is based on “L1 enhancements” from RAN1, with which the work load split is sufficiently clear. Also we expect RAN1 work to start one quarter later after RAN2 initial discussions, and thus we don’t see a risk of parallel discussions in WGs.

2) We think RAN1 has better expertise on how to obtain TA for non-synchronized cases, and the detailed approaches can be discussed in the normative phase. As RAN2 has been included in impacted WGs we don’t see a need to have a separate RAN2 item on TA management.

### **14 – ZTE Corporation**

We are fine with the current objective.

### **15 – New H3C Technologies Co.**

We are supportive for the current objective

### **16 – LG Electronics France**

The main enhancements of this objective are L1-driven but the enhancements are not entirely isolated to L1 enhancements but possibly include some joint enhancements to L2/L3(RRC) as well. For instance, inter-cell BM and L1 measurement and reporting require signaling support in L2/L3 at least. In addition, RLM enhancements, which were briefly discussed during R17 feMIMO, can be considered to better support feMIMO and/or feMIMO capability-based mobility in R18, which require a joint discussion in RAN1 and RAN2 (and possibly RAN4). Given the considerations, it seems better to modify the objective as follows:

- *L1/L2 enhancements, including but not limited to inter-cell beam management, L1 measurement and reporting, beam indication, radio link monitoring, and for non-synchronized scenario to handle TA management, if beneficial[RAN1, RAN2]*

Regarding TA, we are not sure if there is any problem with the current wording, because extra TA management is not necessary in synchronized scenarios but required only in asynchronous scenarios. BTW, the wording “sync” and “async” seems to lack a strict definition.

### **17 – Verizon UK Ltd**

In general, we are fine with the proposal. For TA enhancement, as an operator we don’t have a strong view on RAN1 or RAN2, separated listing or not, as long as non-synchronized scenarios are covered along with synchronized scenarios.

### **18 – China Mobile Com. Corporation**

For Q1, it is clearer to keep the “including” since following details explain what we found to study so far. But we are open to have modified scope of L1 enhancement during the discussion. As for the potential function overlap between L1 and L2/L3, this should be discussed during WI phase.

For Q2, we prefer to explicitly point out that the scenario includes both sync and non-sync. Without detailed discussion, we don't think the TA management need to be limited to L1 enhancement. TA management can be listed as a separate item.

#### **19 – Ericsson LM**

On the note on "early RAN2 involvement": Perhaps clearer would be to say that RAN1 should use / await guidance from RAN2 for these functions.

#### **20 – Nokia Corporation**

- *Which L1 enhancements do companies propose for this sub-objective and what is the justification? Are they optimizing existing L1 functions or replacing a L2/3 function? Can we remove "including"?*

L1 inter-cell mobility requires enhancements for L1 beam measurement reporting to capture the measurements of neighbouring cells and L1 signalling message instructing the cell change. These enhancements are expected to be carried out by extending the existing L1 functions.

- *Views appreciated on whether the TA management for the non-synchronized scenario is a L1 enhancement, or whether higher layer solutions are also applicable (separate item). Please provide technical rationale for your preference.*

As for the TA management for the non-synchronized scenario, there are different options:

·Option 1: The UE needs to perform random access to the target cell to acquire the timing advance. In this case, the random access is not enhanced which is similar to L3 mobility procedures (baseline handover, conditional handover, etc.).

·Option 2: The UE acquires the timing advance for the target cell before the cell change is triggered. In this case, the UE can switch to the target cell in a RACH-less manner.

If TA management of target cell to be achieved using option 2, it will require some L1 enhancements. Thus, both L1 enhancements and higher layer solutions should be considered to evaluate all the possible options.

#### **21 – China Unicom**

We agree with the above clarification that the 'L1 enhancement' means what the objectives shown after 'including'. So "including" should not be removed to avoid any confusion on the objectives. For TA management, we think it can be used for both sync and non-sync case, and the detailed design can be left for discussion during WI phase.

#### **22 – InterDigital France R&D**

We think the current bullet is fine. We can leave it upto the WI itself to determine which L1 enhancements are needed. Regarding TA management, we think this will involve both L1 and L2, so we should not further identify whether it is in the scope of only RAN1 or RAN2 at this stage.

#### **23 – ZTE Corporation**

Some further views from RAN1 perspective:

The UE initialized reporting, and dynamic activation for L1 based neighbouring cell measurement, and unified TCI framework further applying to Scenario-2 should be considered. Of course, some pre-configuration

for neighbouring cell (e.g., DL/UL channel/RS resource besides for TCI state associated with a PCI different from serving cell) and dynamic activation should be considered based on L2/L3 function. We are open to remove or have ‘including ...’.

Then, we think that TA management for non-synchronized scenario also involves L1 enhancement. As we mentioned before, the TCI based TA indication and PDCCH order RACH transmission for neighbouring cell both should be considered. Of course, the pre-configuration/association between TCI state and TA for TCI based TA indication, and between RACH transmission and SSB/CSI-RS for PDCCH order RACH transmission should be considered well with the assistance of higher layer signaling.

#### **24 – TURKCELL**

We’re generally fine with the objective.

#### **25 – MediaTek Inc.**

In view of the comments, we think that the dynamic cell switch procedure (based on e.g., inter-cell BM) should be started in RAN2. L1 enhancements may include L1 measurement reporting and potential L1 signalling instructing cell change.

### **2.3 Objective 2: NR-DC related L3 enhancements**

The proposed objective is:

*To specify mechanism and procedures of NR-DC with selective activation of the cell groups via L3 enhancements:*

- *To allow subsequent CPC/CPAC after changing SCG without reconfiguration and re-initiation of CPC/CPAC [RAN2, RAN3, RAN4]*
- *TBD: whether Rel-17 CPC/CPAC mechanism is used as the baseline*

Please provide comments in particular on:

- Whether you believe that inclusion of MCG and NR-standalone is justified and why. Also please give your view on level of additional workload vs SCG, and relation to Objective 1. [RP-213009](#) argues for such an extension.
- Your view and rationale on the remaining ”TBD” point, including whether you believe enabling via a network command is justified and why ([RP-213009](#) and [RP213221](#) make different arguments), and usage of Objective 1 functionality for such a network command ([RP-213463](#)).

*See contributions [RP-213009](#), [RP-213221](#), [RP-213463](#) for Objective 2.*

**Feedback Form 4: Objective 2: NR-DC L3 enhancements  
comments**

### 1 – DOCOMO Communications Lab.

As for potential inclusion of MCG, we are wondering what the potential use-case is, considering that supporting MCG would lead to additional complexity.

We suppose the main target deployment scenario is FR2 MCG, potentially in a predictable mobility - we can think of an AGV moving along a certain path as an example. We are not sure the case only justifies the impact, and happy to discuss other promising use cases.

Regarding TBD, our quick assessment is that we can re-use CPC/CPAC if MCG is not included, and not otherwise.

### 2 – Apple Computer Trading Co. Ltd

1. We support to cover the MCG change in this objective. The MCG is also possible to be configured and deployed on FR2 and the MCG change will happen frequently, therefore, the similar SCG enhancement is also needed for the MCG change case. To avoid the additional work load, we agree to limit the enhancement in NR SA and NR-DC.

2. For TBD, we think both the condition based (i.e. CPC/CPAC based enhancement) or NW command triggered cell/SCG change procedures can work well. In our understanding, for the NW command triggered solution, the framework is same as L1/L2 mobility (in objective 1), but the cell change command is the L3 signaling instead of L1/L2 command. So we are fine to study both solutions in the normative WI phase.

### 3 – Lenovo (Beijing) Ltd

The motivation of this Objective is mainly to support the switch between multiple SCGs without changing MCG, especially when MCG uses FR1 and SCG(s) uses FR2. Inclusion of MCG and NR-standalone scenario shall be discussed separately.

It is ok to take Rel17 intra-SN inter-SN CPC as baseline. Regarding if NW can indicate “selective as activation of cell groups” via NW command, it may need further assessment (e.g. as part of WI) under a general principle that it shall provide better performance (w.r.t., latency, complex) compared to the legacy L3 based SCG reconfiguration/switch.

### 4 – KDDI Corporation

First we should clarify what should be done to support MCG case.

we are not so motivated to add the objective considering the limited time units.

If we identify what should be done to support MCG case, and the relevant task seems to be small and acceptable to everyone, we are ok.

### 5 – MediaTek Inc.

- **Inclusion of MCG and NR-standalone:** This is like keeping CHO candidates after HO/CHO. We have discussed this idea in Rel-16 but it was eventually not adopted due to concern about RRC responsibility (requiring UE to keep RRC configurations of previous serving cell). For SCG, the candidates should be in the coverage of the same PCell, and thus selective activation makes more sense. Therefore, we prefer not to include MCG and NR standalone scenarios.
- **Network command:** Technically speaking, selective activation can be triggered by network command, and this can be based on L1/L2 signaling since candidate cell RRC configurations have been provided to UE in advance. Then we think selective activation with network command should be considered as a part of Objective 1. In other words, L1/L2 inter-cell mobility may support not only

PCell change but also PSCell change. And in Objective 2, we consider only L3-based procedures (enhancement of CPAC mechanism).

#### **6 – Intel Corporation (UK) Ltd**

As proponent, our thinking is:

The motivations to support MCG and NR SA are:

1 As with CPC/CPAC, so far CHO configuration will be released after successful HO. And therefore the UE cannot perform subsequent CHO unless the network configures it again to the UE after the HO. Therefore the interruption time and signalling overhead are impacted for MCG change if we use CHO as specified today;

2 the solution to support MR-DC for selective activation of Cell groups for SCG is quite similar to the solution that would be needed for MCG. We can support both of them in the same release with only little additional efforts;

Regarding the network command, we see two benefits for it:

1 Can address load balancing scenario which cannot be supported by execution condition;

2 Leaves more flexibility to the network. The network may trigger the switching taking account of other reasons, and can trigger the switching faster, and the network is aware of when the UE will move to the target that is more predictable than execution condition based switching.

#### **7 – SHARP Corporation**

We think the main target of the selective activation is for SCG, so the discussion for SCG case should be prioritized due to the limited TU.

#### **8 – vivo Mobile Communication Co.**

1. Regarding inclusion of MCG and NR-standalone: Our initial assessment on the impact is network provide configuration for multiple candidate MCG, while selective actiation based on L3 enhancements, which could increase the performance of reliability and latency reduction. Similar mechanism has been discussed in Rel-16 Mobility, and not too much complexity will be introduced. We are fine to include it in the objective.

2. Regarding "TBD", we could take CPAC mechanism as the starting point for selective activation of SCG. But network indication through L3 signaling should not be excluded by now. It could be further discussed in WG if time is allowed.

#### **9 – China Telecommunications**

1. We think we should first discuss the SCG change scenarios and then expand the mechanism to the MCG change cases if time allows.

2. We think both CPAC based enhancement (UE triggered) and NW triggered mechanism should be supported for this objective, the detailed solutions can be discussed in the WI phase.

#### **10 – CATT**

First of all we prefer to go for a simple and manageable objective. Therefore we believe objective 2 should not have interaction with L1/L2 mobility, meaning that it is purely L3 procedure. Furthermore, again for the sake of simplicity we believe it is important to use Rel-17 CPAC as baseline, which means we will need to focus on SCG case.

### **11 – Samsung Research America**

- We see a benefit on inclusion of MCG an NR SA case. It would be useful to minimize Uu signaling overhead, especially with subway/train use cases.
- Since it is not assumed that the additional workload is critical with network command, we have no negative view on enabling via network command.
- For the selective activation of the cell groups, we would like to prioritize L3 enhancements over L1 enhancements.

### **12 – HuaWei Technologies Co.**

- 1) No, we don't think MCG and NR-standalone needs to be added. For MR-DC cases, the frequent MCG change is not justified as we understand normally MCG should be deployed at FR1 band with better coverage. In addition, the inclusion of MCG and NR-standalone cases would significantly increase the work load for considering more cases, e.g. MN change with and/or without SCG change.
- 2) As we explained in RP-213221, we think more workload is seen for RAN2 and RAN3: in the solution of SCG change triggered by the network, RAN2 needs to discuss how to send the prepared SCG configurations of candidate SNs to the UE, and also needs to discuss how to send the SCG change command to the UE after the MN or source SN decides to change the SCG; RAN3 will also need to discuss new procedures including the preparation and modification of the candidate SN resources, early/late data forwarding. So we suggest to reuse Rel-17 CPC/CPAC mechanisms.

### **13 – NEC Corporation**

Basically, current scope has been derived from the previous long discussions and thus we would like to keep it and not add something more. Otherwise, we will need more TUs or not complete the work on time. From technical aspect, it is not seen as necessary compared to SCG in Rel-18.

### **14 – ZTE Corporation**

There are two aspects:

- Whether this applies only to SCG
- Whether CPC/CPAC framework can be used as baseline

Considering the configuration and maintenance for multiple cell groups will be supported anyway for intra-CU inter-DU L1/L2 mobility, we think actually that the MCG change will already be supported based on objective 1 (at least for the intra-CU case). Then, we think similar signaling framework can also be used for NR-DC with selective activation to support SCG change at least for the intra-CU case. We think this is the typical case for FR2 (i.e. the intra-CU mobility).

Actually, from our point of view, it will be quite strange if we restrict the applicability of such framework only to MCG change but not for SCG change.

Therefore, we think it is too early to take the CPC/CPAC framework as baseline for NR-DC with selective activation, and we propose to keep it open and do the down selection in WI phase with better understanding on the framework of intra-CU inter-DU L1/L2 mobility

In addition, we understand there is some overlap between NR-DC with selective activation and L1/L2 mobility for intra-CU inter-DU case. Considering the limited time in RAN plenary and since the details

need WG input, we prefer to leave the detail discussion on framework in WI phase for the two cases. However, if companies want to merge the two cases into one objective, then we prefer to include both cases in MR-DC with selective activation (i.e. objective 1 focus on cell level switching, and objective 2 focus on cell group level switching) based on the following consideration:

- Different from intra-DU L1/L2 mobility, inter-DU mobility will require MAC reset/RLC reestablishment and PDCP recovery, thus the corresponding procedure for intra-CU inter-DU mobility will be quite similar as the cell group activation/deactivation/switching required for MR-DC with selective activation.
- Considering the L1/L2 reset and F1-U path switching in inter-DU mobility, ping-pong HO has to be avoided, which is also different from intra-DU case, where ping-pong switching seems not a big issue. To avoid the ping-pong HO in inter-DU case, we think similar triggering mechanism as MR-DC with selective activation shall be considered instead of the L1 measurement based triggering.

So, we think the objective should be revised and we think either the revised objective in RP-213009 Or the one in RP-213463 can be used for this.

#### **15 – Guangdong OPPO Mobile Telecom.**

We prefer to focus on SCG for selective activation of cell group considering the load of R18 mobility enhancement. And inclusion of MCG and NR-standalone scenario will bring extra complexity, especially for the security issue.

Regarding to the issue on whether UE or network triggers the SCG change, we think current CPC/CPAC mechanism can be reused, i.e. the UE autonomous triggers CPC/CPAC based on configured execution condition.

#### **16 – LG Electronics France**

In general, we think the required workload of the objective1 is substantial, and therefore it is very important to keep the scope of other objectives very well-defined and strictly limited.

