

**[95e-28-R17-feMIMO] - Version 0.0.5**  
**RAN**

**3GPP TSG RAN Meeting #95-e Attachment to RP-220948**

**Electronic Meeting, March 17 - 23, 2022**

**Agenda Item:**9.5.1.1

**Source:** Samsung (Email Discussion Moderator)

**Title:** Intermediate Round Summary of [95e-28-R17-feMIMO]

**Document for:** Discussion/Decision

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## 1 Introduction

This email discussion thread intends to address the following two subjects.

- Incorrect PMI Reporting in MIMO Operation (see RP-220170, RP-220171)
- Handling of Open Items of Rel-17 FeMIMO WI (see RP-220403)

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## 2 Initial Round

### 2.1 Incorrect PMI Reporting in MIMO Operation

Background information and proposal can be found in RP-220170. Further, RP-220171 contains a proposed revision of WID "Further enhancements on MIMO for NR" to implement the proposal of RP-220170.

Feedbacks on RP-220170 and RP-220171 are invited considering the scope of discussion that should take place in RAN4, expected timeline, proper WI (including a study phase) and release for handling the topic, etc.

#### **Feedback Form 1:**

**1 – Samsung Electronics Co.**

Incorrect PMI reporting issue was actually discussed in the last quarter in RAN4. The following options have been discussed and no consensus was reached on either of options

- Network planning solution by configuring non-colliding CSI-RS

- Introduce UE performance requirements

RAN4 reached the common understanding as below (copied from RAN4 chairman note)

- The issue for PMI reporting requirement for inter-cell interference scenario is **out of existing Rel-17 FeMIMO scope**, how to handle this issue subject to further decision/guidance from RAN-P; the candidate options discussed in RAN4 as following:

- Option 1: Rel-17 TEI
- Option 2: Rel-18 timeframe
- Option 3: update Rel-17 FeMIMO WI to include this objective

Based on above understanding, first of all, we are open to have further study in RAN4 on finding the solutions to address this commercial network issue

In our understanding, even though network planning solution has no spec impact and also quick solution to address the issue, RAN4 also has to study the performance degradation due to non-colliding CSI-RS configurations, i.e., a study phase is required first before concluding to introduce UE performance requirements.

Furthermore, if RAN4 conclude to introduce UE performance requirements, great RAN4 effort is expected including

- Agreed on baseline receiver as well as UE behavior
- Agreed on test setup
- Agreed on interference level
- Align the simulation assumption for simulation campaign
- Determine the requirements based on alignment of simulation results.

Overall, we think incorrect PMI issue cannot be completed within 2 quarters. Including incorrect PMI issue in any existing Rel-17 performance part will result in delay of completion of REL-17 performance part. Therefore, we suggest

- Having a study phase in Rel-18 Demodulation performance umbrella WI which was designed to accommodate such network performance issue
- Start the specification work based on study outcome
- Such work can start from Q2 2022 considering the urgency of resolving commercial network issue.

## 2 – MediaTek Inc.

We are fine with the proposed WID revision.

### **3 – Nokia Corporation**

We tend to agree with Samsung that such extension of Rel-17 WID is not trivial and it requires substantial amount of work. Adding such objective at this late stage is dangerous, as RAN4 is already very loaded. Hence, we do not support such approach. In case such study is seen as urgently needed, it should be properly dimensioned within Rel-18 timeframe. However we would like to remind similar study has taken place already in RAN1 in Rel-16.

### **4 – Apple GmbH**

These are the options discussed in RAN4#102-e:

- Option 1: Rel-17 TEI
- Option 2: Rel-18 timeframe
- Option 3: update Rel-17 FeMIMO WI to include this objective

Option 1 might not be feasible since this work will not be completed in 1 meeting.

Option 3: We only have 2 meetings for performance part of FeMIMO and it doesn't seem practical to be able to accommodate this additional work in that time frame. We have rather high work load for demod requirements for the next 2 quarters in RAN4. Option 3 doesn't seem feasible

Given the above observations, Option 2 seems most practical. We propose to include it in Rel-18, possibly under demod enhancements if feasible.

### **5 – vivo Communication Technology**

We agree with views from several companies above, adding objectives for already overloaded RAN4 Rel-17 scope will be detrimental for timely completion. It can be considered in Rel-18 timeframe.

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

We agree with other companies (e.g., Samsung/Nokia/...) that it is too risky to up-scope R17 WID at this late stage since RAN4 is overloaded.

Meanwhile, we share similar view as Samsung that further study is needed before RAN4 can decide whether/what solution is needed. There will not be enough time to address this issue if it is treated as an TEI.

Therefore, Option 2 ( i.e., discuss this issue in Rel-18 timeframe) seems the only choice. If this issue is included in some R18 WI, we support to start with a study phase so that the group can have sufficient time to do thorough investigation on the target scenario(s), impacts on the performance, the potential solutions and so on.

### **7 – Lenovo (Beijing) Ltd**

We have the same view as Samsung that it is impractical to handle it within R17 either as R17 TEI or R17 feMIMO WI due to the limited time for R17 and the amount of work requirement. It is reasonable to handle it in R18 time frame. Given the urgency of the issue in deployed network, this topic should be given high priority in R18.

## **8 – Qualcomm Incorporated**

We agree with Samsung that any work should be considered for Rel-18, not for Rel-17; therefore, we don't agree with adding this to the Rel-17 WID.

