**3GPP TSG RAN Meeting #92-e RP-21xxxx**

**Electronic Meeting, June 14-18, 2021**

**Agenda item:** 9.7.1.1

**Source:** Moderator (Samsung)

**Title:** Moderator’s summary for email discussion [92-e-08-feMIMO-Scope]

**Document for:** Discussion and Decision

1. Introduction and background

Per chairman’s instruction, the goal and pertinent contributions for this email discussion is as follows:

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| [92-e-08-feMIMO-Scope] | RP-211035, 1152, 1186, 1190, 1217, 1302, 1359, 1364, 1463, 1187 (feMIMO part) | Eko Onggosanusi, Samsung | 9.7.1.1, 9 |

The following topics have been discussed in the above contributions:

* (1152, 1186/87) Overall progress of Rel-17 NR\_FeMIMO:
  + Even if the overall progress is good, some items experience more challenge in progressing efficiently. Such items include inter-cell mTRP, UL multi-panel, MPE mitigation. For this matter, no RAN intervention was proposed this time as it wasn’t seen necessary. The progress will be reassessed in RAN#93-e.
  + No email discussion is needed on this topic
* (1186, 1364) Overlap between RAN1 AI 8.1.1 (multi-beam) and 8.1.2.2 (inter-cell mTRP) on DPS,
  + Samsung (1186) pointed out that *from WID and workflow perspectives*, there should be no overlap between 8.1.1 and 8.1.2.2: 1) DPS scheme (inter-cell beam management) in 8.1.1 is based on Rel-17 unified TCI while any work in 8.1.2.2 is based on Rel-15/16 TCI; 2) Any work in 8.1.2.2 is targeting mDCI for multi-PDSCH reception (hence simultaneous RX, not DPS) as clearly stated in the WID.
  + But Nokia (1364) pointed out a *de facto* overlap of work between 8.1.1 and 8.1.2.2 on DPS. While DPS is out of scope in 8.1.2.2 according to the WID, at least one alternative (considered for discussion and down-selection) in 8.1.2.2 facilitates DPS. Meanwhile, inter-cell beam management in 8.1.1 comprises DPS.
  + Email discussion is needed on this topic
* (1035, 1152, 1186/90, 1217, 1302, 1359, 1463) Scope of L1/L2-centric inter-cell mobility (L12XCM) in Rel-17. The following sub-topics were discussed:
  + RAN2 scope for Rel-17 L12XCM: scenario 1 (no change in serving cell) vs. scenario 2 (requiring change in serving cell)
    - Samsung (1186/90), affirming the RAN2 response that both scenarios 1 and 2 of R2-2106787 apply to L12XCM *(“RAN2 summarized two expected scenarios and corresponding models (Inter-cell multi-TRP-like model and L1L2 mobility model) with simplified procedures regarding L1/L2 centric inter-cell mobility ...”*), proposes that RAN1 proceed working on inter-cell beam management (including inter-cell beam indication) in parallel to RAN2 work
    - Qualcomm (1302) and CATT (1217) propose to include both scenarios with additional TUs allocated to RAN2. However, if additional TUs are not feasible, CATT proposes to postpone scenario 2 to a later release. On the other hand, MediaTek (1463), OPPO, and Samsung (1190) propose to include only scenario 1 due to the current TU allocation.
  + Other assumptions for Rel-17 L12XCM (given the LS responses from RAN2/3/4):
    - MediaTek (1463), OPPO (1035), and Qualcomm (1302) propose to assume intra-DU (excluding inter-DU) and intra-frequency (excluding inter-frequency)
    - MediaTek (1463) also proposes to assume that “TRP/cell1 and TRP/cell2 are synchronised and timing advance is maintained sufficiently that a RACH would not be required”
    - MediaTek (1463) also proposes that “(p)rotocol stack design for L1/2 centric inter-cell mobility will not target re-use of CA Pcell/Scell concept”
  + Possibility of postponing or de-prioritizing the entire work of L12XCM in Rel-17 to a later release:
    - Vivo (1152) mentioned this as one option among three
    - Huawei (1359) proposes to postpone the entire work to a later release. Huawei maintains that only scenario 2 is relevant for L12XCM (despite the response from RAN2 in R2-2106787) and the workload associated with scenario 2 is excessive.
    - Nokia (1364) proposes to deprioritize the entire work since they observe lack of gain for scenario 2 in their study.
  + Email discussion is needed on each of the above sub-topics