We think extending the objective to MCG (CHO) is not really essential given that SCG operating on a higher frequency range is more vulnerable and hence considered as a primary focus. So, we think limiting the scope to CPC/CPAC should be fine in this WI. Just in case SCG-related enhancements achieve sufficient progress in Rel-18 and extending the enhancements to MCG turns out to require trivial extra efforts, RAN may be able to consider extending the outcome on the SCG to MCG at that time (e.g. via TEI18 or a slight WID revision) but not earlier than that.

For the TBD part, we think we should take CPC/CPAC as a baseline because a) designing a completely new thing would impose unnecessarily higher load in RAN2 and RAN3, and b) taking CPC/CPAC as baseline does not block any enhancements being considered in practice.

#### **17 – China Mobile Com. Corporation**

1. We prefer to limit the scenario to SCG change and are open to extension for MCG and NR SA only if time allows.
2. We found it is useful and flexible to have the NW triggered selective activation based on pre-configured cells. If the cell pre-configuration procedure for UE-triggered solution can be reused to L3 NW-command solution, the workload seems acceptable to us.

## 18 – Ericsson LM

We see some overlap of this objective and what CHO and L1/L2 mobility can do. We hope to not define two solutions for the same problem to avoid market fragmentation and burden the already heavily loaded WGs. We need to consider the workload in the WGs.

## 19 – Nokia Corporation

- *Whether you believe that inclusion of MCG and NR-standalone is justified and why. Also please give your view on level of additional workload vs SCG, and relation to Objective 1. RP-213009 argues for such an extension.*

We support the extension of this objective to selective activation/switching of MCG in MR-DC and NR standalone scenario.

Similar to SCG use case, the UE can be at the cell edge where it can switch back and forth among two or three MCGs. This is particularly relevant for FR2 where inter-cell interference may not be that critical (due to analog/hybrid beamforming) and the radio link of the UE is more susceptible to e.g. obstruction and hand blockages. Herein, the UE can switch fast among the cells without the need to re-initialize the CHO preparation which reduces the signalling overhead and improve mobility robustness, i.e., handover can be triggered immediately by the UE without being impaired by the additional delay that is needed to re-prepare the cells.

The extension of the objective to include MCG in standalone NR (and MR-DC) will cause additional workload. However, there are a lot of synergies with the SCG selective activation use case that can be leveraged.

- *Your view and rationale on the remaining "TBD" point, including whether you believe enabling via a network command is justified and why (RP-213009 and RP213221 make different arguments), and usage of Objective 1 functionality for such a network command (RP-213463).*

Triggering the subsequent cell change by the UE based on radio measurements may be enough. However, we are also open also to consider the triggering of the cell change by network signalling in case the reason for triggering is not necessarily radio-driven, e.g., network may consider load in different inter-frequency SCGs for triggering the cell change.

## 20 – InterDigital France R&D

We think the inclusion of MCG and standalone is justified and we think the should be no/limited workload to have the work extended to MCG. Although a similar framework with objective 1 is possible, we think objective 1 targets L1/L2 mobility, while this objective is an enhancement to L3 mobility, so the solutions are very different. Regarding the TBD point, we should avoid already limiting CPC as the baseline, both to allow NW triggered mobility, but also to consider additional triggers for CHO/CPC that are better applicable to the selective activation scenario (beyond just measurement events).

## 21 – China Unicom

Network triggered solution seems more flexible and no much workload will be added into the WI if NW-triggered solution and UE-triggered solution reuse some similar mechanism. Thus it's proposed to include both CPAC based solution and NW triggered solution can be supported in the objective.



## 22 – Futurewei Technologies

We are fine to also cover MCG change in the objective to support uniform FR1 and FR2 deployment.

We also think network triggering can be considered as well.

Limiting the works to NR-DC provides balance in workload and potential benefits.

## 2.4 Objectives 3 and 4: CHO enhancements

The following objectives are proposed here:

3) To specify CHO including target MCG and target SCG if it cannot be completed in Rel-17 [RAN3, RAN2]

4) To specify CHO including target MCG and candidate SCG for CPC/CPAC [RAN3, RAN2]

– CHO including target MCG and target SCG is used as the baseline

Please indicate if you agree/disagree that Objective 3 can be completed within Rel-17, and therefore removed as a Rel-18 objective, proposed in RP-213221.

Please also indicate if you have any comments on Objective 4. *Note that there were no input documents on this.*

### Feedback Form 5: Objective 3 and 4 (CHO enhancements) comments

#### 1 – Lenovo (Beijing) Ltd

There are different understanding for 4).

- Understanding#1: no target SCG is configured for CHO. After completing CHO, UE has only MCG. UE starts to evaluate the condition for candidate SCG for CPA . UE performs CPA once CPA condition is met.
- Understanding#2: though no target SN is configured for CHO, UE will keep source SN for the case of CHO including target MCG. That means UE has DC after completing CHO. After completing CHO, UE evaluates condition for candidate SCG for CPC. Once condition is met, UE performs CPC.

If understanding #1 is correct, only CPA configuration is sufficient. If understanding#2 is correct, CPC configuration is sufficient.

Another comment for wording: *CPC/CPAC=>CPA/CPA because CPAC includes CPA and CPC.*

#### 2 – MediaTek Inc.

- We agree that Objective 3 can/should be completed within Rel-17, and therefore removed as a Rel-18 objective.
- The terminology of “candidate” and “target” in Objective 4 may be a bit confusing. Our understanding is that a MCG in conditional reconfiguration should be considered as a “candidate” when configured, and becomes “target” when selected for CHO execution (conditions met). This objective seems about

having one candidate MCG and multiple candidate SCGs; it may be rephrased as “To specify CHO including one candidate MCG and multiple candidate SCGs for CPAC”.

**3 – Intel Corporation (UK) Ltd**

We agree that objective 3 can be completed within Rel-17, and therefore can be removed from the R18 WID.

**4 – vivo Mobile Communication Co.**

We agree objective 3 could be completed in Rel-17.

**5 – China Telecommunications**

We agree to remove objective 3 since it can be supported in R17.

**6 – Samsung Research America**

We would like to keep “if it cannot be ...” since it seems difficult to currently confirm the completion in RAN3 works, e.g. We need discussions about the coordination with the CPAC progress on early data forwarding, F1/E1 impact, and stage-2 for the MN-initiated release of the source SN.

**7 – Spreadtrum Communications**

We agree to remove objective 3 .

**8 – HuaWei Technologies Co.**

Proponent, we understand objective 3 can be completed within Rel-17.

**9 – NEC Corporation**

For Objective 3, it is not wise to discuss assume or not assume it is completed in Rel-17. We should base on what is the fact (later). So far, the current description is what we can do and can be kept.

**10 – ZTE Corporation**

We also think there is a good chance to complete the objective 3 in Rel-17.

**11 – Guangdong OPPO Mobile Telecom.**

As RAN3 is expected to complete the work of CHO + MR-DC where the target PCell can provide a CHO configuration consisting of both target MCG and target SCG configuration in Rel-17. It is reasonable to remove objective 3.

**12 – New H3C Technologies Co.**

We are supportive for removing objective 3.

**13 – LG Electronics France**

We think Objective 3 should be a Rel-18 objective because we don't think RAN2 will be able to complete it on Rel-17 due to lack of time.

For objective 4, we are fine with the current wording.

<p><b>14 – China Mobile Com. Corporation</b></p> <p>We agree to remove objective 3.</p>
<p><b>15 – Ericsson LM</b></p> <p>We think that objective 3 can be removed as it seems it will be completed in Rel-17. But we can wait with the removal until when Rel-17 has been completed (i.e. in a March or June updated of the WID).</p>
<p><b>16 – Nokia Corporation</b></p> <p>RAN3 is currently working on objective 3 in TEI Rel. 17 and it is very likely that the basic support for this would be completed. However, as long as RAN3 did not complete its work, objective 3 can be kept in the WID description and revisited once RAN3 concludes his work on this objective in TEI Rel. 17.</p> <p>Objective 4 is a new topic that needs to be addressed in Rel. 18.</p>
<p><b>17 – InterDigital France R&amp;D</b></p> <p>We agree that objective 3 will be handled as part of Rel17 and can be removed.</p>
<p><b>18 – China Unicom</b></p> <p>We support to remove objective 3.</p>
<p><b>19 – TURKCELL</b></p> <p>We agree to remove objective 3.</p>

## 2.5 Mobility-related FR2-specific CA/DC enhancement (Nokia proposal, RP-212950)

Please provide feedback on the additional proposal below. In order to further focus this proposal, I would like to understand which aspects in particular companies feel need improvement and how. In later phase we will discuss extra workload.

*To specify mobility related FR2-specific CA/DC enhancements [RAN2, RAN4]*

- *Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]*
- *FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]*

### **Feedback Form 6: FR2 mobility-related CA/DC enh. comments**

<p><b>1 – Verizon UK Ltd</b></p> <p>Thanks for adding this topic back. If this is to be dropped, at least it shall be dropped openly.</p>
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## 2 – Spark NZ Ltd

Spark NZ

we support the proposal in RP-212950 and specifically:

To specify mobility related FR2-specific CA/DC enhancements [RAN2, RAN4]

- Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]
- FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]

## 3 – KT Corp.

Based from our commercial FR2 deployment, this is one of the area where necessary enhancement should be added in Release-18. We support to add Objective as written above.

## 4 – DOCOMO Communications Lab.

From commercial point of view, we are very interested in the topic which was unfortunately (we hope temporarily) removed by non-technical confusions, if found feasible from workload point of view.

As it addresses SCG/SCell setup, the use case is much more fundamental and wider than other objectives. In recent deployment including FR2, measured addition of the SCG/SCell is getting more important.

## 5 – SoftBank Corp.

Considering FR2 deployment, it is important to improve FR2 usability and we think it is beneficial approach to reduce FR2 SCell/SCG setup delays. So we support adding this objective in Rel-18 MobEnh scope.

## 6 – MediaTek Inc.

- For RAN2 procedure part (first sub-bullet of the proposed objective), the Rel-16 early measurement reporting procedure could already report FR2 cells; it is unclear what to be improved in this procedure.
- For RAN4 RRM part (second sub-bullet of the proposed objective), we understand that in FR2, due to measurement delay, good cells found in Idle mode may not be good choices when UE enters connected mode, and thus throughput enhancement is not as good as expected even with EMR. However, it is still unclear to us what UE can do to achieve better early measurements without increasing power consumption. We'd like to see some examples of what can be done, and what the impacts on UE are.

## 7 – Intel Corporation (UK) Ltd

For “*FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times*” – FR2 RRM enhancements was identified as one of topics in the RAN4 Rel-18 email discussion (RP-212682) with measurement delay reduction listed as one of the topics. It is better to avoid overlapping discussions across different WIs and the proposal can be merged into RAN4 RRM enhancements work.

It is unclear what changes will be for RAN2. RAN2 should only work on it if RAN4 's changes have impact on RAN2.

## **8 – Nokia Corporation**

For Mediatek: As shown in our system level simulations and analyses presented in the June workshop in RWS-210079 and contribution to RAN#94e, the current early measurements, which are based on idle mode measurements reported in connected mode, do not work well for FR2. This means that for FR2 deployments idle mode measurements reported in connected mode may indicate wrong cell to be used for SCell activation. This is due to a fact that radio conditions may change rapidly in FR2 beam based deployments even with low and moderate UE speeds. Therefore, it is important for RAN2 to enhance procedures and criteria to improve FR2 SCell/SCG setup delays and early measurement reporting. It is also important that RAN4 defines the corresponding UE RRM requirements as usual.

For Intel: RAN4 may also define additional UE RRM measurement enhancements. The proposed RAN4 requirements under this item are related to the RAN2 enhancements for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]. And as usual the RAN4 requirements should be in the same WID as the corresponding work in other RAN WGs.

We have updated our contribution in RP-213515 to include additional supporting companies (Source: Nokia, Nokia Shanghai Bell, TELUS, Verizon, Telecom Italia, Telefonica, KT), which propose this work to be included to the Rel-18 Mobility Enhancement work item as already discussed in RAN#93e and in the workshop.

## **9 – China Telecommunications**

We are supportive of FR2-specific enhancements for CA and DC, if time allows, we are fine to study the potential solutions in R18.

## **10 – vivo Mobile Communication Co.**

We are open to study the enhancements for FR2-specific mobility, while the only concern is the limited TU assignment for this project.

Besides, we would like to understand more about the work in RAN2: what kind of procedure and criteria to improve SCell/SCG setup delay or early measurement reporting.

## **11 – TELECOM ITALIA S.p.A.**

As indicated by other operators, we think this is a critical issue in commercial FR2 deployment.

Therefore it should be in the scope and even prioritized with respect to other objectives

## **12 – Deutsche Telekom AG**

We think that FR2 specific mobility enhancements are not relevant in Rel-18 timeframe and should be dropped for workload reasons.

## **13 – TELEFONICA S.A.**

We support FR2-specific enhancements for CA and DC and should be prioritized in Rel-18 Mobility Enhancement work item

**14 – NEC Corporation**

We are open for this basically but we believe it will require additional TUs if this is to be added. Since the total TUs cannot grow, this may be a problem.

**15 – ZTE Corporation**

In general we agree with the motivation of this objective.

However, without the necessary feedback from RAN4 upfront, it is a bit unclear what enhancement can be pursued for RAN2 related procedures or criteria. If the main intention is to reduce the RRM evaluation time for FR2 cells in EMR, then we think it can also be merged to RAN4 RRM enhancement. In any case, the work should first be done in RAN4 and if there is anything needed from RAN2, this work can be triggered by RAN4 based on an LS.

So, in case majority view is to include this objective, we should at least make it clear that RAN4 is the leading group for this.

**16 – Telia Company AB**

We see that FR2 mobility related CA/DC enhancements proposed by Nokia in RP-212950 are important for high performing commercial deployments in the future network roll-outs and crucial especially taking into account Release 18 timeframe and the needed capacity from FR2 layer.

**17 – HuaWei Technologies Co.**

We are not sure the exact impacts on RAN2 specification, since we understand RAN2 has specified the procedure for the early measurement configuration and reporting. If the motivation is to specify additional RRM requirement in order to reduce the measurement delay for FR2, this seems more suitable to be discussed together with other RAN4 FR2 RRM enhancements.

**18 – Verizon UK Ltd**

Agree with many operators above - this is one of the most practical scenarios where obviously the performance is lacking and 3gpp has not taken it seriously. As Nokia showed, things like early measurement report may functionally work on paper but not in real world. I think if 3gpp wants to spend a little effort study, working on this is far more meaningful and efficient than many other studies on futuristic/academic/-less practical items because this is mostly a mobile network operators' issue, not WIFI users' issue, and it can only be addressed by 3gpp, while items in many other R18 studies will benefit from the research and study of all industries and institutes in the world.

**19 – New H3C Technologies Co.**

The impact on RAN2 specification on *FR2-specific CA/DC enhancements* isn't clear to us. we hope proponent to clarify it. In addition, it is better for RAN4 to lead this objective if majority views support it.

**20 – LG Electronics France**

We think these FR2-specific enhancements are something to be considered but it is not crystal clear what enhancements related to EMR are intended with this objective. Hence, if anything related to this objective is attempted, it should clarify its justification and enhancements in more detail. On the TU side, however, we think the current draft TU budget for this WI cannot accommodate these enhancements. One potential

placeholder for this enhancement would be CA(/DC) enhancement WI, which then adds RAN2 TU budget for CA(/DC) enhancement WI.