However, even before trying to agree with the topic to be added in Rel-18, we would like to get a positive re-confirmation by the original proponents - in NWM format or over the reflector - that the issue is still seen valid and relevant. This is because based on prior off-line checks, we have got the impression that all concerns have been resolved already.

Lastly, if such confirmation is received, and RAN decides to move forward with the performance work, we'd like to have it stated in the objective that the performance requirements will be based on a reference receiver that doesn't employ enhanced features (such as CSI-RS interference cancellation, for example). Our reasoning is based on the understanding that the potential problem exists only with very early or simplistic implementations. Therefore, solving the problem, if there is any, should not require any advanced implementation.

## **9 – SoftBank Corp.**

We are fine with the proposal and we are open to discuss it considering the workload in RAN4.

## **10 – KDDI Corporation**

We are fine with the proposed WID revision. If RAN4 will conclude the issue is still valid through the next quarter discussion, then RAN4 can start the discuss for solutions. Even though we are not sure whether RAN4 can complete the solution, but we think RAN4 can discuss whether the issue is still valid or not at least in May meeting.

## **11 – CATT**

We agree with Samsung and many other companies that including this in Rel-18 timeframe seems to be the only feasible option.

## **12 – MediaTek Inc.**

We understand that there have been some PMI reporting issues observed in practical deployments, where this has caused degradation in performance. Therefore, we would support some work on this, and we are fine to have it as Rel-17 TEI or by updating Rel-17 FeMIMO WI to include this objective.

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

We support to define requirements for the "Incorrect PMI Reporting" in Rel-17 timeframe in either Rel-17 TEI framework or extend the scope of Rel-17 FeMIMO WI. The work may require 2-3 quarters to complete and should be feasible to complete within Rel-17.

Alternatively, in case companies have strong concerns on Rel-17 it can be considered in Rel-18 NR Demod WI targeting early completion (e.g. start in Q3 and complete in Q4'22 or Q1'23) and release-independent requirements.

Further clarification on the objectives and scenarios is recommended to make RAN4 work more focused

- **Investigate incorrect PMI reporting under interference-limited cell-edge scenarios with collided CSI-RS scenario from different TRPs and if needed specify new PMI reporting requirements [RAN4]**

#### **14 – Huawei Technologies France**

We do not see it is an issue in practical deployment, and do not support to revise the FeMIMO WID at this stage. Indeed, the issue has been discussed several times in RAN1 and RAN4, but there is no any consensus that it is an issue which needs to be addressed by Specs' definition or change. From technical perspective , the mentioned incorrect PMI reporting is due to the incorrect CSI-RS configurations for neighboring cells with severe inter-cell interference. It could be addressed with proper CSI-RS configurations to avoid such collision (may be through different time/frequency/spatial/sequences for CSI-RS configurations), so it is an implementation issue.

#### **15 – China Telecom Corporation Ltd.**

In our understanding, this issue happens in the scenario where colliding CSI-RS with the same n\_ID is configured. We agree with Samsung and Qualcomm that UE behavior or reference receiver needs to be discussed to resolve this issue by UE processing, and might be difficult to finish the work in two quarters from RAN4 perspective. Meanwhile, considering the operators' interests, it seems no harm to at least have some study in Rel-17.

#### **16 – VODAFONE Group Plc**

If requirements for incorrect PMI reporting are to be defined, we support it to keep within R17 timeframe. With the understanding of RAN4 load at the end of this release, Intel's comments to make the RAN4 work more focused is agreeable to us

#### **17 – NTT DOCOMO INC.**

Basically we are fine with the proposal, however the workload should be carefully considered. As mentioned by Samsung, this issue can be avoided by other solutions, thus urgency should be carefully assessed.

#### **18 – Ericsson France S.A.S**

Thanks for the comments. A few responses:

Regarding the network planning solution; this avoids colliding CSI-RS, but we do not believe that it is a good way to solve this issue. Sure, it avoids the incorrect PMI reporting, but instead it causes additional overhead and/or interference towards PDSCH. It would be much better for the UEs to report the PMI correctly so that both things can be achieved; optimized interference and overhead performance and correct MIMO operation. We certainly do not believe that configuring colliding CSI-RS is incorrect; it is a way to improve overall performance.

Regarding the Qualcomm comments; we understand this issue has been seen with several different UE types, but we can check if it has been solved in all UE types (if possible). If it is not, a solution is needed. In any case though, since obviously the issue can arise with some implementations then even if it is solved in the first observed implementations it could be useful to make a requirement to ensure that such implementations would not occur again in the future. We don't expect any requirement to be linked to advanced features.

Considering the feedback, one way to do this could be as follows: For Q2, RAN tasks RAN4 to discuss and conclude on the impact of the incorrect PMI reporting issue and expectations as to whether it is already

being addressed without a requirement, usefulness of a requirement and what would be the scope and needed work to develop a requirement. This may be handled under TEI or similar. Based on this, June RAN can decide whether the requirement is needed and if so feasible to develop in the remainder of Rel-17, or whether in Rel-18.

Please consider this as a proposed WF in the 2nd round.

#### **19 – AT&T GNS Belgium SPRL**

We support the proposed WF presented by Ericsson. This seems to be a reasonable compromise to modifying the Rel-17 WID perf part at this late stage.

