**3GPP TSG-RAN Meeting # 89-e RP-20XXXX**

**Electronic Meeting, September 14-18, 2020**

**Agenda item:** X.X

**Source:** Moderator (Nokia)

**Title:** Email discussion summary for Rel-17 FR2 RF work area

**Document for:** Information

# Introduction

This document will summarize companies’ inputs regarding the scope of the FR2 RF work area for Rel.17.

# FR2 RF Work Area in Rel-17

## Document submitted to RAN#88-e

One input contribution related to Rel-17 FR2 RF work area was submitted to RAN#88-e in [1]

## Issues related to Rel-17 FR2 RF work area for discussion

* Sub-topic 1-1: Identify FR2 RF sub-work areas for Rel-17
  + Identify FR2 RF areas needing new requirements or further enhancements in Rel-17 (e.g. FR2 RF aspects, which were originally included to the Rel-16 RF FR2 work item but could not be completed in Rel-16, FR2 RF areas requiring further enhancements in Rel-17 or new FR2 RF aspects)
  + Provide also justifications for the proposed FR2 RF sub-work areas
* Sub-topic 1-2: WI objectives for each identify Rel-17 FR2 RF sub-work area
  + Identify detailed scope and objectives for each Rel-17 FR2 RF sub-work area proposal
* Sub-topic 1-3: Any other issues

## Companies’ views

*Interested companies to provide comments and proposals for the sub-topics in the following sections*

### Sub-topic 1-1: Identify FR2 RF sub-work areas for Rel-17

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| **Company** | **Comments and proposals** |
| Apple | We observe that the currently ongoing Rel-16 FR2 RF work item has gone through some descoping, and we anticipate some leftover items to be proposed for Rel-17 work. It would be useful to consider these upon the conclusion of the RAN4 #96e meeting.  Considering newly proposed work areas, we would like to propose the following three, further noting that all three work areas have been described in RP-201109 [1]:   1. Beam correspondence with localized beam sweeping 2. Non-simultaneous uplink (NSU) on non-contiguous carriers in FR2 3. FR2 UE antenna element scaling   In the case of BC with localized beam sweeping, it is our understanding that the RAN1 related effort may have been already covered in R17 FeMIMO WI, e.g. “Unified TCI framework for DL and UL beam indication”, where the focus is on the signaling solution to enable the localized beam refinement functionality. Upon RAN1 successfully completion of this work, RAN4 effort should specify the UE requirements for the feature.  In the case of NSU, we would like to emphasize that if inter-band UL CA within FR2 becomes part of the Rel-17 work scope, then this feature is, in our understading, essential to enabling inter-band UL CA for handheld form factors.  In the case of FR2 UE antenna element scaling, it is useful to solicit other companies’ feedback on how to structure the work between RAN4 and RAN1. One option can be to list the work objective in the RAN4 WID with secondary responsibility given to RAN1 to enable the necessary signaling. |
| Nokia | In our view the following FR2 RF sub-work areas should be considered for Rel-17 in order to complete the FR2 RF enhancements started but not completed in Rel-16. Also it is important to continue further development of FR2 for practical FR2 deployments and different operator scenarios and spectrum allocations. Some of the areas are dependent on Rel-16 FR2 progress and details need to be checked after the RAN4#96-e meeting progress.   * Inter-band DL CA enhancements, cases not completed in Rel-16 * Inter-band UL CA   + including study on non-simultaneous UL for inter-band * Potentially intra-band CA enhancements depending on Rel-16 progress * Beam Correspondence enhancements (details also depends on Rel-16 progress)   + Study BC enhancements and requirements for dynamic radio conditions (in realistic FR2 deployments conditions vary significantly and it is important to ensure that UEs are able to have and keep good beam correspondence) * MPE enhancements including MPE enhancements for beam management purposes e.g. introduce UE’s MPE related reports to target beams/cells to allow the source gNB to optimize beam management |
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### Sub-topic 1-2: WI objectives for each identify Rel-17 FR2 RF sub-work area

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| **Company** | **Comments and proposals** |
| Apple | We provide our proposed set of new enhancements for Rel-17 FR2 RF work below:  - Beam correspondence enhancement with localized beam sweeping, such that: [RAN4]  - The UE relies on the unified TCI framework for DL and UL beam indication  - The network configures a small number of SRS resources (e.g. fewer than 8) to improve UE Tx beam selection based on DL RS only  - Non-simultaneous uplink (NSU) on inter-band UL CA in FR2 [RAN4]  - Define RF requirements for non-simultaneous transmission on aggregated UL carriers with UE switching between non-contiguous carrier groups for the case(s) of inter-band UL CA in FR2  - Define RRM requirements for non-simultaneous transmission on aggregated UL carriers with UE switching between non-contiguous carrier groups for the case(s) of inter-band UL CA in FR2  - Considering the cases of NSU for carriers which can be a Pcell, Scell, or Pscell in RF and RRM work  - FR2 UE antenna element scaling, such that: [RAN4, RAN1]  - UE antenna element scaling can occur for Tx only, Rx only, or Tx & Rx arrays  - Study the impact of antenna element scaling on UE RF requirements (such as transmit power control tolerance, maximum output power, minimum output power, beam correspondence, and maximum input level) and RRM requirements (such as beam management, UL spatial relation switch, RLM, etc), and, if identified, specify the corresponding requirements [RAN4]  - Study the impact of antenna element scaling on the physical layer design associated with beam management, and if identified, specify the corresponding requirements [RAN1] |
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### Sub-topic 1-3: Any Other Issues

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| **Company** | **Comments and proposals** |
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## Summary of discussion

*Summary of the discussion and proposal to be provided by the moderator*

# Conclusions

*Aim is to provide a FR2 RF work area proposal with detailed WI objectives and justifications based on the discussion*

# References

[1] RP-201109, Views on Rel-17 RAN4 RF work plan, Apple Inc.

[2] RP-201331, Work areas of RAN4 R17 non-spectrum related WI/Sis, RAN4 Chairman (FUTUREWEI)