#### **21 – TELENOR ASA**

We think this is critical for commercial FR2 deployment and support the proposal.

#### **22 – China Mobile Com. Corporation**

We agree with the intention of this objective and prefer to have a more detailed manifestation.

#### **23 – Nokia Corporation**

We have provided further details including solutions examples for the RAN2 and RAN4 objectives.

*Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCell/SCG setup delays and early measurement reporting [RAN2]*

One way we think would be beneficial is to reuse the EMR framework in NR Rel-16, but with the additional measurements during connection setup in order to ensure higher UE measurement accuracy for FR2 deployments. The UE indicates to the network the availability of measurements during connection setup/resume which can assist the network in (MR)-DC setup and configuration.

*FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times [RAN4]*

In addition to the fact that for FR2 the current EMR i.e. idle mode measurements reported in connected mode do not work for FR2 like discussed in our contributions and earlier comments, also the current FR2 UE RRM requirements are very relaxed, which may lead to a situation that the UE indicates outdated measurements to the network that are no longer useful for FR2 SCell/SCG setup. Therefore, it is important to ensure that RAN defines suitable requirements for the enhanced RAN2 procedures and criteria. However, considering how relaxed the current FR2 UE RRM requirements are it is rather unrealistic to assume that FR2 UE RRM requirements can be improved to the same level as FR1 requirements. The work item should focus on

FR2 UE RRM Requirements for FR2 early measurement report enhancements to reduce FR2 SCell/SCG cell setup times. General FR2 UE RRM requirements enhancements can be then done in a separate RAN4-led item, which is common practice for other topics as well.

#### **24 – Ericsson LM**

We would be OK with this objective it is limited to **only** RAN4 work. We do not think we should (or need to) change RAN2 procedures to improve FR2 mobility.

#### **25 – China Unicom**

The motivation of the objective seems attractive. We are open to discuss this if time allows.

#### **26 – TURKCELL**

We support FR2-specific CA/DC enhancement. It's critical for commercial FR2 deployment.

## 27 – China Telecommunications

We are open to study the FR2-specific mobility enhancement if time allows.

## 2.6 RACH-less handover (Apple proposal, RP-213374/RP-213375)

Please provide feedback on the additional proposal below, including views on the relationship/independence with/from Objective 1, and amount of extra work.

*To specify mechanism and procedure for mobility latency reduction which does not require the support of MIMO or DC.*

- *Configuration and operation of LTE-like MBB and RACH-less handover [RAN2, RAN1]*

### Feedback Form 7: RACH-less handover comments

#### 1 – Apple Computer Trading Co. Ltd

We support the LTE-like RACH-less and MBB handover scheme, since it is simple and easily implemented by the UE for HO interruption time reduction.

The terminal forms supported by the market and standards are becoming increasingly diversified. so the R18 mobility enhancement should bring the benefit to the different UE types. The WI scope should cover the enhancements not only for the powerful UEs who are equipped equipped with the MIMO or CA/DC capability, but also the simple solutions (e.g. RACH-less, MBB) for the low-end UEs.

#### 2 – KDDI Corporation

we support this proposal.

#### 3 – MediaTek Inc.

- **Make-before-break (MBB):** In LTE, MBB means that after handover command, UE continues communication with source cell until some point before sending preamble. In intra-cell L1/L2 mobility, after TCI state indication, UE continues using old TCI state before switching to new TCI state. Inter-cell L1/L2 mobility is expected to inherit such make-before-break characteristics. However, there may be some requirements (e.g., extra hardware or protocol stack) for UE to prepare for target cell while communicating with source cell. We can discuss the requirements in Objective 1, and then apply them to MBB in L3 handover.
- **RACH-less:** This can be discussed together with TA management in Objective 1.

#### 4 – Intel Corporation (UK) Ltd

The additional gain is unclear compared with existing dedicated PRACH resource/2-step RACH, in addition we will have ways that further reduce the latency in Rel-18, i.e. L1/L2 mobility and MR-DC with selective activation of Cell groups, therefore we do not see the need to consider this in Rel-18 .



**5 – vivo Mobile Communication Co.**

We are not sure whether this is needed if L1/L2 based inter-cell mobility has been specified, as there may be less benefit on top of L1/L2 based mobility.

Apple made a very good comment that these simple solutions could be used for low-end UEs. Thus, we should firstly identify in which use case that low end devices have requirement on interruption time.

**6 – Samsung Research America**

It would be still useful to provide higher performance to low-cost NR UEs. We would like to point out that we have developed the Redcap UEs, and MBB and RACHless are beneficial to such UEs.

Furthermore, LTE MBB and RACHless are good baselines, and the additional workload would be trivial.

**7 – Guangdong OPPO Mobile Telecom.**

We agree RACH-less HO is beneficial for latency reduction during HO, while L1/L2 mobility can also reach similar goal. Considering the workload of R18 mobility enhancement, we prefer to postpone the study of RACH-less HO to later release.

**8 – NEC Corporation**

We think this should not be added in Rel-18 scope, as current scope is already well justified and wide enough.

**9 – ZTE Corporation**

We support the MBB+RACH-less since it can provide a good balance between performance and complexity. In addition, we notice the RACH-less is also proposed in NTN WID, it is important to avoid parallel discussions on this in both Wis, so, it should be clarified which WI will actually be responsible for this work.

**10 – HuaWei Technologies Co.**

As indicated in the objective 1, it is applicable to both FR1 and FR2, which can be regarded as a generic approach to address the mobility latency. Hence we don't see a need to introduce another approach also serving for the similar purpose in the same release, as we heavily discussed before.

**11 – New H3C Technologies Co.**

Because the objective 1 already considers mobility latency reduction, we aren't sure whether we need introduce additional scheme to address mobility latency issue with consideration of the limited TU and work load.

**12 – LG Electronics France**

We would like to drop this objective for the following reasons: a) we already have a DAPS solution for interruption reduction at least for FR1, and seeking another solution just for less complexity is not sufficiently justified. b) we do not think mobility optimization for PCell on FR2 is not urgent, and c) the required workload for this objective may not be trivial due to beam considerations. Then, the current TU budget cannot simply accommodate this objective without removing other objectives that are already stable. We do not want to jeopardize the overall stability of the scope of this work item.

**13 – China Mobile Com. Corporation**

We are open to this if time allows.

**14 – Ericsson LM**

MBB can be used for scenarios where neither DAPS nor L1/L2-mobility can be used (e.g. for inter-CU and when DAPS is not supported). The RAN2 impact could hopefully be fairly small but RAN4 requirements need to be specified of course.

RACH-less for NR will be more complex and different than for LTE due to beams. In Rel-16, 2-step CFRA was introduced for handover with the understanding that this would make RACH-less for NR not needed.

**15 – Nokia Corporation**

We support the objective of reducing the mobility interruption time without requiring MIMO or DC. This is helpful for inter-CU/inter-gNB FR2-FR2 scenarios which is neither addressed by objective 1 nor DAPS (which did not consider FR2-FR2 handover). Moreover, considering that UE vendors are reluctant to implement DAPS, there is need for a simpler method to reduce the interruption time not only in FR2-FR2 scenario but also in FR1.

As for the solutions, we are open to consider the listed options: LTE-like MBB and RACH-less handover. However, we would also like to extend the scope of RACH-less handover to work for other common scenario where the target cell does not necessarily have the timing advance value set to 0 or equal to that of source cell. As discussed in Rel. 16, “Single Active Protocol Stack” handover was proposed as enhancement to LTE RACH-less where the UE acquires the timing advance of the target cell before the cell change is triggered by the network. This increases the applicability of RACH-less handover to all scenarios including the common scenario where the timing advance of the target cell is different from that of source cell or non-zero. We would like to broaden a bit the scope of the proposed solution to include as well enhancements for LTE RACH-less.

**16 – InterDigital France R&D**

We agree with the reasoning of the apple proposals, in that the enhancements in the current WID target only UEs supporting MIMO and DC. We would be fine with addition of work on MBB and RACH-less to target UEs with limited capabilities, as long as we agree LTE is used as a baseline, and there is very limited deviation from that baseline (in order to avoid a significant increase in the workload).

**17 – China Unicom**

We are fine with RACH-less if time allows.

**18 – TURKCELL**

We are supportive of this objective.

**19 – VODAFONE Group Plc**

We support the proposal from Apple.

**20 – Facebook**

We support the proposals.

## 21 – Futurewei Technologies

As L1/L2 mobility and quick activation of selective CG can already address latency and signaling overhead issue, it is not clear that additional options of MBB and RACH-less would bring more incremental benefits. Given the workload of Rel-18 and limited use scenarios of MBB and RACH-less approaches, we don't think they should be added in Rel-18 scope.

## 2.7 Summary of initial phase

### Justification section:

- No issues so far. Update based on agreements.
- Modifying CPAC to SCG change proposed and seems reasonable, as there are still discussions about whether to use CPAC or not as baseline.

**Moderator proposes:** Continue based on minor updates in next round.

### Objective 1:

- First 2 sub-objectives can be considered stable.
- L1 enhancements proposal to clarify scope:
  - Companies felt that current objective was clear enough, and clear that there would be no overlap between RAN1 and RAN2.
  - Regarding TA for unsynchronized, different views on whether this would be based on higher layer approach or lower layer approach. Also some companies want to discuss TA mgmt. for synchronous cases.
- **Moderator proposes:**
  - Discuss further the TA management for synchronized cases.
  - Clarify that the TA discussion can consider higher layer as well as L1 enhancement solutions for asynchronous cases.

### Objective 2:

#### Whether to apply only to SCG or to extend to MCG.

- Network command approach seems to be less clear, and concerns about specifying duplicated features raised.
- A number more companies were against inclusion of MCG than supporting it.

**Moderator proposes:** Maintain the current scope for Objective 2. Not include MCG.

- CPAC used as baseline or not:
  - Majority wanted CPAC as baseline.
  - Different views on whether to apply a NW command. Use case was mainly for inter-CU and load balancing.
  - **Moderator proposes:** Use CPAC as baseline. Downscope the L3 network command approach.

Objective 3:

- Different views on whether it will be completed or not in Rel-17.
- **Moderator proposes:** Leave in Rel-18 WID for now, and we revise the WID later based on Rel-17 progress.

Objective 4: No real issues, but should discuss further some minor wording clarifications.

**Moderator proposes:** Discuss further minor wording updates.

CA/DC for FR2 mobility:

- Many operators supporting efforts to improve the indicated scenario by the proponent.
- RAN2 and RAN4 RRM objectives proposed.
  - More clarity would be useful on the expected RAN2 impacts, as unclear what they are.
- **Moderator proposes:** Discuss further. Suggest that RAN4 would need to lead and start any work.

LTE-like MBB and RACH-less handover:

- Support for this for inter-CU scenarios at least, and for cases where MIMO is not used.
- **Moderator proposes:** Discuss further whether this can be part of Objective 1, and identify if we can easily apply some aspects to L3-based mobility without really increasing the workload.

RAN4 requirements:

- These need to be added more clearly (core and performance). RRM core requirements and a performance part need further discussion.
- **Moderator proposes:** Further discuss on RAN4 objective formulation.

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### 3 Intermediate Phase

#### 3.1 WID update

v02 proposes minor changes to Justification and Objective 4, as discussed in the initial phase. Is this acceptable?

**Feedback Form 8: WID update feedback**

<b>1 – InterDigital France R&amp;D</b> We are fine with the changes
<b>2 – Qualcomm CDMA Technologies</b> It is fine.
<b>3 – DOCOMO Communications Lab.</b> Fine
<b>4 – vivo Mobile Communication Co.</b> We are fine with it.
<b>5 – KDDI Corporation</b> We are fine with the changes.
<b>6 – Apple Computer Trading Co. Ltd</b> For Objective 4 on RAN4 requirements, it should also include the requirements for the L3 based mobility enhancement.
<b>7 – New H3C Technologies Co.</b> We are fine with the modification.
<b>8 – China Telecommunications</b> We are fine with the modification.

<p><b>9 – LG Electronics France</b></p> <p>Fine</p>
<p><b>10 – MediaTek Inc.</b></p> <p>Yes, the updated Justification and Objective#4 are good for us.</p>
<p><b>11 – HuaWei Technologies Co.</b></p> <p>It seems fine for now, anyway this can be refined further based on the outcome of the email discussion.</p>
<p><b>12 – China Unicom</b></p> <p>We are fine with this.</p>
<p><b>13 – Samsung Research America</b></p> <p>For impacted TS, TS38.401 can be added at this moment since it is a stage-2 spec. including F1/E1 impact.</p>
<p><b>14 – SHARP Corporation</b></p> <p>We are fine with the modification.</p>
<p><b>15 – Lenovo (Beijing) Ltd</b></p> <p>The following modification aims to align with the current agreement: a CPC/CPAC-configured UE has to release the CPC/CPAC configurations when <del>performing</del> <b>completing</b> random access towards the target PSCell.</p>
<p><b>16 – SoftBank Corp.</b></p> <p>We are fine with the modification.</p>
<p><b>17 – NEC Corporation</b></p> <p>We are Ok with those changes.</p>
<p><b>18 – China Mobile Com. Corporation</b></p> <p>Fine.</p>
<p><b>19 – Nokia Corporation</b></p> <p>Fine with the modifications but we agree with Apple that RAN4 requirements should cover also L3 based mobility enhancements of objectives 2/3/4.</p>
<p><b>20 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine with the change.</p>
<p><b>21 – ZTE Corporation</b></p> <p>We are fine with this.</p>

<p><b>22 – Beijing Xiaomi Mobile Software</b></p> <p>Fine with the update</p>
<p><b>23 – Ericsson LM</b></p> <p>Fine</p>
<p><b>24 – TURKCELL</b></p> <p>We're fine with the modification.</p>

### 3.2 Objective 1 proposals

I would still like to try to focus the scope of RAN1 work if possible, so make a new proposal.

**Proposal 1:** Clarify further in the WID that the L1 enhancements use the existing L1 framework being developed in Rel-17 for inter-cell Beam Management as a baseline for extension to cover serving cell change. is this acceptable?

#### Feedback Form 9: Objective 1: Proposal 1 feedback

<p><b>1 – InterDigital France R&amp;D</b></p> <p>We are fine with moderator's proposal.</p>
<p><b>2 – Qualcomm CDMA Technologies</b></p> <p>It is a reasonable clarification.</p>
<p><b>3 – DOCOMO Communications Lab.</b></p> <p>We prefer to keep current version without such clarification. In Rel-17, serving cell change is not supported. It is not clear to us how to use existing L1 framework for extension to cover serving cell change. Above can be discussed in WI phase.</p>
<p><b>4 – KDDI Corporation</b></p> <p>No strong view but we tend to share the view with docomo and prefer the previous one.</p>
<p><b>5 – Apple Computer Trading Co. Ltd</b></p> <p>Our preference is to keep current version without adding note. It is more feasible to leave the comparison between Rel-17 inter-cell BM framework and other solutions as part of study. It is a bit premature to conclude to reuse without any analysis and study.</p>
<p><b>6 – New H3C Technologies Co.</b></p> <p>We are fine with moderator's proposal.</p>

**7 – vivo Mobile Communication Co.**

We prefer to keep the original wording.

We are not sure whether it is proper to make the down selection in RAN plenary. It is more reasonable to make such decision in WG. If companies really want to have some limitation, we could at most mention that Rel-17 framework for inter-cell Beam Management would be used as the starting point.