#### **20 – BT plc**

We support start of the work on incorrect PMI reporting issue in R17 timeframe - even if it is a study. So we are fine with RP-220171. We do not support a network planning-based solution to the issue.

## 2.2 Handling of Open Items of Rel-17 FeMIMO WI

RP-220403 proposes a list of Rel-17 core work items that still have open items remaining and further proposes that exception sheets should be agreed for these items to finalize the specifications by June 2022. Further enhancements on MIMO for NR is one of those items.

Note that the status report for FeMIMO WI is provided in RP-220832.

Feedbacks on the proposal of RP-220403 are invited.

### **Feedback Form 2:**

#### **1 – Samsung Research America**

##### **Response re RP-220403**

RP-220403 from Nokia et.al. proposes two actions:

**Action 1:** List "open issues" in the SR

**Action 2:** Submit an exception sheet listing the so-called "open issues" listed in the SR

For **Rel-17 NR\_FeMIMO-Core**:

1) RAN1 has stated 100% Core completion and only maintenance-level work remains - since RAN#94-e Dec 2021.

2) RAN1 has stated 100% Core completion and only maintenance-level work remains by RAN#95-e

3) The so-called "open issues" were mentioned in RAN2. The rapporteur (Samsung) has assessed 100% completion. Nokia seems to disagree and pointed out the so-called "open issues". Although such "open issues" are perceived as those of maintenance (as well as non-essential) and can be resolved in 2Q2022 by the ASN1. freeze, to accommodate Nokia's concern, a list for the so-called "open issues" in RAN2 has been included in the SR RP-220832 (section 2.2.2).

4) The SR RP-220832 has stated 100% Core completion.

In regard of the two proposed actions in RP-220403:

1) **Action 1 (list of RAN2 open issues in SR) has been addressed** as explained above (even if, strictly speaking, it is unnecessary as the issues are of maintenance in nature)

2) It is our view that **Action 2 (exception sheet with list of RAN2 open issues) is unnecessary and redundant** for the same reason. There is no risk that the so-called "open issues" (albeit maintenance in nature) are not addressed since they are already captured in section 2.2.2 of the SR RP-220832.

### **2 – ZTE Corporation**

We think that the listed open RAN2 issues in the current SR can be addressed in maintenance session, which is business as usual. There is no need to have an exception sheet as the core functionalities has been completed. This WI can declare 100% completion.

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

We share similar view as Samsung and ZTE. The R17 feMIMO can be declared 100% completion and the remaining open issue can be resolved in the maintenance stage. We don't see the necessity of the exception sheet based on the following reasons:

- It is time-consuming and it is not likely the group can converge to a specific list
- It is not useful for the maintenance works

### **4 – MediaTek Inc.**

We think an exception sheet is needed, considering outstanding MAC/RRC issues with RAN1 dependencies related to mTRP/BM aspects.

### **5 – CATT**

We agree with Samsung's assessment and support to declare 100% core completion. As also commented by Samsung, ZTE and OPPO, the issues left open can be resolved in maintenance stage.

### **6 – Apple GmbH**

In our view, for Rel-17 FeMIMO, we can declare 100% core part completion.

There are some remaining issues in RAN1 and RAN2, especially the PHR related issues in RAN2. However, those issues can be resolved during the maintenance phase and should not prevent the declaration of 100% core part completion.

### **7 – Nokia Corporation**

Generally, this WI showcases why the the so-called "maintenance phase" is often misused. The WI was not complete in December for RAN1234, and is not complete for RAN1/RAN2 now. To ensure this WI can be completed properly, exception sheet is required.

**For RAN1:** RAN1 was listed to have no open issues in RAN#95e. Despite this, the following decision was made in RAN1#108e:

**R1-2202814 Moderator summary #3 on enhancements of beam management for multi-TRP Moderator (CATT)**

*From Mar 2nd GTW session*

*Agreement*

*Support to configure/update explicit BFD -RS set by RRC signaling and MAC CE signaling.*

This issue has been on the table in RAN1 for quite some time, and it was clear only RRC is necessary for WI completion (which was also majority view). Yet when this was commented online, the WI rapporteur indicated that if both MAC CE and RRC are not agreed, the WI cannot be completed. Hence, it seems it was clear the WI was not even complete in December and all the details of this agreement are open and require first RAN1 work in May meeting, then RAN2 work to define both the RRC and MAC interactions. So we are left with no other conclusion that this WI was never complete in RAN1 (despite the previous SR).

**For RAN2:** The open issue list by the rapporteur is very good and honestly illustrates most aspects still open. RAN2 CR rapporteurs have done all they could to complete the work, but the CRs were only created for the first time in previous RAN2 meeting due to lack of RAN1 input, and not all RAN2 questions have been possible to account for yet. Additionally RAN2 still needs to digest all the RAN1 agreements from RAN1#108e (e.g. as per above).

**8 – Samsung Research America**

@Nokia: Re your comment "Yet when this was commented online, the WI rapporteur indicated that if both MAC CE and RRC are not agreed, the WI cannot be completed."

***Please note that this statement is falsehood since the WI rapporteur did not even attend this multi-TRP session (AI 8.1.2.3 in RAN1). Nor was the WI rapporteur involved in the email discussions for this issue. Please take extra care in stating facts properly :-)***

**9 – Ericsson LM**

Similar to Nokia, we also think it is important that we have a transparent and honest assessment of the completion level. No one benefits from stating that the work is done when it is not, the rapporteur least of all. This holds true for all items.