1. Compilation of companies’ inputs: initial round

During the initial round, interested companies are encouraged to share their view on the following:

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| Please review section 1 for background summary.  **Issue 1**: Overlap between RAN1 AI 8.1.1 and 8.1.2.2 pertaining to DPS. The WID is clear about mDCI/multi-PDSCH reception for the objective of 8.1.2.2. Therefore, it is proposed that to ensure scope conformance with the WID and avoid overlap, *RAN affirm that RAN1 AI 8.1.2.2 (inter-cell mTRP) should focus on mDCI/multi-PDSCH reception and refrain from adding the support for DPS*.   * Q1.1: Please comment on the above proposal   **Issue 2**: Scope of L1/L2-centric inter-cell mobility (L12XCM) in Rel-17. Please share your view on the following:   * Q2.1: Assume intra-DU (excluding inter-DU) and intra-frequency (excluding inter-frequency) * Q2.2: Assume that “TRP/cell1 and TRP/cell2 are synchronised and timing advance is maintained sufficiently that a RACH would not be required” * Q2.3: Assume that “(p)rotocol stack design for L1/2 centric inter-cell mobility will not target re-use of CA Pcell/Scell concept” * Q2.4: Affirming the RAN2 response that both scenarios 1 (no change in serving cell) and scenario 2 (requiring change in serving cell) of R2-2106787 apply to L12XCM, RAN1 is to proceed working on inter-cell beam management (including inter-cell beam indication) in parallel to RAN2 work * Q2.5: RAN2 scope *for Rel-17* L12XCM, i.e. scenario 1 (no change in serving cell) and/or scenario 2 (requiring change in serving cell) * Q2.6: Possibility of postponing or de-prioritizing the entire work of L12XCM in Rel-17 to a later release |