**8 – China Telecommunications**

We are fine with the proposal.

**9 – LG Electronics France**

We are fine with the moderator’s proposal unless this causes more confusion to companies.

**10 – MediaTek Inc.**

Yes, this makes the scope and purpose of L1 enhancements clearer. With the clarification, L1 enhancements in R18 will focus on extending L1 frameworks in R17 ICBM to support serving cell change.

Moreover, we should remove “inter-cell beam management” (ICBM) from current “L1 enhancements” objective description. Beam management is a set of layer-1 and layer-2 procedures, and the layer-1 part includes L1 measurement and reporting, and L1 beam indication (as shown in the objective). That is, the L1 enhancement objective is for some part of, but not the whole ICBM mechanism. Removing ICBM not only makes the objective more concrete, but also helps avoid potential confusion about RAN1/RAN2 work split once the WI starts. That is, we can modify the objective as:

*“L1 enhancements, including ~~inter-cell beam management~~, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]”*

Alternatively, we may modify the objective as

*“L1 enhancements, ~~including~~ for inter-cell beam management, including L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]”*

**11 – HuaWei Technologies Co.**

We do not see need to make such clarification, in initial round we understand most companies understand the current scope is already clear. Only in case there is a strong need from companies to clarify the L1 enhancement sub-bullet, we can accept the proposal from the moderator but no more beyond, in order to keep the stability of the long-term formulating scope on L1/L2 mobility.

**12 – China Unicom**

We share the same view with many companies that the previous objective is fine enough, so it is our preference not to add the clarification with this limitation.

**13 – Samsung Research America**

We support P1

**14 – SHARP Corporation**

We are fine with the proposal.



<p><b>15 – Lenovo (Beijing) Ltd</b></p> <p>We are fine with the proposal.</p>
<p><b>16 – NEC Corporation</b></p> <p>Yes, it is acceptable.</p>
<p><b>17 – China Mobile Com. Corporation</b></p> <p>We are not sure if the limitation will work without more analysis. Thus, we prefer the previous one.</p>
<p><b>18 – Nokia Corporation</b></p> <p>We prefer to keep the original wording. L1 inter-cell beam management framework of Rel. 17 did not consider serving cell change and it is early to decide whether L1 inter-cell beam management framework can be used as baseline to cover L1 inter-cell mobility.</p>
<p><b>19 – Guangdong OPPO Mobile Telecom.</b></p> <p>We prefer to keep the current objective without adding clarification.</p>
<p><b>20 – ZTE Corporation</b></p> <p>We support moderator’s proposal</p>
<p><b>21 – Beijing Xiaomi Mobile Software</b></p> <p>We think it’s normal procedure and support the clarification</p>
<p><b>22 – Ericsson LM</b></p> <p>We prefer to keep the original text. We can remove the NOTE and keep the alternate objective as proposed by MediaTek i.e.:</p> <p><i>“L1 enhancements for inter-cell beam management, including L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]”</i></p>
<p><b>23 – Verizon UK Ltd</b></p> <p>Like many companies above, prefer the original text and are also OK with E/// and MTK proposal.</p>
<p><b>24 – Apple Poland Sp. z.o.o.</b></p> <p>Same as Ericsson, we support the modified objective description from MTK to make the RAN1 working area more solid and clear, but we still think the ‘note’ is NOT needed before performing any study yet in working group.</p>
<p><b>25 – TURKCELL</b></p> <p>We prefer to keep the original text.</p>

**Proposal 2:** Clarify more clearly that the L1 enhancements are applicable to synchronized and non-synchronized scenarios in the objective. Is this agreeable?

## Feedback Form 10: Objective 1: Proposal 2 feedback

<b>1 – InterDigital France R&amp;D</b> We agree with this clarification
<b>2 – Qualcomm CDMA Technologies</b> Yes, support.
<b>3 – DOCOMO Communications Lab.</b> Support
<b>4 – KDDI Corporation</b> Support
<b>5 – Apple Computer Trading Co. Ltd</b> Support
<b>6 – New H3C Technologies Co.</b> Support
<b>7 – vivo Mobile Communication Co.</b> support
<b>8 – China Telecommunications</b> Support
<b>9 – LG Electronics France</b> Support in general. But for enhancements to TA management, we do not think any enhancement is essential for synchronized scenarios, i.e., TA-related enhancements should focus on non-synchronized scenarios. We may add a Note merely saying that “Whether enhancements to TA management for non-synchronized scenarios is also applicable for synchronized scenarios can be determined in a normative phase” or the similar for this objective.
<b>10 – MediaTek Inc.</b> Yes, we agree that both synchronized and non-synchronized scenarios should be supported (for TA management). Our understanding about synchronized vs. non-synchronized is whether the source and target cells are synchronized. Even if the two cells are synchronized, the TA values may be different and thus TA management is still needed for UE mobility support. However, for synchronized case, there may be some methods that allow target TA acquisition without RACH; we can work on this in Rel-18.

<p><b>11 – HuaWei Technologies Co.</b></p> <p>We first would like to ask for clarifications between Proposal 2 and 3 as it seems they are correlated with each other.</p> <p>From our understandings, Proposal 2 is about the inter-cell beam management aspects, which can be considered for both synchronized and non-synchronized scenarios, as follows. While Proposal 3 is a separate discussions on TA management.</p> <p>L1 enhancements <u>for both synchronized and non-synchronized scenarios</u>, including inter-cell beam management, L1 measurement and reporting, beam indication</p> <p>If our understandings on Proposal 2 is correct, we are okay to make it clear.</p>
<p><b>12 – China Unicom</b></p> <p>We support this.</p>
<p><b>13 – Samsung Research America</b></p> <p>We support P2</p>
<p><b>14 – SHARP Corporation</b></p> <p>Yes, we support the proposal.</p>
<p><b>15 – Lenovo (Beijing) Ltd</b></p> <p>support P2.</p>
<p><b>16 – NEC Corporation</b></p> <p>Yes, it is acceptable.</p>
<p><b>17 – China Mobile Com. Corporation</b></p> <p>Support.</p>
<p><b>18 – Nokia Corporation</b></p> <p>We support adding this clarification.</p>
<p><b>19 – MediaTek Inc.</b></p> <p>Moderator comment: To Huawei, P2 is about the general L1 enhancements. P3 is about TA.</p>
<p><b>20 – ZTE Corporation</b></p> <p>Agree. Even for synchronized scenario, we think that the enhancement on PDCCH-order RACH transmission to neighboring cell is also necessary for supporting scenario-2</p>
<p><b>21 – Guangdong OPPO Mobile Telecom.</b></p> <p>We agree to consider both synchronized and non-synchronized scenarios for TA management.</p>

<p><b>22 – Beijing Xiaomi Mobile Software</b></p> <p>fine with proposal 2</p>
<p><b>23 – Ericsson LM</b></p> <p>Agree</p>
<p><b>24 – TURKCELL</b></p> <p>Yes, it is acceptable.</p>

TA management clarification:

Some companies indicated that they would like to consider TA management in “synchronized” scenarios.

**Question:** I would like more clarification on what they mean here. I would like to understand whether proponents mean that in this case there would be no need for re-establishing TA, or alternatively whether they mean they would like to apply TA also in such a case. Feedback appreciated from proponents.

**Proposal:** Add a NOTE to indicate that the TA management enhancement can consider L1 enhancement solutions as well as higher layer solutions.

**Feedback Form 11: Objective 1: TA clarification**

<p><b>1 – InterDigital France R&amp;D</b></p> <p>We think there is no need to further clarify TA management in the WID. These details (e.g. whether TA is applied to non-synchronized) can be discussed in the WI. Also, the note seems not necessary.</p>
<p><b>2 – Qualcomm CDMA Technologies</b></p> <p>Agree with others that TA management should be applicable to synchronized since downlink sync does not imply that the same TA can be used for different TRPs. It is fine to add a Note for upper layer vs L1 but not critical.</p>
<p><b>3 – DOCOMO Communications Lab.</b></p> <p>First, we agree to add such a note. Whether L1 enhancement and/or higher layer solutions are adopted for TA management can be discussed and decided in WI phase. On TA management for sync scenario, we do not think it is needed.</p>
<p><b>4 – KDDI Corporation</b></p> <p>In general, we think that details can be discussed in the WI, so not so motivated to have the clarification now, but the majority thinks needed, then we are fine with that.</p>
<p><b>5 – Apple Computer Trading Co. Ltd</b></p> <p>We support to add the NOTE to make the objective more clear.</p>

<p><b>6 – New H3C Technologies Co.</b></p> <p>We are fine with putting this note for making the objective clear.</p>
<p><b>7 – vivo Mobile Communication Co.</b></p> <p>We are fine to add this note in the objective, while whether L1 enhancement and/or higher layer solutions for TA management should be decided in WG.</p> <p>Regarding the question: from UE perspective, either synchronized or non-synchronized case, UE may need to perform RACH for TA management.</p>
<p><b>8 – China Telecommunications</b></p> <p>We are fine to add the NOTE to make the objective clearer.</p>
<p><b>9 – LG Electronics France</b></p> <p>Fine</p>
<p><b>10 – MediaTek Inc.</b></p> <p>Yes, TA management enhancement can consider L1 enhancement solutions as well as higher layer solutions. In that sense, TA management may be considered as a separate sub-bullet (not under “L1 enhancements”)</p>
<p><b>11 – HuaWei Technologies Co.</b></p> <p>It is a bit unclear what would be the exact scenarios to consider TA management for synchronized cells. From the mobility perspective the serving cell will be changed, typically the UE needs to obtain TA only when moving to a non-synchronized cell with a different TA value. So we don’t see needs to consider this in the Mobility topic. If it refers to the multiple TA for mTRP case for sync case, this is already included in R18 MIMO scope and we’d better not duplicate the discussion here.</p> <p>In addition we don’t see such note is critical to be added, the objective already includes both RAN1 and RAN2 as responsible groups, and according to the feedback from companies it is clear both WGs need to look into this.</p>
<p><b>12 – Samsung Research America</b></p> <p>We have not precluded L2 enhancement. We are fine to add the NOTE.</p>
<p><b>13 – SHARP Corporation</b></p> <p>We support the proposal.</p>
<p><b>14 – Lenovo (Beijing) Ltd</b></p> <p>Fine to add this note.</p>
<p><b>15 – China Unicom</b></p> <p>We are open to this, but it seems that whether L1 enhancement and/or higher layer solutions are adopted for TA management need to be discussed in WI phase.</p>

<p><b>16 – China Mobile Com. Corporation</b></p> <p>We are fine to add this note or we can just list TA management as a sperate item as mentioned by MTK.</p>
<p><b>17 – Nokia Corporation</b></p> <p>We are fine to add the note to clarify that TA management may comprise L1 or higher layer enhancements. The specific solutions can be discussed in the work item.</p>
<p><b>18 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine to add the note if majority companies prefer to, while we see no difference with the current objective since RAN2 is already involved as responsible working group.</p>
<p><b>19 – ZTE Corporation</b></p> <p>We support. We identify a clear requirement of L2/L3 signaling for assisting L1-based TA enhancement.</p>
<p><b>20 – Ericsson LM</b></p> <p>We believe TA management to be part of any mobility solutions. There could be scenarios where TA update is not required and there could be other scenarios where TA update is needed. As the current objective already includes both RAN1 and RAN2, we do not need to explicitly add a new NOTE in our opinion.</p>
<p><b>21 – Beijing Xiaomi Mobile Software</b></p> <p>We agree both L1 and L3 solution can be considered</p>
<p><b>22 – TURKCELL</b></p> <p>We support to add the note to make the objective more clear.</p>
<p><b>23 – Futurewei Technologies</b></p> <p>We are fine to have a separate bullet for TA management with both RAN1 and RAN2 being responsible for.</p>

### 3.3 Objective 2 proposals

**Proposal 1:** It is proposed not to consider MCG change / NR standalone any further in the scope of Selective CSG activation. Is this acceptable?

**Proposal 2:** Use CPC/CPAC Rel-17 solution as the baseline for the selective activation in order to limit the amount of work required.

**Proposal 3:** Do not consider a L3 network command further as part of Rel-18.

#### Feedback Form 12: Objective 2 feedback

### **1 – InterDigital France R&D**

For proposal 2 and 3, we think it is not so critical now to exclude anything in the WID. The solution can be discussed during the WI. For proposal 1, we think extending to MCG is not so much additional work, but we are fine if companies want to exclude it.

### **2 – Qualcomm CDMA Technologies**

MCG change was not discussed before and we are not comfortable adding a new objective which will expand the already large scope. P2 is fine. We don't think P3 is necessary and we shouldn't restrict solutions based on existing legacy signaling.

### **3 – DOCOMO Communications Lab.**

P1: OK to not to have MCG in Rel-18.

P2 and P3: Fine

### **4 – KDDI Corporation**

P1: We are fine without MCG in Rel-18.

P2&P3: We are fine with the proposal.

### **5 – Apple Computer Trading Co. Ltd**

1. For P1, we support to include MCG change in the scope, since the motivation to enhance the subsequent CG change is same for SCG and MCG, and the designs are also similar.

>Motivation: both MCG and SCG change are focusing on the frequently CG change on FR2.

> Design: both designs follow the same model: configure multiple candidate CGs and select one to activate for data transmission.

2. For P2, We donot need to mention the baseline for now, since it is related to the detailed design, and we can discuss this as part of the WI.

3. For P3: L3 network command triggered solution is also one candidate option, we can discuss it in the WI phase.

### **6 – New H3C Technologies Co.**

We are fine with P2 and P3.

### **7 – vivo Mobile Communication Co.**

P1: we donot think much effort is needed to include MCG change. But we are fine to follow majority.

P2, P3: How about we just mention CPAC mechanism is taken as the starting point, while whether to consider network indication through L3 signaling could be discussed and decided in WG if time is allowed.

### **8 – China Telecommunications**

We are fine with the above proposal.

### **9 – LG Electronics France**

Fine with P1, P2, P3.