Reading the list of open issues in the status report makes it quite clear that it is not 100%.

Would it only be ASN.1 review details that remain, then we could agree that 100% is fine since ASN.1 review is something which RAN2 does in general for all WIs. But this is not the case for this item.

The feMIMO SR says that we need to sort out, for example:

- the "need" for certain bits in MAC CEs.
- some "optimizations" for MAC CEs.
- a "reporting procedure" should be discussed to determine which cells are included in the MAC CE and also "how to handle DC cases".

These types of discussions will require non-negligible time in RAN2 and makes it quite clear that the work is not 100% completed.

#### **10 – TELECOM ITALIA S.p.A.**

We support Nokia statement

*Generally, this WI showcases why the the so-called "maintenance phase" is often misused. The WI was not complete in December for RAN1234, and is not complete for RAN1/RAN2 now. To ensure this WI can be completed properly, exception sheet is required.*

And Ericsson statement

*Similar to Nokia, we also think it is important that we have a transparent and honest assessment of the completion level. No one benefits from stating that the work is done when it is not, the rapporteur least of all. This holds true for all items.*

*Reading the list of open issues in the status report makes it quite clear that it is not 100%.*

3GPP should really stop hiding issues and provide a clear assessment of the ongoing work

#### **11 – InterDigital**

We have a similar view with Samsung, ZTE, Oppo, etc. that we can declare 100% core part completion and some minor remaining open issues can be handled during maintenance phase as we did in the most of previous releases.

#### **12 – vivo Communication Technology**

In our view core part is 100% complete. On RAN2 open issues raised above our understanding is that RAN2 can handle those issues as maintenance, the status report states "if needed...", "maybe needed..." that means it is up to RAN2 experts whether those are considered essential or non-essential, which can be closed before ASN.1 review.

#### **13 – China Telecommunications**

In our understanding, this WI can be declared completed. The listed open RAN2 issues in the status report can be addressed in the maintenance phase. No exception sheet is needed.

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

We share same view with Samsung. The WI can be considered complete. The remaining maintenance work can continue be done in next meeting during ASN.1 review.

#### **15 – Qualcomm Incorporated**

We agree with Samsung's assessment. Our view is that core completion should be marked 100% and no exception sheet is necessary.

#### **16 – HuaWei Technologies Co.**

We also agree with the rapportuer's assessment. Those remaining issues can be addressed in the maintenance work as well as ASN.1 review process, thus we think it can be marked 100% and no need for exception sheet.

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

### **- For RAN1**

- We want to be consistent in Rel-17 where RAN1 part of feMIMO was considered completed. Thus, there is no need of exception sheet for RAN1. We are open for the approach from RP-220403 in Rel-18 and onwards.

### **- For RAN2**

- From RRC perspective, although RAN2 didn't have opportunity to review carefully, it seems most of parameters (at least based on RAN1 RRC parameter list) are implemented. In that sense, we could say the remaining issues can be handled in the maintenance.
- However, from MAC perspective, it is clear that RAN2 didn't implement one MAC CE that updates explicit BFD-RS set because RAN1 decision was made late. And then, the question is whether this can be simply implemented in the next meeting by RAN2. It is not so clear because we don't know how many candidate detection RSs are configured in each BFD-RS set which will determine MAC CE bit size and what additional information are needed in the MAC CE. RAN2 was informed that the maximum number of detection resources per set per CC is 64, but apparently, there is confusion because RAN1 discussion shows it is about recovery RS not detection RS.
- Therefore, having exception sheet seems more reasonable conclusion to indicate the current feMIMO RAN2 status.

### **- For RAN4**

- All Core part open issues are closed and remaining minor remaining aspects can be handled in the maintenance stage.

## **18 – DOCOMO Communications Lab.**

We agree with WI rapporteur's assessment and support this WI entering into the maintenance phase. Maintenance work can be facilitated by WG-level open issue list and we do not see the need for working an exception sheet out via additional discussion here.

## **19 – Nokia Corporation**

My apologies for the statement on "WI rapporteur" - this was based on misunderstanding from my part.

But the facts remain: RAN1 made ~7 pages of agreements listed in the SR. This doesn't seem like "maintenance phase". Let's not hide the work that needs to be done - we all want to make this WI work, that's where the exception sheet helps chairs to provide sufficient amount of time to those WIs that truly need it.

## **20 – China Unicom**

We share similar view with most of companies that this WI can declare 100% completion. For the RAN2 issues can be treated in the maintenance as usual. No need for exception sheet.

## 2.3 Initial Round Summary

### 2.3.1 Incorrect PMI Reporting in MIMO Operation

Feedbacks are diverging. One extreme is that the issue of incorrect PMI does not exist because it can be avoided by a proper implementation. Another extreme is that a UE performance requirement should be specified in Rel-17 to quickly resolve the issue. There are also different views regarding how many RAN4 meetings would be needed to study the issue and to define UE performance requirements if needed.

In order to have constructive discussion, it seems important to try to agree on a proper work plan to derive common understanding on the issue itself and to proceed to the next steps for developing a requirement if deemed necessary.

Based on the above consideration, the moderator proposal is as follows.