Table 1 Inputs – initial round

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| **Company** | **View** |
| Mod V0 | **Please share your views on Q1.1, Q2.1/2.2/2.3/2.4/2.5/2.6** |
| OPPO | **Issue 1**: Overlap between RAN1 AI 8.1.1 and 8.1.2.2 pertaining to DPS. The WID is clear about mDCI/multi-PDSCH reception for the objective of 8.1.2.2. Therefore, it is proposed that to ensure scope conformance with the WID and avoid overlap, *RAN affirm that RAN1 AI 8.1.2.2 (inter-cell mTRP) should focus on mDCI/multi-PDSCH reception and refrain from adding the support for DPS*.   * Q1.1: Please comment on the above proposal   According to the WID, the objective of 8.1.2.2 is for multi-DCI based multi-PDSCH reception. Regarding the DPS, the definition is not clear here since there may be different interpretations of the terminology “DPS” during RAN1 discussion, e.g., transparent, non-transparent. Thus, we prefer to make it clear what “DPS” refers to in this proposal. |
| OPPO | **Issue 2**: Scope of L1/L2-centric inter-cell mobility (L12XCM) in Rel-17. Please share your view on the following:   * Q2.1: Assume intra-DU (excluding inter-DU) and intra-frequency (excluding inter-frequency)   Yes, we think this is reasonable way to go   * Q2.2: Assume that “TRP/cell1 and TRP/cell2 are synchronised and timing advance is maintained sufficiently that a RACH would not be required”   Yes, the L12XCM is focusing on FR2 where cell range is small. The cell change is only possible in the overlapping area of FR2 cell hence the timing difference between TRP/cell1 and TRP/cell2 is not significant in practice. Or, if RACH procedure is assumed necessary then the RACH procedure itself will defeat the main intention of the whole feature.   * Q2.3: Assume that “(p)rotocol stack design for L1/2 centric inter-cell mobility will not target re-use of CA Pcell/Scell concept”   Not exactly. In scenario1, it is not entirely clear that TRP/cell2 is a neighboring cell or a serving cell before its relevant TCI state is activated. But once data communication starts it is obviously that TRP/cells is also a serving cell. RAN2 agreed that user plane protocol stacks down to MAC layers are shared between TRP/cell1 and TRP/cell2, so TRP/cells will looks very like a component carrier. The difference is that normal component carriers of CA architecture are inter-frequency carriers while now most likely TRP/cell1 and TRP/cell2 are intra-frequency carriers. Actually another alternative is to take TRP/cell2 as same serving cell of TRP/cell1 with minor variant parameters of e.g. data channel. In this way the model will be simpler. If this alternative can be confirmed then we also agree that CA concept is can’t be reused.  In scenario2, we agree that CA concept is not applicable since TRP/cell2 is actually a neighboring cell i.e. UE is only connected to either TRP/cell1 or TRP/cell2 but not simultaneously. If the TRP/cell1 is PCell, then the outcome of the serving cell change should be same as legacy handover procedure despite that the detail signaling procedure will be totally different.   * Q2.4: Affirming the RAN2 response that both scenarios 1 (no change in serving cell) and scenario 2 (requiring change in serving cell) of R2-2106787 apply to L12XCM, RAN1 is to proceed working on inter-cell beam management (including inter-cell beam indication) in parallel to RAN2 work   Yes   * Q2.5: RAN2 scope *for Rel-17* L12XCM, i.e. scenario 1 (no change in serving cell) and/or scenario 2 (requiring change in serving cell)   Only scenario1, if TU is allowed   * Q2.6: Possibility of postponing or de-prioritizing the entire work of L12XCM in Rel-17 to a later release   No strong opinion. |
| Nokia, Nokia Shanghai Bell | It would be good if there was some structure for the questions without just copy-pasting the proposals from different contributions: The main questions to tackle are very simple: 1) Which parts of the current WI scope are possible to complete in Rel-17? 2) How much time is needed to complete those? How to arrange the topics within AIs is of secondary nature and it can be addressed once the way forward is clarified.  Then Q1.1 just asks whether DPS based on mTRP is possible to be completed and in which AI, whereas Q2.X are about L1 mobility-related aspects (unfortunately in a somehat random order, and since they are coming from different contributions, they are not "apples-to-apples" comparisons, and it is unclear to us how to address those.  For Q1.1, we would note once again that it doesn't matter what is handled in which RAN1 agenda item: Only the WI objectives matter and those are what we should focus on for RAN Plenary discussions. The WI also makes no mention whatsoever about "DPS", nor is it even clear in this context what that would mean. So let's rather focus on questions that help to advance the understanding on the WI scope - we have provided examples of these below. |
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Table 1 Company inputs: Which parts of the current WI scope are possible to complete in Rel-17?

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| **Company** | **View** |
| Nokia, Nokia Shanghai Bell | As discussed in our contribution, the impacts of inter-cell L1 mobility seem major and the existing RAN2/3/4 TUs are not sufficient. Adding more TUs is not feasible either, so L1 mobility should be simply scoped out.  For mTRP objective, RAN2 discussion has currently focused on inter-cell parts (i.e. allowing TRPs to come from different PCIs), which is partly linked with inter-cell L1 mobility. It also seems that what RAN2 discussed is not exactly the same thing that RAN1 discussed, so it's not 100% clear what is even possible in RAN2 with this. |
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Table 1 Company inputs: Is there a need to increase the amount of TUs for the Rel-17 FeMIMO WI and how much TUs are needed (for each involved WG)?

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| **Company** | **View** |
| Nokia, Nokia Shanghai Bell | As we discuss in our contribution, it seems that RAN2/4 TUs for this WI were badly underestimated, and RAN3 TUs are simply missing. Hence, considering the already wide scope of Rel-17, RAN should downscope the WI to match the TUs: RAN2/3/4 are already full. This means only matters that have no or minimal RAN3 impacts are allowed, with only limited RAN2/4 impacts (matching the existing TUs). So either the mTRP parts are also taken out, or their scope is clearly limited for **all WGs** (not just RAN1 and not on the AI - level but on objectives).  For mTRP, enhancing the existing Rel-16 mTRP framework should be take as baseline, i.e. no additional "L1-centric" mTRP framework should be created. |
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1. Summary and moderator proposals

During the initial round, based on the collected inputs in section 2, the following **observation** can be made:

* ...

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| **Proposed way forward 1 (after the initial round)**:  ... |

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# References

1. RP-202024 Revised WID: Further enhancements on MIMO for NR Samsung