<p><b>10 – MediaTek Inc.</b></p> <p>We support all three proposals about selective activation.</p>
<p><b>11 – HuaWei Technologies Co.</b></p> <p>We agree with the proposals from the moderator. Considering the workload and potential use cases, we believe Proposal 1-3 are important to make the scope still manageable for Rel-18.</p>
<p><b>12 – Samsung Research America</b></p> <p>Just a minor typo for P1, i.e. “CSG” replaced to “SCG”</p>
<p><b>13 – SHARP Corporation</b></p> <p>We are fine with P1,P2,and P3.</p>
<p><b>14 – Lenovo (Beijing) Ltd</b></p> <p>We are fine with P1, P2 and P3.</p>
<p><b>15 – NEC Corporation</b></p> <p>For Proposal 1, it is acceptable. For Proposal 2 and 3, we agree with both proposals.</p>
<p><b>16 – China Mobile Com. Corporation</b></p> <p>P1: Agree.</p> <p>P2&amp;P3: CPC/CPAC Rel-17 solution can be the baseline just for the UE-triggered solution. However, we see some potential use cases for the NW-triggered solution. We don’t want to have the limitation like P2 at this stage. We slightly prefer not to exclude NW-triggered activation.</p>
<p><b>17 – Nokia Corporation</b></p> <p>For P1, we support to consider MCG change since the justification for the enhancement is the same for both MCG and SCG.</p> <p>For P2/P3: There is no need to limit the scope of the solutions. This can be discussed during the work item.</p>
<p><b>18 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine with P1, P2 and P3.</p>
<p><b>19 – ZTE Corporation</b></p> <p>- Firstly, we want companies to clarify what is the configuration stored in the UE side to support the L1/L2 based mobility according to objective 1 for the inter-DU case. Our understanding is that the configuration stored in the UE side to support the L1/L2 based mobility according to objective 1 for inter-DU case should be <u>a cell group configuration</u>. With the above understanding, it seems we need an artificial restriction that such cell group configuration for L1/L2 mobility <u>can only be used for MCG whilst a very similar cell group configuration used for L3 mobility is only applicable to SCG</u>. We think such restriction is really strange! (RRC based) configuration and maintenance for multiple cell groups at the UE is already expected to be supported by objective 1 (L1/L2 based mobility) since this is needed for the intra-CU inter-DU scenario as a minimum.</p>



- It should be noted that in FR2 case the FR2 cell group may be very useful to be configured as MCG or SCG. So, artificially restricting it to SCG only seems not really necessary and we are not sure if this actually reduces the work load on the group (we think the artificial restriction will increase the work).
- If we need such artificial restriction, it will require more work because the network has to configure two separate containers (one for SCG and one for MCG) with same configuration. This seems to lead to more work in the WGs and also would lead to more signalling overhead.
- The configuration and maintenance for multiple cell groups for L1/L2 based mobility also deviates from the "CHO framework" and again we think that the new configuration framework could be the same for L1/L2 based mobility and for NR-DC with selective activation. If companies still would like to consider the CPAC framework for NR-DC with selective activation, we are fine to discuss in the WI phase pros and cons of the different approaches. But stating already now, before detailed discussion in RAN2, that the CPAC approach should be the baseline in our understanding would be a mistake that could lead to sub-optimal and actually more complex solutions. We are then not sure we are ready to accept this in the WI description.

#### **20 – Ericsson LM**

When looking at the WID that now starts to take shape, it becomes clear that the scope is too big. We need to down scope.

We think the whole objective can be dropped.

#### **21 – Beijing Xiaomi Mobile Software**

Support all three proposals

#### **22 – MediaTek Inc.**

R2 Chair:

I have some sympathy for the ZTE general views (maybe not every detail). Both objectives 1 and 2 are targeting serving cell changes that are fast/low overhead/low interruption etc. In current RRC TS there is high degree of commonality between PCell Change (HO/MCG change) and PSCell change (SCG change). A reasonable assumption is that objectives 1 and 2 can start from a common RRC modelling on what is preconfigured, candidate, target etc etc. Whether something is L3 mobility vs L2 mobility etc is right now rather academic. If the only difference L2 L3 is the trigger initiating the cell change, the difference is quite minor. In fact a smart approach in RAN2 in addressing objectives 1 and 2 is absolutely required. Even with such smart approach the current TU allocation is very slim.

#### **23 – TURKCELL**

We're fine with P1. It's acceptable. It's early to limit the scope of the solutions in P2 and P3.

#### **24 – Futurewei Technologies**

We share similar views of ZTE and RAN2 chair.

### 3.4 Objective 3 proposals

**Proposal:** Keep current objective for now and discuss at RAN#95e whether we can remove from the scope.

### Feedback Form 13: Objective 3 proposal

<b>1 – InterDigital France R&amp;D</b> We are fine with the way forward proposed by the moderator.
<b>2 – Qualcomm CDMA Technologies</b> Support
<b>3 – DOCOMO Communications Lab.</b> Fine
<b>4 – KDDI Corporation</b> We are fine with the proposal.
<b>5 – Apple Computer Trading Co. Ltd</b> We are fine with the proposal.
<b>6 – New H3C Technologies Co.</b> We support this proposal.
<b>7 – vivo Mobile Communication Co.</b> We are fine with this proposal.
<b>8 – China Telecommunications</b> We are fine with the proposal.
<b>9 – LG Electronics France</b> Fine
<b>10 – MediaTek Inc.</b> Agree
<b>11 – HuaWei Technologies Co.</b> As the proponent, we don't see much need to keep the current objective, anyway we are okay to revisit as suggested by the moderator.
<b>12 – Samsung Research America</b> We support the proposal
<b>13 – SHARP Corporation</b> We are fine with the proposal.

<p><b>14 – Lenovo (Beijing) Ltd</b></p> <p>We are fine with this proposal.</p>
<p><b>15 – NEC Corporation</b></p> <p>We agree with the proposal</p>
<p><b>16 – China Mobile Com. Corporation</b></p> <p>Support.</p>
<p><b>17 – China Unicom</b></p> <p>Agree with this proposal.</p>
<p><b>18 – Nokia Corporation</b></p> <p>We are fine with the proposal.</p>
<p><b>19 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine with the proposal and objective 3 can be removed as long as RAN3 complete its work.</p>
<p><b>20 – ZTE Corporation</b></p> <p>No strong view either way since we will anyway revisit this at RAN#95e</p>
<p><b>21 – Ericsson LM</b></p> <p>Agree</p>
<p><b>22 – Beijing Xiaomi Mobile Software</b></p> <p>We see some difference between RAN3 and RAN2 work to enable CHO+MR-DC. We can accept to check the status at RAN#95</p>
<p><b>23 – TURKCELL</b></p> <p>We are fine with the proposal.</p>

### 3.5 CA/DC enhancement for FR2 related mobility

I would like further feedback on the following:

- Whether companies agree for RAN4 to lead any work on this, and whether the work could be restricted to RAN4 changes.
- What RAN2 changes would be proposed by the proponents.

## Feedback Form 14: CA/DC enhancement for FR2 mobility

### 1 – InterDigital France R&D

If we consider this work, we would be fine with limiting the work to RAN4, as suggested by the moderator.

### 2 – Qualcomm CDMA Technologies

This should be RAN4-led for sure and we are fine with limiting it to RAN4 only.

### 3 – Apple Computer Trading Co. Ltd

RAN2 impact is not clear to us, and the work should be limited in RAN4.

### 4 – New H3C Technologies Co.

We are fine with RAN-led for this objective and current it can be limited to RAN4.

### 5 – Nokia Corporation

During the initial round we have provided further details for potential RAN2 work and reasoning why RAN4 work alone is not sufficient. If some of the details or reasonings for RAN2 work are not clear, we would appreciate detailed questions instead of simply saying that RAN2 impact is not clear. These CA/DC enhancements for FR2 mobility are strongly requested by operators to support their FR2 deployments and it would be important to respect that need and ensure that also FR2 deployments can be efficient with high performance. As explained earlier, this work cannot be limited to RAN4 only. Also number of operators requested RAN2 and RAN4 work for these reasons.

### 6 – TELECOM ITALIA S.p.A.

support Nokia

### 7 – vivo Mobile Communication Co.

We are fine to include it as RAN4-led item.

Regarding potential RAN2 work, we think it depends on the gap identified in RAN4 between the current requirements and CA/DC activation for FR2, which could be triggered by LS?

### 8 – LG Electronics France

We are not convinced if the proposed EMR enhancement to enable measurements during connection setup/resume period (mainly RAN2 work) as claimed by the proponent could tackle the measurement accuracy issue appropriately, because the extra measurement opportunities during the period are expected to be limited. For this reason, we are not supportive of the current form of the objective. Furthermore, it is still unclear to us what enhancements related to EMR measurement requirements are needed/considered (RAN4 work). However, given the strong interest of operators in FR2 deployments, we are fine to discuss this to further clarify the intended enhancement and assess whether it is valuable.

### 9 – MediaTek Inc.

This should start from RAN4; RAN2 can still do corresponding signaling design (if any).

### **10 – HuaWei Technologies Co.**

Agree with the moderator that RAN4 to lead this discussion and we think the current FR2 RRM enhancements under RAN4 seems more suitable for this discussion.

From RAN2 perspective, we are not convinced yet on the enhancements. As clarified by the proponent, it seems that the intention from the proponents is to let UE indicate the availability of measurements results to the network. However such mechanism is already defined and currently MSG5 can provide this indication or piggy back of early measurement result. If the intention is to carry this indication in MSG3, this does not bring gains as the measurement result has to be reported only when the security context is established, otherwise this brings security risks.

### **11 – DOCOMO Communications Lab.**

We prefer to involve RAN2 for shorter delay, with the assumption that procedure impact of enabling early measurements during connection setup is not drastic. We are inclined to a RAN2-led objective if RAN2 is agreed to be involved.

### **12 – MediaTek Inc.**

MODERATOR comment to Nokia: Please could you provide exactly what you would propose in terms of detailed objectives for RAN2 as well as RAN4, and which aspects you believe are not possible with existing specs for EMR reporting?

### **13 – Nokia Corporation**

Following the moderator's request please find detailed objective proposal below.

- To specify mobility related FR2-specific CA/DC enhancements [RAN2, RAN4]
- Procedures and criteria for mobility related FR2-specific CA/DC enhancements to improve FR2 SCel- l/SCG setup delays and early measurement reporting as follows [RAN2]
  - o UE initiates improved FR2 measurements when requesting connection setup
  - o Network may provide additional assistance information on FR2 cells to be measured either avail- able in SIB, EMR configuration or with dedicated message as a response to connection setup
  - o UE performs additional FR2 measurements for improving FR2 SCel/SCG setup during connec- tion setup
  - o UE reports its additional FR2 measurements made during the connection setup to the network to improve FR2 SCel/SCG setup
- FR2 UE RRM Requirements for the above-mentioned additional FR2 early measurement report en- hancements for FR2 SCel/SCG cell setup times [RAN4]

The current RAN2 procedures and criteria do not enable network to request/configure additional FR2 UE measurements for FR2 SCel/SCG setup improvements during connection setup. And like discussed and analysed earlier the FR2 idle mode measurements reported in connected mode are not sufficiently up-to- date that they could be used for FR2 purposes. Some UE may perform additional measurements during the connection setup but this is not part of the current procedures and network is not aware if UE makes such additional measurements and which UEs make such measurements.

**14 – Samsung Research America**

From the discussion, we understand that the proposal is about enhancements while UE is in RRC\_CONNECTED, so it should be clear from the objective, if agreeable.

**15 – SoftBank Corp.**

We support the detailed objective involving RAN2 by Nokia. It would be reasonable to be RAN2-led objective as the network indicates to perform the additional measurements and needs to aware the results during the connection setup procedure.

**16 – MediaTek Inc.**

If we understand Nokia's new objectives correctly, it requests UE to do FR2 measurement during connection setup. We are not sure this is always doable as some of UE's RF resource is used for connection setup. So, the feasibility should be studied first.

Even if this is feasible, the current SPEC does not prevent UE from doing this. It can already be done by the early measurement framework introduced in Rel-16. Please also note the that the "assistance information" (i.e. target FR2 cells to be measure) is already introduced in SIB and dedicated message (in RRC Release message) as part of R16 EMR work. So, we still see no need to have RAN2 work on this.

Our suggestion is to have RAN4 study first on the feasibility of the proposal.

**17 – KT Corp.**

Based on our 28GHz commercial network, we clearly see the benefits of improving FR2 SCell/SCG setup delay which is RAN2 work. Hence limiting this objective to RAN4 only may not end up with achieving desired performance. We would like to keep the objective as RAN2 and RAN4 work.

**18 – China Mobile Com. Corporation**

We share the same view with the Rapporteur. RAN2 still can be involved whenever needed.

**19 – ZTE Corporation**

As explained by Mediatek, even if some RAN2 work is foreseen for this in future, we think the work should first be initiated in RAN4 as explained above to ascertain feasibility etc. Hence, we think the objective should certainly be led by RAN4.

By the way, we note that the problem also exists for FR1 (e.g. RAN4 defined measurement periodicity for EMR is "60s\*Nlayer" for cell center UEs, which is extremely long). We think to handle this problem properly, some RAN4 discussion is needed anyway. Hence, we think RAN4 led objective is the correct way forward for this.

A further question to understand here is whether the work is done as part of the mobility WI or whether it needs to be included in the RAN4 led RRM enhancements WI

**20 – Nokia Corporation**

As explained in our contributions relaxed FR2 UE requirements are only one part of the problem why the current EMR do not work for FR2. Therefore, RAN2 improvements are important and it is not sufficient to work with RAN4 requirements as well. It is also unrealistic to assume that UE vendors are willing to make idle mode FR2 requirements sufficiently stringent as it would have negative impact of UE power consumption, which is important factor especially for FR2 devices.

**21 – Ericsson LM**

When looking at the WID that now starts to take shape, it becomes clear that the scope is too big. We need to down scope.

This objective can only be included if restricted to RAN4 only. No new RAN2 procedures. Unless it is clear that this is only for RAN4 requirements, this objective has to be dropped.

**22 – TELENOR ASA**

Telenor supports Nokia, TIM, Softbank view. We agree that update of the RAN2 procedures should be part of this work.

**23 – Beijing Xiaomi Mobile Software**

We think RAN2 can be involved if necessary

**24 – Telia Company AB**

We support Nokia and also comments from TIM, Softbank, KT and Telenor.

There should be update of the RAN2 procedures as part of WID.

Work cannot be restricted to RAN4 only.

**25 – Verizon UK Ltd**

Glad to see companies agree to at least RAN4 treatment. We think RAN2 improvements are important (may be the essence of this) - there are possible signaling improvements that may significantly shorten the delay beyond what RAN4 UE can do by itself.

**26 – TELEFONICA S.A.**

We support the inclusion of RAN2 objectives as part of the WID

**27 – TURKCELL**

We support Nokia and all comments from TIM, Softbank, KT, Telenor, Telia, Verizon and Telefonica. This work can not be restricted to RAN4 only.

**28 – Futurewei Technologies**

If UE is not capable of/required to perform FR2 measurement during connection setup/resume, it is not clear that any RAN2 procedure/signaling change can help.

This work should start from RAN4, and RAN2 can be involved when RAN2 impact is triggered by RAN4 progress.

**29 – Nokia Corporation**

Futurewei: RAN4 requirements are naturally needed for the new enhanced RAN2 procedures like proposed in the objectives. Furthermore, like for many UE features some UEs may not support all the feature but as long as we define UE capability for the new enhanced procedures, the network knows it and can e.g. prioritize those UEs on FR2 layers supporting the enhanced procedures and thus better FR2 performance and use experience.

## 3.6 Make-before-break and RACH-less handover

In order for these objectives to be included the moderator believes there would essentially need to be minimal extra work. I would like to understand how companies aim to achieve this without increasing the workload.