#### **Proposal:**

- In Q2, RAN4 is tasked to discuss and conclude on the followings in Rel-17 TEI.
  - Impact of the incorrect PMI reporting
  - Expectations as to whether it is already being addressed without a requirement
  - Usefulness of a requirement
  - Work scope and the number of RAN4 meetings needed to develop a requirement
- RAN#96 decides whether the requirement is needed and if so, decides when it can be done, i.e., in the remainder of Rel-17 or in Rel-18.

### 2.3.2 Handling of Open Items of Rel-17 FeMIMO WI

Feedbacks are as follows.

- 100% and no exception sheet: Samsung, ZTE, oppo, CATT, Apple, IDC, vivo, China Telecom, CMCC, Qualcomm, Huawei, DOCOMO, China Unicom (13 companies)
- Exception sheet for open issues in RAN1 and RAN2: Nokia, Telecom Italia (2 companies)
- Exception sheet for open issues in RAN2: Ericsson, MediaTek, Intel (3 companies)

It is noted that the status report already indicates that the listed RAN2 open issues can be handled as a part of usual maintenance work until ASN.1 freeze in the second quarter of 2022, since RAN2 completed the functionally critical issues.

Given this situation, the moderator proposal is as follows.

#### **Proposal:**

- Declare 100% completion level for core work item
- Exception sheet is not needed

### 3 Intermediate Round

#### 3.1 Incorrect PMI Reporting in MIMO Operation

Feedbacks on the moderator proposal from the initial round are invited.

**Moderator proposal from the initial round:**

- In Q2, RAN4 is tasked to discuss and conclude on the followings in Rel-17 TEI.
  - Impact of the incorrect PMI reporting
  - Expectations as to whether it is already being addressed without a requirement
  - Usefulness of a requirement
  - Work scope and the number of RAN4 meetings needed to develop a requirement
- RAN#96 decides whether the requirement is needed and if so, decides when it can be done, i.e., in the remainder of Rel-17 or in Rel-18.

**Feedback Form 3:**

<p><b>1 – Verizon UK Ltd</b></p> <p>We support WF proposed by Ericsson and believe further study in RAN4 is necessary. Considering a practical issue on the field, we expect a solution in Rel-17 from RAN4, and the related works should not be delayed. For this, a clear guidance (for how to process the work in RAN level and reasonable timeline) is needed to help RAN4 to process the work.</p>
<p><b>2 – Futurewei Technologies</b></p> <p>We are ok with the proposal.</p>
<p><b>3 – T-Mobile USA Inc.</b></p> <p>We support the proposal.</p>
<p><b>4 – AT&amp;T GNS Belgium SPRL</b></p> <p>We support the moderator proposal.</p>

<p><b>5 – vivo Communication Technology</b></p> <p>We support the moderator proposal</p>
<p><b>6 – Beijing Xiaomi Mobile Software</b></p> <p>We are OK with the moderator’s proposal.</p>
<p><b>7 – ZTE Corporation</b></p> <p>We are fine with the moderator’s proposal.</p>
<p><b>8 – CATT</b></p> <p>We are ok with the proposal.</p>
<p><b>9 – KDDI Corporation</b></p> <p>We support the moderator proposal.</p>
<p><b>10 – Qualcomm Incorporated</b></p> <p>We thank Ericsson for the clarification. We would further appreciate if it could be clarified further by the proponents, before the next RAN4 meeting, whether this is an issue observed with any of the implementations currently being deployed, and/or when it was last seen. Although we agree with Ericsson that even if the problem is not being observed in any current implementation, it could be still considered whether to define requirements; but in that case the time criticality is much reduced. Given the current time crunch in RAN4, we expect that RAN4 may not be able to complete or even start the preliminary discussion in Q2, in which case this topic would be rediscussed again in June in RAN without RAN4 feedback. In other words, we don’t think RAN4 should start a TEI. It is sufficient to have a preliminary RAN4 discussion on the existence of a problem.</p> <p>With that condition and understanding, we are ok with the moderator’s proposal.</p>
<p><b>11 – Apple GmbH</b></p> <p>We support the Moderator’s proposal.</p>
<p><b>12 – China Telecom Corporation Ltd.</b></p> <p>We are ok with the proposal.</p>
<p><b>13 – Intel Corporation (UK) Ltd</b></p> <p>We support the moderator proposal</p>
<p><b>14 – NTT DOCOMO INC.</b></p> <p>We support the moderator’s proposal.</p>
<p><b>15 – Guangdong OPPO Mobile Telecom.</b></p> <p>We support the moderator’s proposal.</p>

<p><b>16 – SoftBank Corp.</b></p> <p>We support the moderator’s proposal.</p>
<p><b>17 – New H3C Technologies Co.</b></p> <p>We support the moderator’s proposal</p>
<p><b>18 – Ericsson France S.A.S</b></p> <p>We support the proposal</p>
<p><b>19 – VODAFONE Group Plc</b></p> <p>We support the moderator’s Proposal</p>
<p><b>20 – Nokia Corporation</b></p> <p>We are in general fine with the moderator’s proposal for the second round, considering also the clarifications mentioned by Qualcomm above. It is important to identify which types of deployments and devices are more susceptible to these issues so that potential work to address them can be done in a focused manner.</p>
<p><b>21 – Huawei Technologies France</b></p> <p>Thanks moderator for the proposal. Given the high workload in RAN4 for next quarter to complete the remaining topics in Rel-17, we are not sure going back to RAN4 to have further discussion is necessary. We are ok to have further discussion in RAN#96, but not ok that RAN tasks RAN4 to have resource consuming discussion for the listed issues.</p>
<p><b>22 – BT plc</b></p> <p>We support the moderator’s proposal</p>
<p><b>23 – Samsung Electronics Co.</b></p> <p>We support Moderator’s proposal</p>

### 3.2 Handling of Open Items of Rel-17 FeMIMO WI

Feedbacks on the moderator proposal from the initial round are invited.