### Feedback Form 15: MBB and RACH-less handover

<p><b>1 – InterDigital France R&amp;D</b></p> <p>The WID can explicitly indicate that the LTE solution is re-used. This would limit the work to specifying the same solution that already exists in LTE.</p>
<p><b>2 – Qualcomm CDMA Technologies</b></p> <p>We don't have a strong preference for this objective. If it is included, it should be captured that "Rel-14 LTE solutions should be used as a baseline".</p>
<p><b>3 – DOCOMO Communications Lab.</b></p> <p>We are not sure if we have wide use cases for the solutions. Considering that there is an additional candidate in 3.5, we are reluctant to re-add these topics unless they are (nearly) pure copy-paste work.</p>
<p><b>4 – KDDI Corporation</b></p> <p>We share the view with InterDigital, workload is very limited and manageable.</p>
<p><b>5 – Apple Computer Trading Co. Ltd</b></p> <p>The workload can be minimized via two ways:</p> <ul style="list-style-type: none"><li>1&gt; Take LTE RACH-less handover and MBB HO as baseline;</li><li>2&gt; Avoid the redundant design and discussion if some part is overlapped with objective 1.</li></ul>
<p><b>6 – New H3C Technologies Co.</b></p> <p>We don't have strong view with this topic.</p>
<p><b>7 – China Telecommunications</b></p> <p>We are open to support this objective, and we also agree that the R14 LTE RACH-less handover and MBB HO should be the baseline.</p>
<p><b>8 – vivo Mobile Communication Co.</b></p> <p>We should firstly identify in which use case that low end devices have requirement on interruption time. If this is included, it should be de-prioritized in WI, as others are more likely to be deployed.</p>
<p><b>9 – LG Electronics France</b></p> <p>We would like to drop this objective because a) this WI is already populated with several objectives and in particular the required workload of objective1 may be substantial. Given this, increased workload with this additional objective seems unacceptable for the current TU estimate for this WI (already almost max) and</p>



b) the justification for this objective is not strong given already available technologies for mobility latency reduction such as DAPS, 2-step RACH.

**10 – MediaTek Inc.**

Make-before-break and RACH-less are covered in Objective#1 for L1/L2 mobility. We can first work there and then see if the conclusions are also applicable for other mobility scenarios.

**11 – HuaWei Technologies Co.**

As commented by quite a few companies, the workload of MBB and RACH-less handover is not trivial, considering harmonization with NR features, e.g. beam, CHO etc. It is also noted that it will have additional RAN4 impact. Actually this aspect has been discussed in Rel-16 Mobility but not agreed due to marginal benefit and complexity in NR and it is not happening in Rel-17 as well. In addition, as stated in initial round, L1/L2 mobility can already consider the cases where the UE is not required to support MIMO and DC, which can fulfill the major motivation raised by the proponents. We do not think adding more solutions with same purpose help, it may instead lead to fragmentation. Thus we don't support to add this back.

**12 – Samsung Research America**

We support to introduce both MBB and RACHless in NR, but We have to also minimize the workload. Thus, we would like to focus on porting the current LTE solutions into NR, while considering both FR1 and FR2.

**13 – Lenovo (Beijing) Ltd**

This aspect can be limited to the LTE use case to reduce the load.

**14 – SHARP Corporation**

If RACH-less and MBB HO are included, LTE solutions should be a baseline.

**15 – China Mobile Com. Corporation**

We are open to this.

**16 – China Unicom**

We are open to this, but if it was included in the scope, LTE solutions should be taken as baseline to minimize the workload.

**17 – ZTE Corporation**

We support this objective.

To minimise the additional work, we propose the following:

**For MBB**, we think we can reuse the LTE framework to minimise the work as noted by other companies above

**For RACH-less**, we can reuse the framework developed for SSB to PUSCH mapping for CG-SDT for instance as a baseline.

<p><b>18 – Guangdong OPPO Mobile Telecom.</b></p> <p>We tend to agree with Huawei on the workload of MBB and RACH-less handover considering NR-specific feature, i.e. beams. As objective 1 already addresses the issue on latency reduction and the TU is limited, we prefer to de-prioritize this objective.</p>
<p><b>19 – Ericsson LM</b></p> <p>When looking at the WID that now starts to take shape, it becomes clear that the scope is too big. We need to down scope.</p> <p>While we think there is some merit to MBB: We think this has to be removed.</p>
<p><b>20 – Beijing Xiaomi Mobile Software</b></p> <p>The largest concern is work load, as indicate by other companies. If LTE mechanism is reused without much change, we can accept to include this objective. Otherwise, it’s better to limit the scope.</p>
<p><b>21 – Nokia Corporation</b></p> <p>We support to have a mobility solution that can reduce the interruption during handover for inter-CU/inter-gNB scenario in FR1 and FR2. To minimize the effort, we can start from LTE Rel. 14 MBB and RACH-less as baseline for discussion.</p>
<p><b>22 – VODAFONE Group Plc</b></p> <p>Support this addition. Agree with Apple, Samsung, Nokia.</p>
<p><b>23 – TURKCELL</b></p> <p>MBB and RACH-less handovers can be included with LTE solutions as a baseline.</p>
<p><b>24 – Futurewei Technologies</b></p> <p>MBB and RACHless have been proposed to NR for a couple of releases, and haven’t been adopted due to limited benefits compared to other methods for mobility enhancement. Reuse LTE schemes indicate they’d still bring marginal gain at best. Given the workload in this release, time should be spent on other more promising techniques (e.g., objective 1), and MBB and RACHless should be dropped from the consideration of this WID.</p>

### 3.7 RAN4 requirements:

New RRM core and performance requirements would need to be defined for this work.

**Proposal:**

- Please see proposed text in WID (v002) update and provide feedback.
- It is also proposed for RAN4 to further discuss in Q1 the need for additional core RRM requirements for Objectives 2-4.

## Feedback Form 16: RAN4 requirements

<p><b>1 – InterDigital France R&amp;D</b></p> <p>We are fine with the current text.</p>
<p><b>2 – Qualcomm CDMA Technologies</b></p> <p>We are fine with the suggestion.</p>
<p><b>3 – Apple Computer Trading Co. Ltd</b></p> <p>RAN4 work should include the new requirements for all the mobility requirements, both L1/L based and L3 based mobility.</p>
<p><b>4 – New H3C Technologies Co.</b></p> <p>We are fine with moderator’s proposal.</p>
<p><b>5 – China Telecommunications</b></p> <p>We are fine with the proposal.</p>
<p><b>6 – vivo Mobile Communication Co.</b></p> <p>We are fine with the proposal.</p>
<p><b>7 – MediaTek Inc.</b></p> <p>Agree</p>
<p><b>8 – HuaWei Technologies Co.</b></p> <p>we are fine with the WID update on this aspect.</p>
<p><b>9 – DOCOMO Communications Lab.</b></p> <p>We are fine with moderator’s proposal.</p>
<p><b>10 – SHARP Corporation</b></p> <p>We are fine with the proposal.</p>
<p><b>11 – MediaTek Inc.</b></p> <p>We believe that RAN4 RRM requirements are needed for Objectives 2-4, and thus we think that we could already add now:</p> <ul style="list-style-type: none"><li>- Specify RRM core requirements for the enhanced CHO configurations in the above objectives, as necessary [RAN4]</li></ul>
<p><b>12 – China Mobile Com. Corporation</b></p> <p>Agree.</p>

<p><b>13 – China Unicom</b></p> <p>Fine with the proposal.</p>
<p><b>14 – Nokia Corporation</b></p> <p>We agree with Apple that RAN4 requirements should be defined also for L3 mobility enhancements that are proposed in the work item.</p>
<p><b>15 – ZTE Corporation</b></p> <p>We are fine with the proposal.</p>
<p><b>16 – Guangdong OPPO Mobile Telecom.</b></p> <p>We are fine with the proposal.</p>
<p><b>17 – Beijing Xiaomi Mobile Software</b></p> <p>Fine with proposal</p>
<p><b>18 – Ericsson LM</b></p> <p>Fine</p>
<p><b>19 – HuaWei Technologies Co.</b></p> <p>RAN4 Chair: Impact on RRM part is reasonable. But I wonder if the RF requirement for switching mechanism of L1/L2 mobility is needed or not.</p>
<p><b>20 – TURKCELL</b></p> <p>We are fine with moderator’s proposal.</p>
<p><b>21 – MediaTek Inc.</b></p> <p>Moderator comment: Thanks for the comments from RAN4 chair. I would imagine that RAN4 RF requirements would follow existing beam switching/transient requirements, and that the RRM requirements would need to take any delays caused by that into account. Happy to discuss further though.</p>

### 3.8 Summary of Intermediate Round

Please find the detailed Moderator’s summary in document RP-213538. Below captures the high level points, including the GTW outcome. I have also uploaded a revised WID (v04) to the Drafts folder.

**Justification section:** Largely stable, discuss any further refinement in the final round.

**Objective 1:** I have tried to capture a balanced outcome in the revised WID. We can further discuss in the final round.

**Objective 2:** I have made a proposal based on the GTW agreement on MCG. We may want to align the justification further. We should also discuss further in Final Round the harmonization between Objective 1 and Objective 2.

**Objective 3:** Please review the revised WID that captures the status.

**Objective 4:** No further action required.

**CA/DC enhancement for FR2-related SCell/SCG setup delay:** Propose to discuss the detailed objective for the study. For further discussion in the final round.

**MBB and RACH-less handover:** Discuss in final round applicability & restrictions for application of LTE MBB and RACH-less handover to NR.

**RAN4 requirements:** Please see revised WID for proposal.

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## 4 Final Phase

### 4.1 Revised WID Justification/Objectives 1, 2, 3, 4, 5)

Please review and provide any comment on the changes to Objectives 1, 2, 3, 4, 5 and provide feedback.

**Feedback Form 17: Revised WID: Justification & Objectives**  
**1/2/3/4/5**

**1 – Qualcomm CDMA Technologies**

The latest version v04 is acceptable.

**2 – Samsung Research America**

Regarding the Note 1 of the objective 1, we can study different types of solutions, but may specify only one solution (including possibly a hybrid solution). Hence, we would like to suggest to re-word the note as follows:

“Note 1: For TA management, **solution can be both L1-centric and/or higher layer-centric solutions are in-scope.**”

**3 – MediaTek Inc.**

MODERATOR COMMENT (well 2 comments): I am actually starting to think that we should just have a separate bullet on TA management after all. Stating this only as a L1 enhancement if we are also considering higher-layer centric solutions doesn't make sense. So maybe "TA management: Considering L1-centric and higher layer-centric solutions" is best.

Also I think the synchronized/non-synchronized scenarios needs to apply to the whole Objective 1 (so applied to the main bullet). Otherwise it is strange.

Please let me know any major issues with the above points.

**4 – vivo Mobile Communication Co.**

We are in general fine with version v04, with below minor suggestions:

1. We agree TA management as a separate bullet and wording could be "TA management: Considering L1-centric and/or higher layer-centric solutions"

2. We agree "synchronized/non-synchronized scenarios" should apply to all objective 1. Thus, we suggest to put "synchronized/non-synchronized scenarios" in Note 4.
3. Typo in bullet 5: "Specify RRM core requirements for the enhanced CHO configurations in the above objectives 34 and 45, as necessary [RAN4]"
4. Typo in bullet 6?: "Also investigate the potential benefits to FR2 SCell/SCG ~~cell~~ setup delay from defining new RRM core requirements based on the following assumptions [RAN4]."
5. It is up to Rapporteur whether need to merge RAN4 work on RRM core requirements into one bullet, as it seems that for L1/L2 mobility is included in bullet 1 as a sub-bullet, while that for CHO enhancement is captured as a separate bullet 5.

#### **5 – HuaWei Technologies Co.**

We are fine with the justifications but have some comments on the objectives.

- 1) Regarding Objective 1, we are okay to have a Note on TA management if it is majority view, but unfortunately fail to understand TA management "in both synchronized and non-synchronized scenarios". When having serving cell change, what aspects need to be addressed for synchronized case? we think this only applies to the non-synchronized case.
- 2) Regarding Objective 2, we understand the GTW agreed that MCG is not included, therefore we are not sure the changes are needed and the previous version is better. Adding the bracket (at least for SCG) and change SCG to CG would cause more confusions on which scenarios to be addressed in priority.
- 3) Some typos can be fixed in bullet 6, e.g. the second "L" is missing from "L1/L2-based inter-cell mobility", and "FR2 SCell/SCG ~~cell~~ setup delay". We think this objective should add feasibility as well for study, see our detailed comments in 4.3.
- 4) we understand L1/L2 mobility would have dynamic switch of cells, which would require RAN4 work for RF core requirements. Therefore we think this part should be added explicitly.

#### **6 – NTT DOCOMO INC.**

The updated Objectives in v04 is fine to us.

1. We agree TA management as a separate bullet.
2. We agree "synchronized/non-synchronized scenarios" should apply to all objective 1.

#### **7 – Nokia Corporation**

In objective 5, RRC core requirements for the enhanced CHO configuration of objectives 3 and 4 (not objectives 4 and 5) should be defined

#### **8 – China Mobile Com. Corporation**

The latest version seems fine to us. We prefer the updated wording in MODERATOR COMMENT above, such as "TA management: Considering L1-centric and higher layer-centric solutions" and "synchronized/non-synchronized scenarios" should apply to all objective 1.

#### **9 – SoftBank Corp.**

We are fine with the version v04. We are also fine with "the synchronized/non-synchronized scenarios needs to apply to the whole Objective 1".

**10 – MediaTek Inc.**

MODERATOR COMMENT1: To Huawei, the GTW outcome was that we include SCG but that we do not explicitly preclude application to MCG as well, but that it is not necessarily in scope either. It clearly relates a bit to harmonization of approaches between Objective 1 and Objective 2. The text intends to capture that.

**11 – LG Electronics France**

v4 is fine in general but we have the following comments:

a) We acknowledge that the revised objective 2 reflects GTW discussion properly, where it was recommended to state that SCG is a primary focus but we do not explicitly exclude MCG.

b) objective5 needs to be corrected to:

- 5. Specify RRM core requirements for the enhanced CHO configurations in the above objectives 34 and 45, as necessary [RAN4]

**12 – TURKCELL**

We are fine with the latest version.

**13 – KDDI Corporation**

We are fine with the latest version v04

**14 – Beijing Xiaomi Mobile Software**

With typo fixed, v04 is good to us. TA management is already in the objective. We don't see much difference from separate bullet or not.

**15 – Apple Computer Trading Co. Ltd**

We are fine with the latest version v04.

For objective 1, we agree the sync and non-sync scenario should be applicable on the whole objective 1.

**16 – ZTE Corporation**

We are fine with the justification. For the objectives, please see our comments in the section below (mainly for harmonization of phy and higher layer aspects).

**17 – China Telecommunications**

We are fine with the current version, and also agree to have a separate item for TA management.

**18 – Intel Corporation (UK) Ltd**

We should start the discussion on 4.2 first, i.e. objective 1/2 harmonization.

#### **19 – Guangdong OPPO Mobile Telecom.**

We are generally fine with the latest version v4.

- For TA management, we have no strong view on whether to capture the TA management with separate bullet.
- And we agree with moderator that synchronized/non-synchronized scenarios apply to the whole Objective 1.

#### **20 – MediaTek Inc.**

MODERATOR COMMENT2: Please note that I just uploaded a v05 of the WID addressing the comments raised. As we put TA in a separate bullet I don't think we now need to talk about how centric the solution is either, which I assume was the reason for "and/or" (as we don't define multiple solutions I hope).

I also added the RF requirement from Huawei in brackets, but this should be confirmed I think with RAN4 experts. I understand it would be more for inter-frequency case, so I made it specific to that.

#### **21 – Ericsson LM**

Unless more companies are concerned about the workload in the WGs, it seems this WI will remain (too) large.

On the details of Objective 1: We think it is important that RAN4 are involved early. This to ensure that the UE processing delay for changing the configurations are not going to be too large to not give any meaningful gains. RAN1/2 may need to ensure that the configurations are not too large so that switching from one to another will require too long processing delay. Hence, it is important that RAN4 are involved early.

#### **22 – InterDigital France R&D**

We are fine with the latest version.

#### **23 – MediaTek Inc.**

MODERATOR COMMENT3: Please note that I uploaded a version v06 of the WID based on current status:

- Some general tidying up of the text
- Adding a note regarding the Objective 1/2 RRC modelling.
- Modified wording of the CA/DC study, according to latest status, but will wait for further comment.

Please also note the completion dates that I forgot to mention earlier.

If you would like co co-sign please contact me by email.

## 4.2 Objective 1/2 harmonization

Starting point for discussion: Possible options for WID:

- 1) Merge objectives together
- 2) Interim, keep separate objectives but add a Note indicating the target for harmonization.



Thoughts welcome on the above and concrete proposals welcome. If I think of something I may also add during the discussion.

### Feedback Form 18: Objective 1 and 2 harmonization

#### 1 – Qualcomm CDMA Technologies

We shouldn't "harmonize" these two objectives. They correspond to different features with different frameworks. As in the latest WID, Objective 2 uses L3 signaling. The applicability of L1/L2 signaling to activation of SCG is a separate discussion.

#### 2 – HuaWei Technologies Co.

Objective 1 and 2 are targeted for different scenarios with different framework, so we don't think either option is feasible, and thus separate objectives should be kept anyway.

#### 3 – vivo Mobile Communication Co.

We don't think it is a good idea to harmonize these two objectives. L1/L2 mobility would be performed by TCI switching through beam indication, while SCG selective activation would be performed by L3 signaling, which are totally different features. Maybe it is better for proponent to elaborate more about the motivation for harmonization.

#### 4 – MediaTek Inc.

Although they might have been proposed for different scenarios, the two objectives do share some similarities. They both involve configuration and maintenance of candidate CGs and allow subsequent CG changes after a (previous) CG change (i.e., without releasing the configurations of other candidates). In fact, both can be seen as a kind of "selective activation".

- In Objective, 1 the CG change is based on L1/L2 signaling. If we start from Rel-17 inter-cell beam management, the CG change is initiated by network. But it may also be initiated by UE, e.g., via mechanism similar to beam failure recovery.
- In Objective 2, the CG change is based on L3 signaling. If we start from Rel-16 CPC, the CG change is initiated by UE (when network-configured conditions are met). But it may also be triggered by network using a RRC message (e.g., a handover command not carrying target cell configurations).

Considering current structure of objectives, a simply way-forward is to keep separate objectives, with a note in Objective 2 like

*NOTE: Harmonization with solutions for Objective 1 should be considered.*

#### 5 – SHARP Corporation

We think they have a different mechanism to work, so they should keep separate.

#### 6 – NTT DOCOMO INC.

We don't think harmonization and merging the two objectives are needed.

Although in both objectives, one or multiple cell groups should be configured to UE, the purpose/usage of the cells in a cell group, the potential required configurations (e.g., PDCCH/PDSCH/...) of each cell, as well as the configuration architecture or restriction of cell groups in MCG/SCG may be different, which should be discussed in WI phase. Hence, we prefer to keep separate objectives without the note.

If a note is needed for relationship between Objective1 and Objective2, we can say something like harmonization of RRC modelling in Objective1 and Objective2 can be considered.

#### **7 – Spreadtrum Communications**

We think objective 1 and 2 are targeted for different scenarios and different procedure are needed, so separate objectives should be kept.

#### **8 – Nokia Corporation**

The two objectives 1 and 2 should be kept separate and should not be merged or harmonized. Objective 1 deals with cell change -under the same CU using L1 signalling whereas objective 2 deals with cell group change in different nodes using L3 enhancements.

#### **9 – China Mobile Com. Corporation**

We don't think Objective 1 and 2 can be harmonized. Objective 1 aims to use L1/L2 signalling to reduce latency of inter-cell mobility. While Objective 2 is to activate cell groups via L3 signalling. The designs of these two mechanisms consider different signalling (L1/L2 versus L3) and performance requirement.

#### **10 – LG Electronics France**

In our view, objective1 and 2 are two different procedures, based on different capabilities. Then, harmonization of these two will complicate the work unnecessarily, even possibly imposing unnecessary restrictions. So, we do not think harmonization is required.

#### **11 – TURKCELL**

We think Objective 1 and Objective 2 are for different scenarios. We prefer separated objectives in WID.

#### **12 – Guangdong OPPO Mobile Telecom.**

We prefer to keep separate objective. They should not be harmonized as objective 1 and objective 2 are different procedures.

#### **13 – KDDI Corporation**

We share the view with others, don't think Objective 1 and 2 can be harmonized.

#### **14 – Beijing Xiaomi Mobile Software**

We prefer not to harmonize these two objectives. Although common design may be desired for objective 1 and 2 in some aspects, e.g. multiple configuration maintenance. But there is clear difference. Objective 2 could be done in L3, which is not restricted to L1/L2 signaling.

#### **15 – ZTE Corporation**

- We generally agree with the comments from MediaTek above.
- We just want to clarify that we are not pushing for something as drastic as merging the two objectives! We acknowledge that these two objectives target different scenarios. So, this exercise of merging need not be done. However, we should recognise the fact that it is beneficial to have a common framework between objective 1 and objective 2. It is important not to have any artificial separation between L1/L2 enhancements and the L3 enhancement when the basic mechanism to enable this will

reuse the same building blocks as explained in our previous comments (i.e. both rely on cell group configuration being maintained at the UE and switching between these cell group configurations). This is commonality should be taken into account in defining the final solution.

- To achieve this, we are also fine with some note along the lines as proposed by MediaTek.

*e.g. NOTE: Common framework should be considered for objective 1 and objective 2 to minimize the work in the WGs*

- One minor comment to the objective wording (given that applicability of CPC/CPAC mechanism will be discussed during the WID – i.e. not yet the baseline, we propose to modify the objective 2 slightly as below:

*To allow subsequent CPC/CPAC cell group change after changing CG without reconfiguration and re-initiation of CPC/CPAC [RAN2, RAN3, RAN4]*

Apart from the above changes, we are generally fine with the edits from the moderator!

## **16 – China Telecommunications**

We think objective 1 and objective 2 are applicable to different scenarios and should have different procedures, so separate objective is preferred.

## **17 – Apple Computer Trading Co. Ltd**

We are fine to keep the separate objectives. But we also see two objectives are similar in some aspects, e.g. the candidate cell configuration and maintenance. For the common parts, we prefer to add a NOTE to indicate the unified design should be applied.

## **18 – Intel Corporation (UK) Ltd**

We support 1) merge objectives together.

There are quite many common parts among objective 1 and 2, following bullets from objective 1 can be reused for objective 2 directly or with little changes, see below example on how to merge them together.

- To specify mechanism and procedures of L1/L2 and L3 based inter-cell mobility for mobility latency reduction:
  - o Configuration and maintenance for multiple candidate cells or cell groups to allow fast application of configurations for candidate cells or cell groups [RAN2, RAN3]
  - o Dynamic switch mechanism among candidate serving cells (including SpCell and SCell) for the potential applicable scenarios based on L1/L2 and L3 signalling [RAN2, RAN1]
  - o CU-DU interface signaling to support L1/L2 and L3 mobility, if needed [RAN3]
  - o Specify RRM core requirements for L1/2 and L3-based inter-cell mobility, as necessary [RAN4].
- o L1 enhancements for inter-cell beam management in both synchronized and non-synchronized scenarios, including L1 measurement and reporting, beam indication, and TA management [RAN1, RAN2]
- Note 1: For TA management both L1 and higher layer centric solutions are in scope.

- Note 2: early RAN2 involvement is necessary, including the possibility of further clarifying the interaction between this bullet with the previous bullet

Note 3: FR2 specific enhancements are not precluded, if any.

Note 4: The procedure of L1/L2 and L3 based inter-cell mobility are applicable to the following scenarios:

§ Standalone, CA and NR-DC case with serving cell change within one CG

§ Intra-DU case and intra-CU inter-DU case (applicable for Standalone and CA: no new RAN interfaces are expected)

§ Both intra-frequency and inter-frequency

§ Both FR1 and FR2

Note 5: The procedure of L3 based inter-cell mobility are also applicable to the following scenarios:

§ inter-CU inter-DU case;

## 19 – MediaTek Inc.

R2 Chair: Currently both Pcell change and PSCell change are reconfiguration with sync procedure, i.e. same. If we add the possibility of preconfiguration of target configurations and the possibility to switch back and forth between different configurations for reconfiguration w sync there is for sure the possibility to align how this is modelled and how such configurations are handled for multiple cases e.g. across O1 and O2. The seamless behavior and corresponding user plane behaviours may be somewhat different between O1 and O2, e.g. depending on the ambition level for L1L2 mobility, I guess we can consider e.g. reconfiguration with conditional sync, reconfiguration wo synch etc. ANYWAY, Both O1 and O2 need to build upon already existing functionality. A completely new paradigm e.g. where "L2L1 mobility" would specified as a brand new MAC procedure with no relation previous RRC procedures is completely unrealistic. I hope everyone is on the same page. In any case, reuse of baselines and harmonisation of common parts will be enforced in the WG as there is no choice not to, with the current TU allocation. Please also be aware e.g. that 3GPP has never before allowed non-secure serving cell change, so depending on the detailed solution for O1, we might anyway need to add a secure L3 trigger as an option. I make this comment to illustrate why I don't think the trigger is the main defining part of the procedure. Given this consideration, I find that the Ericsson proposal to just remove O2 and add the O2 scenario to O1 with potential addition of e.g. L3 trigger could potentially work in practice, would ensure harmonization and likely minimize the work. However, based on the comments, I understand that companies are not ready for this. In fact, given the number of comments that seems a bit wrong, I conclude that many companies have not even considered it yet (e.g. maybe R1 delegates have handled O1 and R2 delegates have handled O2?).

I think it would be beneficial to at least have a note in the WID on the likely / potential harmonization of O1 and O2 such that companies may be more ready for such discussions when the work starts in the WGs. The Docmo proposal may be quite adequate for such purpose.

## 20 – InterDigital France R&D

The objectives themselves are separate, because they correspond to a different solution for mobility. Whether aspects such as configuration, etc., can be harmonized should be discussed in the WI itself. It would be premature to force/exclude such harmonization now before we discuss the solution itself. Perhaps the WID can just focus on the objectives themselves, without making any conclusion about the design.

## 21 – MediaTek Inc.

MODERATOR PROPOSAL: I would like to then propose to add a NOTE to Objective 2 saying: *A harmonized RRC modelling approach for objectives 1 and 2 could be considered to minimize the workload in RAN2.*

I think this is quite balanced, just hints at it for consideration.

## 4.3 CA/DC enhancement

Please provide feedback on the proposal in the revised WID (v004).

### Feedback Form 19: CA/DC study objective text

#### 1 – Qualcomm CDMA Technologies

With this text, we are now effectively branching off a Study Item component for RAN4 only. This should of course be discussed along with other RAN4-led items, at least for RAN4 time management. The rest of the objectives are for RAN2-led Work Item and do not need a study phase.

#### 2 – DOCOMO Communications Lab.

We are fine with moderator's proposal.

On Qualcomm's point, RAN2 will be involved in the normative phase if the solution is found feasible. We prefer to keep the objective here.

#### 3 – vivo Mobile Communication Co.

We think it is better to also task RAN4 to study whether this new requirement is needed or not, as whether any potential RAN2 work is needed depends on the gap identified in RAN4 between the current requirements and CA/DC activation for FR2.

#### 4 – HuaWei Technologies Co.

For this objective, we understand the feasibility needs also to be studied: e.g. whether UE has sufficient RF/RRM resources, whether the FR2 measurement can be completed during the short period, etc. therefore we suggested to add below:

**Study the feasibility of performing enhanced measurement during RRC connection setup and study the impact of FR2 RRM mobility measurement acquisition and reporting on FR2 SCell/SCG setup delay for a UE connecting from idle mode. Also investigate the potential benefits to **reduce** FR2 SCell/SCG call setup delay from defining new RRM core requirements based on the following assumptions [RAN4]:**

- o The UE initiates improved measurements when it requests RRC connection setup.
- o The UE subsequently uses existing signalling procedures to report those measurements to the network.

#### 5 – MediaTek Inc.

We are fine with the revised text.

#### 6 – Nokia Corporation

During the GTW session yesterday it was discussed and also commented by the moderator that the aim was to study in RAN4 what we proposed as a work item. These enhancements includes RAN2 related enhancements. Thus, following the GTW session discussion we propose to align the study objectives with the discussion and allowing RAN2 enhancements after the RAN4 study if the outcome of the study shows benefits.

The proposed updated study objectives:

Study improvements ~~the impact of FR2 RRM mobility measurements acquisition and reporting for reduced on FR2 SCell/SCG setup latency~~ for a UE connecting from idle/inactive mode. ~~Also investigate the potential benefits to FR2 SCell/SCG call setup delay from defining new RRM core requirements based on the following assumptions [RAN4]:~~

- o ~~The UE performs~~ initiates improved additional FR2 measurements when it requests RRC connection setup is triggered.
  - o Network may provide additional assistance information on FR2 cells to be measured either available in SIB, EMR configuration or with dedicated message as a response to connection setup
  - o UE performs additional FR2 measurements for reducing FR2 SCell/SCG setup latency during connection setup
  - o UE reports its additional FR2 measurements made during the connection setup to the network to reduce FR2 SCell/SCG setup latency
  - o ~~The UE subsequently uses existing signalling procedures to report those measurements to the network.~~
- Target completion of the study by TSG-RAN#98 meeting.

#### **7 – China Mobile Com. Corporation**

We are fine with the current version. It provides a more detailed manifestation and gives an achievable way forward.

#### **8 – MediaTek Inc.**

MODERATOR COMMENT: Just to clarify, the 1st part of the objective is to identify clearly what can be done today. The 2nd part "Investigate the potential benefits of improvements...." was the improvement part. How do we know what we are improving if we do not have a baseline? So I would suggest we keep that structure.

To Nokia, on the assistance info part, I think it is better to add a note under the "improved measurements" to say "Note: the benefit of the UE having additional information to assist measurement improvement can also be considered", rather than assuming that it exists.

#### **9 – SoftBank Corp.**

OK for the moderator's proposal.

We think it is useful to study setup delay reduction from inactive mode. We think it seems not to increase significant RAN4 workload.

#### **10 – LG Electronics France**

We just want to confirm that this objective should not impose any non-trivial work to RAN2 in any case, i.e., most work of this objective should be restricted to RAN4. If that is not the case, we expect that this work item will suffer from a severe lack of TUs, and therefore we should simply drop this objective in the first place.

#### **11 – TURKCELL**

We share the concerns of Qualcomm and Nokia. RAN2 can be involved in the normative phase.

## 12 – Nokia Corporation

@Moderator: We have updated the text so that the 1st (understanding performance with the existing requirements and procedures) and 2nd (understanding performance improvements if procedures, signaling and UE requirements are improved) part are kept separate.

Updated objectives:

Study the impact of FR2 ~~UE RRM mobility measurements acquisition~~ and reporting on FR2 SCell/SCG setup delay for a UE connecting from idle/inactive mode. Also ~~study investigate~~ the potential improvements/benefits to FR2 SCell/SCG call setup delay and early measurement reporting from defining new additional UE measurement procedures with signaling support to the existing Early Measurement Reporting and improving UE RRM core requirements based on the following assumptions [RAN4]:

- o The UE performs initiates improved additional FR2 measurements when it requests RRC connection setup is triggered.
- o Network may provide additional assistance information on FR2 cells to be measured either available in SIB, EMR configuration or with dedicated message as a response to connection setup
- o UE performs additional FR2 measurements for reducing FR2 SCell/SCG setup latency during connection setup
- o UE reports its additional FR2 measurements made during the connection setup to the network to reduce FR2 SCell/SCG setup latency
- o ~~The UE subsequently uses existing signalling procedures to report those measurements to the network.~~

Target completion of the study by TSG-RAN#98 meeting.