**Moderator proposal from the initial round:**

- Declare 100% completion level for core work item
- Exception sheet is not needed

#### Feedback Form 4:

##### 1 – Futurewei Technologies

We are ok to declare 100% completion and no exception sheet. Of course, the remaining issues will need to be handled and resolved in maintenance phase.

##### 2 – Ericsson LM

We think this would be an unfortunate outcome. This is not how we are supposed to use the open issue list/completion level/exception sheets. This to us looks like RAN plenary is trying to hide the fact that the feMIMO item has significant unfinished work. The work does not become more complete just because we write 100%.

##### 3 – Samsung Research America

###### Rapporteur's response to Ericsson:

**First**, the rapporteur **acknowledges and thanks** Ericsson for their utmost, tremendous, and extra support in RAN2 toward completing the RRC and MAC CE components for FeMIMO WI, e.g. Helka-Liina - without which we wouldn't even be confident enough of claiming the 100% Core completion :-)

**Second, regarding your claim** "*RAN plenary is trying to hide the fact that the feMIMO item has significant unfinished work.*" (emphasis added), this is **simply untrue** at least for the following reasons:

1. While a few companies insist that the 'open issues' are significant enough to justify stating <100% Core completion and submitting an exception sheet, the majority perceive that those 'open issues' are simply a normal part of next-level details customary of a maintenance phase – in the sense that 100% Core completion can be declared and exception sheet is not needed.
2. Regardless what different companies perceive of the so-called 'open issues', they have been included in section 2.2.2 of SR RP-220832. The list is openly displayed in RAN and not hidden.
3. Not only so, but a RAN-level commitment to resolving the so-called 'open issues' has been made. In section 2.2.2 of SR RP-220832, the following statement has been included: "*The following open issues can be handled as a part of usual maintenance work until ASN.1 freeze in the second quarter of 2022.*" (emphasis added)

To conclude, nothing is being hidden (the list is included in the SR with a firm commitment for resolution) **even without** declaring <100% Core completion and submitting an exception sheet.

##### 4 – InterDigital

We support the moderator's proposal

##### 5 – China Mobile Com. Corporation

Support moderator's proposal.

##### 6 – Spreadtrum Communications

We agree with Samsung's assessment. We support the moderator's proposal.

<p><b>7 – Beijing Xiaomi Mobile Software</b></p> <p>We support the moderator’s proposal.</p>
<p><b>8 – Guangdong OPPO Mobile Telecom.</b></p> <p>We support the moderator’s proposal.</p>
<p><b>9 – ZTE Corporation</b></p> <p>We support the moderator’s proposal.</p>
<p><b>10 – CATT</b></p> <p>We support the moderator’s proposal.</p>
<p><b>11 – vivo Communication Technology</b></p> <p>We are fine with moderator proposal.</p>
<p><b>12 – Qualcomm Incorporated</b></p> <p>We support the moderator’s proposal.</p>
<p><b>13 – HuaWei Technologies Co.</b></p> <p>We are OK with the moderator’s proposal in general. On the remaining issues, we think for the MAC part, some issues are kind of optimizations and we don’t think they are essential to make the WI completion &lt;100%. Some issue is due to the latest RAN1 agreement and RAN2 can make the adaptation accordingly as usual, this can also be handled in the maintenance phase. For RRC parts, we can update parameters during ASN.1 review.</p>
<p><b>14 – DOCOMO Communications Lab.</b></p> <p>We support the moderator’s proposal.</p>
<p><b>15 – Intel Corporation (UK) Ltd</b></p> <p>For RAN2 remaining open issues - we agree that it is a gray area whether the open issues are considered as critical to be exception sheet or not. In addition, there is no difference in our work with whether the open issue is captured in the exception sheet or not. In that sense, we are ok with the moderator’s proposal as the majority wants.</p>
<p><b>16 – MediaTek Inc.</b></p> <p>R2 Chair: Well, this may indeed be grey area. This WI is big and complex, R1 assigned R2 to resolve quite many small things, and the participants have been struggling somewhat due to learning curve and some controversy. The spirit in R2 has been good, and fortunately led by very competent people, and even though it has taken some time, I see constructive progress on all issues and unclarities. Nevertheless due to general immaturity, I see some risk that there may still be some unresolved things after Q2, and I think exception sheet brings some benefits of additional focus and push, so I would be supportive of such direction.</p>

**17 – New H3C Technologies Co.**

We support the moderator's proposal.

**18 – NEC Corporation**

We support the moderator's proposal.

**19 – Nokia Corporation**

We agree with Ericsson that this would be very unfortunate outcome of the discussion. Declaring a WI "100% complete" and stating that "open issues can be handled in maintenance phase" is an antilogy: If there are known open issues, the WI is not completed, and the exception sheet has to detail the key open issues that still require time to complete the WI in WGs.