@LG: Like discussed in the GTW yesterday this study will be conducted by RAN4 but RAN4 may and should study also how much FR2 SCell/SCG setup delays can be improved when improving procedures and signaling aspects. This is aligned with other studies done by RAN4 e.g. in Rel-16 on FR2 MPE to which RAN4 recommended new additional signaling to RAN2 and Rel-17 UL gaps where RAN4 is currently studying improvements if new UL gaps are defined and RAN2 signaling improvements are done. So the proposed objectives are well aligned with other similar RAN4 studies.

## 13 – Beijing Xiaomi Mobile Software

Current scope is good.

## 14 – ZTE Corporation

- In general, we think both IDLE and INACTIVE states should be considered for this work. So, this should be clarified in the objective.
- We still think these fit better in the RAN4 RRM WI. As a minimum we should avoid some overlapping discussions between these two WIs and any mechanisms investigated under this WI doesn't preclude the enhancements being investigated in the other RRM RAN4 WI and vice-versa. We think we should take another look at this objective at next RAN plenary when the overall RAN4 package is approved.
- Also, we think it will be too late for the UE if it starts performing new measurements only after initiating the RRCSetup/Resume. So, we think the feasibility of performing measurements after having initiated the Setup/Resume procedure should be investigated in RAN4 first.
- So, based on the above, we propose the following updates to the objective:

Study the **feasibility and** impact of FR2 RRM mobility measurement acquisition and reporting on FR2 SCell/SCG setup/resume delay for a UE connecting from idle/**inactive** mode. Also investigate the potential benefits to FR2 SCell/SCG call setup delay from defining new RRM core requirements based on the following assumptions [RAN4]:

- o The UE initiates improved measurements when it requests RRC connection setup/resume.
- o The UE subsequently uses existing signalling procedures to report those measurements to the network.

#### 15 – China Telecommunications

We are fine with the current version.

#### 16 – Apple Computer Trading Co. Ltd

This should be discussed together with other RAN4-led item first. If it's overlapped and can be included in other RAN4 item, we donot need to add the bullet in the WID.

#### 17 – Intel Corporation (UK) Ltd

FR2 RRM enhancements was identified as one of topics in the RAN4 Rel-18 email discussion (RP-212682) with measurement delay reduction listed as one of the topics. It is better to avoid overlapping discussions across different WIs and the proposal can be merged into RAN4 RRM enhancements work. It should be a study item component for RAN4.

#### 18 – MediaTek Inc.

We think original wording from moderator or the one from Huawei is fine. Nokia wording implies to have new "assistance information" and refuse to use existing signaling. This is not well justified especially before the feasibility is concluded by RAN4. New signaling (if needed) could be discussed after RAN4 complete the study. Concluding to have new RAN2 procedure or new signaling or new assistance information now is NOT suitable. We are not ready to accept the proposal with major RAN2 impact.

#### 19 – Nokia Corporation

The current wording from the moderator seems to suggest that only RAN4 requirements are studied instead of studying procedural improvements. This is not aligned with the GTW discussion yesterday. Furthermore, since the study is done by RAN4 at this point of time we don't talk about RAN2 impacts. Furthermore, there are also other RAN4 studies where RAN4 studies improvements, which includes improvements in RAN2 specifications, e.g. in Rel-16 on FR2 MPE to which RAN4 recommended new additional signaling to RAN2 and Rel-17 UL gaps where RAN4 is currently studying improvements if new UL gaps are defined and RAN2 signaling improvements are done. There are also number of other examples. Furthermore, for these type studies done in RAN4 and only in later phase after the study RAN2 would be involved RAN2 Chair's suggestions has been that there is no need to reserve dedicated RAN2 TUs. It would be good to follow the same principle here as before.

#### 20 – Nokia Corporation

@MediaTek: The existing EMR procedures also use "network assistance information", given via RRCRelease and SIB. The design principle of EMR (since LTE Rel-15) was to indicate to UE **what** to measure and **how long** to measure. That was intended to reduce the UE burden and have efficient procedure. The same principle applies for the assistance information here - new signalling may be needed, and study should allow additional signalling to make those measurements more power-efficient.

To take another example: The SMTC is signalled to the UE not because it is absolutely needed, but because it allows UE to do more efficient measurements and reduce UE power consumption. The same principle



should apply here - signalling should allow more efficient operation, not cripple it because of artificial limitations on signalling.

Finally, for most new Rel-18 feature, network also needs to know the supporting UEs so activation is only done for those UEs. That typically means new AS signalling and UE capabilities, all of which is part of normal RAN2 work.

#### 21 – Ericsson LM

We are fine with this formulation assuming it is restricted to RAN4 requirements only and hence does not impact RAN2 . No changes should be done to RAN2 procedures.

Again: plenary should not only talk about reducing workload, it is plenary's responsibility to make sure that the workload is reduced.

#### 22 – Verizon UK Ltd

We agree with Docomo, Softbank etc that this should be kept. We are also sympathetic to Nokia's view. In our understanding, GTW conclusion was that this study is in RAN4 but it doesn't restrict the solution/specification to RAN4 only. That was the compromise we accepted. If it was not the case, then we will not accept. This is a real product related issue - many of partners here know. It at least worth a study - being moderate and keeping balance is important for the long-term health for 3gpp. How come only operators and some companies are the ones to compromise?

#### 23 – MediaTek Inc.

MODERATOR comment: @Nokia: Regarding new signalling details, from a RRM requirements perspective, I think as part of the investigation what RAN4 should do is identify whether the UE would benefit from further assistance information from the network to perform measurements, what type of information, and by when it would need to have such information for it to be used effectively. I don't think it is relevant to RAN4 as to how any such new information should be provided in a study as that would be part of normative work, so don't think we should start referring to SIBs etc. That would be for RAN2 to figure out once feedback is received. Here is an updated proposal below, based on partial ZTE version:

*Study the impact of FR2 RRM mobility measurement acquisition and reporting on FR2 SCell/SCG setup/~~re-~~sume delay for a UE connecting from idle/~~inactive~~ mode. Also investigate the level of feasible improvement in FR2 SCell/SCG eall-setup delay from defining new RRM core requirements, and whether additional information from the network would help the UE to perform those measurements effectively. ~~based on~~ The following sequence of events should be assumed assumptions [RAN4]:*

- o The UE initiates and performs improved measurements when it requests RRC connection setup/resume.*
- o After acquiring those improved measurements, the UE subsequently uses existing signalling procedures ~~to~~ reports those improved measurements to the network to support SCell/SCG setup.*

#### 24 – Futurewei Technologies

We support Moderator's update based on ZTE's comments. RAN2 can be involved after RAN4 study concludes benefit of introducing enhancements to signaling and procedure.

#### 25 – Telia Company AB

RAN2 possible involvement (new signalling) could still be indicated more clearly.

**26 – Nokia Corporation**

@Moderator: Your objective text proposal still talks about the UE requirement enhancements with potential network assistance although also RAN2 procedure improvements should also be studied by RAN4 as agreed as a compromise in the GTW. Updated objectives on top of the moderator’s latest version above:

*Study the impact of FR2 RRM mobility measurement acquisition and reporting on FR2 SCell/SCG setup/resume delay for a UE connecting from idle/inactive mode. Also investigate the level of feasible improvement in FR2 SCell/SCG setup delay from defining new UE measurement procedures and RRM core requirements, and whether additional information from the network would help the UE to perform those measurements effectively. The following sequence of events should be assumed [RAN4]:*

- o *The UE initiates and performs improved measurements when it requests RRC connection setup/resume.*
- o *After acquiring those improved measurements, the UE subsequently reports those improved measurements to the network to support SCell/SCG setup.*

**27 – InterDigital France R&D**

We are fine with the latest moderator update.

**4.4 MBB and RACH-less handover**

Comments appreciated on applicability & restrictions for application of LTE MBB and RACH-less handover to NR.

**Feedback Form 20: MBB and RACH-less handover**

**1 – Qualcomm CDMA Technologies**

The main issue with this is whether it is realistic to finish in time along with all other objectives. One option will be to add it as a lower priority item and only "if time allows" within the currently considered TU allocation.

**2 – DOCOMO Communications Lab.**

To answer the question without mentioning support/not or workload, the TA restriction (zero or same) of RACH-less HO critically restricts its usage from our perspective.

**3 – Samsung Research America**

MBB is just a simple solution, i.e. allowing to keep TX/RX with the source until first preamble is transmitted to the target. Thus I don’t see any remarkable applicability issue.

As LTE RACHless is ported to NR, we may need to consider new issues related to FR2 and BWP, e.g. for pre-configured UL scheduling in the target. However, we have assumed that it would not result in heavy workload. It can be manageable.

**4 – HuaWei Technologies Co.**

We understand from GTW this is not added for the time being and we do not see need to discuss this repeatedly right now. Anyway this is not a simple copy paste, NR has beamforming design which does not exist in LTE, and once these kinds of solutions are introduced, these aspects cannot be omitted. Thus we are not optimistic that it can be a simple copy paste.

**5 – vivo Mobile Communication Co.**

We have similar view as Huawei on the outcome of GTW discussion. We assume nothing needs to be added in the scope by now, and Chair thinks this could be checked later, considering the progress of this project and the workload.

**6 – MediaTek Inc.**

Technically speaking, LTE MBB/RACH-less may be applicable to NR at least for FR1. But it may not be simple copy-paste; we would need to investigate further the exact impacts.

**7 – China Mobile Com. Corporation**

There may be more issues for FR2. The workload is acceptable to reuse the legacy solution, but we prefer to study LTE MBB/RACH-less in NR only after other objectives are completed.

**8 – MediaTek Inc.**

MODERATOR comment: Just to clarify, the GTW outcome was not to add it now, so I have no intention to discuss that aspect further. However the chairman recommended to continue to discuss a bit further to gain better technical understanding. This is why I raised this point here, so would encourage technical feedback.

**9 – LG Electronics France**

Unless TU is increased by a reasonable amount, we think the current TU budget cannot accommodate this objective, Furthermore, we do not think this work is essential given existing technologies that can achieve interruption reduction such as DAPS, 2-step RACH, and the new one enabled by objective1 of this WI.

This enhancement could be considered as R18 TEI later.

**10 – KDDI Corporation**

We believe that the workload is manageable, but we can accept Qualcomm’s idea as compromise “add it as a lower priority item and only ”if time allows” within the currently considered TU allocation.”

**11 – Nokia Corporation**

We have the same understanding as KDDI and support Qualcomm’s proposal for WF.

**12 – ZTE Corporation**

We support this proposal, but considering the time budget, we think we can stick with the way-forward suggested by RAN chair during the GTW session yesterday and come back to this if time allows.

**13 – China Telecommunications**

We think if we take LTE RACH-less and MBB solutions as the baseline, it will not bring much workload. So if time allows, we are fine to study it. Moreover, we also support to list it as low priority.

**14 – Beijing Xiaomi Mobile Software**

As guided by chairman, we can decide whether to include eMBB and RACH-less after other objectives finish.

**15 – Intel Corporation (UK) Ltd**

It might not be straightforward to take LTE solution directly into NR since NR FR2 is totally different from LTE, esp, considering beam management, and. PRACH in NR is used to indicate the selected beam. It will also require RAN4 work on RRM requirement, esp considering FR2 is totally different from LTE. Therefore to us, it is not just copy/paste. More TUs are needed to support it, and therefore it is quite difficult to fit them in Rel-18.

**16 – Apple Computer Trading Co. Ltd**

On NR applicability,

1> For MBB HO, UE just keeps on the data transmission on source cell until the first UL transmission in target cell, and UE is not required to support the simultaneous RxTx capability. We donot see the NR applicability issue;

2> For RACHless HO, the beam selection for the first UL transmission can reuse the design on the L1/L2 mobility or the SDT-CG design. The workload is also manageable.

On the TU allocation,

We can accept the compromised solution, to list it as the low priority objective.

**17 – MediaTek Inc.**

MODERATOR COMMENT: Please see my earlier comment. I was happy to allow to discuss technical aspects here, as I thought this may help gain further understanding. We should not discuss re-opening yesterday's decision now. Thanks for understanding.

**18 – Ericsson LM**

Agree with Huawei.

**19 – Futurewei Technologies**

Agree with other companies that beam operation is an integral part of NR operation (for both FR1 and FR2), and it is not clear that LTE MBB and RACH-less can be simply "copy and paste" into NR. We should not re-open the discussion if these items can be included in Rel-18 WID at this stage.

**20 – InterDigital France R&D**

MBB HO can be directly copy-pasted from LTE. For RACHless HO and the issue of beam selection, this can be concluded with minimal discussion and we see this as something that can be handled with limited TUs. We are fine with the compromise proposal by Qualcomm.

**21 – VODAFONE Group Plc**

We are fine with the compromise proposal by Qualcomm (but also note the moderator's comment on the GTW outcome.)

## 4.5 Final Phase summary

### 4.5.1 Revised WID Justification/Objectives 1,2,3,4,5

General consensus on the principle of the proposed changes from the Moderator, reflecting the outcome of the GTW. Updates to the revised WID made as comments came in.

Note that it was also highlighted that there may be a need for RAN4 RF requirements, which was captured in brackets in the WID, but requires further checking.

**Outcome: Updates reflected in proposed WID.**

### 4.5.2 Objective 1/2 Harmonization

Quite some reluctance to merge the 2 objectives. No major objections expressed to include a Note. Moderator therefore proposed the following balanced note considering the different views, and reflecting workload concerns:

*”NOTE: A harmonized RRC modelling approach for objectives 1 and 2 could be considered to minimize the workload in RAN2.”*

**Outcome: Moderator reflected the above text in the revised WID.**

### 4.5.3 CA/DC enhancement

Discussion on the text for the objective agreed in the GTW. Nokia proposed the following updates to the moderator proposal, and received no objections:

*”Study the impact of FR2 RRM mobility measurement acquisition and reporting on FR2 SCell/SCG setup/resume delay for a UE connecting from idle/inactive mode. Also investigate the level of feasible improvement in FR2 SCell/SCG setup delay from defining new UE measurement procedures and RRM core requirements, and whether additional information from the network would help the UE to perform those measurements effectively. The following sequence of events should be assumed [RAN4]:*

- o The UE initiates and performs improved measurements when it requests RRC connection setup/resume.*
- o After acquiring those improved measurements, the UE subsequently reports those improved measurements to the network to support SCell/SCG setup.”*

**Outcome: Moderator reflected above text in the revised draft WID.**

### 4.5.4 Make-before-break and RACH-less handover

As agreed in the GTW, moderator offered discussion to align technical understanding the impact of reusing a copy-paste of LTE MBB/RACH-less handover for NR to identify the required work in case at some point within Rel-18 this was to be added to the WI objectives.

**Outcome: Some different views, and some companies indicated that more investigation would be required to truly identify the impacts.**

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## 5 Conclusion

It is proposed to approve the WID in document RP-213565.