We would like to remind, again, that RAN2 has not processed all the RAN1 agreements, nor has RAN1 answered all RAN2 questions. That's why we think it's important to provide more time for this WI in May meeting, especially given the MAC CE agreement from RAN1.

If the WI is declared 100% complete now, we assume that **none of the issues above are essential for completion of the work item and all related RAN1#108e agreements (e.g. creating a new MAC CE) that require RAN2 work shall be reverted by RAN#95-e, and RAN1/2 works on the remaining issues with reduced effort compared to WIs that have exception sheet.** But we wonder if that is really the intended way forward?

**20 – Samsung Electronics Co.**

(Question to Nokia) It seems Nokia's comments are about the issues that have to be treated in RAN2. Then, is it correct understanding that there is no open issue left in RAN1 in Nokia's view? If so, it is in line with what is stated in the status report even though there are different views on how to handle RAN2 issues (maintenance work vs exception sheet). Clarification would be appreciated.

**21 – Samsung Electronics Co.**

(Comment as Moderator) By the way, the above comment is from moderator perspective.

**22 – Nokia Corporation**

To Samsung: Definitely RAN2 has open issues, which have also been well-documented already. For RAN1, this is what the exception sheet indicates for RAN1:

*- RAN1 completed the work. Some remaining details will be completed during maintenance phase.*

The list of RAN1 agreements also lists several FFS - given that 100% completion was claimed for RAN1 last time, are those essential or just nice to have? And if the RAN1 part is 100% complete, then we assume RAN1 only needs minimal amount of time for this WI since the WI is complete.

**23 – Samsung Electronics Co.**

To Nokia (from moderator): The above question was from the moderator perspective as clarified. By the way, the sentences referred to seem from the status report (not from an exception sheet as it was not submitted). What was exactly meant by the two sentences could be clarified by the rapporteur.

### 3.3 Intermediate Round Summary

See RP-220888 for the moderator proposal.

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## 4 Final Round

### 4.1 Questions for the final round discussion

Following the discussion in Monday GTW session, feedbacks on the following two questions are invited.

**Q1:** It is necessary to agree on a minimum of set of topics to be discussed in RAN4, of which outcome can facilitate the discussion about a work plan (if necessary) in a future RAN meeting. It would be important to discuss justification why RAN4 has to work on the incorrect PMI reporting. Would the followings be agreeable as the topics for the next round of RAN4 discussion?

- Impact of the incorrect PMI reporting
- Usefulness of a requirement

#### Feedback Form 5:

<b>1 – Intel Corporation (UK) Ltd</b> The set of topics is fine to get an initial assessment in RAN4.
<b>2 – T-Mobile USA Inc.</b> We support RAN4 discussion on these topics.
<b>3 – AT&amp;T GNS Belgium SPRL</b> We are OK with the set of topics proposed for the next round of RAN4 discussions. However, it seems that the moderator proposal in RP-220888 contains a list of 4 items for RAN4 in Q2 in order to provide RAN the necessary input at RAN#96. If the intent is to focus on these topics first, it should still be clear that RAN4 is expected to complete the full list of items in RP-220888 assuming that the outcome of the first two topics justifies completing the other two items (to include the work scope and the number of RAN4 meetings needed to develop a requirement).
<b>4 – Verizon UK Ltd</b> We support RAN4 to discuss the topic of PMI reporting and identify the issues.

**5 – ZTE Corporation**

It's okay to prioritize these two items firstly. If they are agreed at the end, then we could further discuss the work plan if necessary.

**6 – Apple GmbH**

In general we support to further evaluate in RAN4 and it is good to have defined topics to discuss in Q2. Is the intention to evaluate the impact of incorrect PMI or to evaluate if there is an issue that causes False PMI reporting? Could Moderator please clarify? It would be nice if the agreement reflects the purpose.

**7 – vivo Communication Technology**

We support the topics listed for RAN4 discussion.

**8 – Samsung Electronics Co.**

Moderator response to Apple: as explicitly written, the intention is to discuss the impact of incorrect PMI reporting. Usefulness of a requirement would be related to the seriousness of the impact.

**9 – Apple GmbH**

To Moderator: Thanks for the response. In our understanding incorrect PMI reporting will definitely result in performance degradation. In RAN4 we need to evaluate if the False or incorrect PMI reporting problem exists. Is that correct understanding? In that case the agreement needs to reflect it.

**10 – KDDI Corporation**

We support the moderator proposal, two topics.

**11 – SoftBank Corp.**

We support to discuss these topics in RAN4.

**12 – Guangdong OPPO Mobile Telecom.**

During previous rounds, it seems different companies have different views on existence of this issue and current UE implementations. Thus, in addition to the topics listed by moderator, we also support Apple's suggestion that RAN4 needs to study and justify whether the issue exists or not.

**13 – NTT DOCOMO INC.**

We are fine with moderator's proposal and Apple's suggestion.

**14 – MediaTek Inc.**

We support RAN4 looking into this, and fine with moderator proposal.

**15 – Huawei Technologies France**

Thanks moderator for the proposal. To make it clear, we'd like to have some revision for the second one:

- Usefulness of a **demod** requirement **with no impact to other WGs**

**16 – Samsung Electronics Co.**

Response to Apple and OPPO: it would be difficult to deny the need for discussing about the existence of the incorrect PMI reporting issue itself if there is a question. On the other hand, in my view, the existence of the problem was already understood in the sense that companies recognize an immediate solution could be using an alternative network implementation so that the colliding CSI-RS is not used, regardless whether they prefer it or not. Considering this situation and the close link between existence and impact, perhaps, the first item could be revised to "existence and impact of the incorrect PMI reporting".

**17 – China Telecom Corporation Ltd.**

We are ok with the moderator proposal and the additional clarification from HW. Just one comment on "with no impact to other WGs": to our understanding, this does not preclude the possibility of new UE capability. According to the initial round discussion, new UE reference receiver or UE behaviour is not precluded if we want to resolve this issue.

**18 – Nokia Corporation**

We are OK with the proposal from the moderator.

**19 – VODAFONE Group Plc**

We are fine with the moderator's proposal

**20 – Ericsson France S.A.S**

We are OK with the proposal, the Huawei clarification together with the CT comment not to rule out capability.

We think that an additional sub-bullet should be added to "usefulness of a requirement" and that should be "Scope and work needed to create a requirement".

The intention would be for RAN4 to consider what the requirement could be and provide some insight on whether from a technical basis creation of a requirement within Rel-17 would be at all feasible. The intention is not to actually agree on any requirement details; just to get an estimate of the amount of work that would be needed based on a top level technical view.

**21 – Samsung Electronics Co.**

We support Moderator's revised proposal, i.e., existence and impact of the incorrect PMI reporting

**22 – Samsung Electronics Co.**

Moderator feedback on Ericsson comment: if we add a sub-bulet "Scope and work needed to create a requirement" under "usefulness of a requirement", there might be a concern on RAN4 workload as commented in Monday GTW session. There were 4 topics for discussion in Monday GTW session and 3 of them would be in the list. I suggest adding a disclaimer "it can be discussed in RAN4 if the workload allows. Otherwise, it can be discussed in RAN#96." if it is desired to have this.

**23 – BT plc**

We are generally fine with the topic list. We echo China Telecom’s comment on UE capability - we should not preclude impact on other WGs at this stage.

**Q2:** When RAN4 discussion as described above should take place?

- Alt 1: Q2-2022
- Alt 2: Q3-2022
- Alt 3: Q4-2022

**Feedback Form 6:**

**1 – Intel Corporation (UK) Ltd**

Our first preference is Alt 1. We expect that it will be discussed in Demod session and Q2 workload should be smaller than Q3, when many WIs perf part is expected to be completed.

**2 – AT&T GNS Belgium SPRL**

We prefer Alt 1 in order to meet the goal of providing RAN the necessary input by RAN#96.

**3 – Verizon UK Ltd**

This work needs to take place from Q2 (Alt 1) in RAN4 within the scope of Rel-17.

**4 – ZTE Corporation**

Since the concern raised from companies in GTW was RAN4 workload being too high in Q2, we are also okay to consider this in Q4 or later in Rel-18 discussion.

**5 – Apple GmbH**

We would like to point out that in the next 2 RAN4 meetings the focus would be on Rel-17- performance part completion with high work load for Demod. Hence, we think Q4 would be better suited for this evaluation, but if majority companies think that the initial evaluation as scoped out is doable given RAN4 workload in demod, we are fine with Alt-1.

**6 – vivo Communication Technology**

Given the importance of completion of Rel-17 and the workload, we prefer it to be discussed in Q4.

**7 – KDDI Corporation**

We prefer Alt1, but at the same time we think we should check whether RAN4 time unit is available for this discussion.

<p><b>8 – Guangdong OPPO Mobile Telecom.</b></p> <p>It depends on RAN4 workload and how urgent this issue is. In our understanding, the most important work for RAN4 in current stage is to complete R17. Thus, we prefer to start the work in a later time (e.g., Q4).</p>
<p><b>9 – SoftBank Corp.</b></p> <p>Our preference is Alt. 1 but we understand the it should be discussed considering the workload in Demod session.</p>
<p><b>10 – NTT DOCOMO INC.</b></p> <p>We think alt. 1 is suitable to justify whether the issue exists or not, but demod workload should be carefully considered.</p>
<p><b>11 – MediaTek Inc.</b></p> <p>Alt1 would be ok - but not checked the TU availability.</p>
<p><b>12 – Huawei Technologies France</b></p> <p>Though we think it is just an implementation issue, we are open to have some clarification and discussion in next quarter unless it is not time consuming and will not have impact to the completion of other RAN4 topics. Alt 1 is ok for us.</p>
<p><b>13 – MediaTek Inc.</b></p> <p>...but analysing those 2 points above does not require much RAN4 time in our view.</p>
<p><b>14 – VODAFONE Group Plc</b></p> <p>Alt1 is OK, but other alternatives can be accepted as well depending on the RAN4 workload</p>
<p><b>15 – Ericsson France S.A.S</b></p> <p>The discussion should be on the nature and urgency of any problem and the usefulness of a RAN4 solution. In our view, this should be done in Q2. We do not expect a high workload from this discussion, and it should not delay other topics.</p>
<p><b>16 – Samsung Electronics Co.</b></p> <p>By recognizing the urgency of solve the issue in commercial network, we support Alt 1.</p>
<p><b>17 – BT plc</b></p> <p>Alt-1 is our preference</p>

## 4.2 Final Round Summary

See RP-220948.

