3GPP TSG-RAN WG2 #119 R2-220xxxx

E-Conference, 17th – 29th August 2022

Agenda Item: 6.24.1

Source: Apple

**Title: Discussion on FR2 UL Gap MAC CR (Apple)**

Document for: Discussion and decision

# 1 Introduction

The is the summary of the following email discussion.

* [AT119-e][030][NR17] FR2 UL Gap MAC CR (Apple)

Scope: Treat R2-2206959, R2-2208931

Intended outcome: Brief Report, Agreed CR (if possible).

Deadline: EOM

R2-2206959 LS to RAN2 on UL gap in FR2 RF enhancement (R4-2211222; contact: Apple) RAN4 LS in Rel-17 NR\_RF\_FR2\_req\_enh2 To:RAN2 Cc:RAN1

R2-2208931 Correction on FR2 UL gap Apple CR Rel-17 38.321 17.1.0 1399 - F NR\_RF\_FR2\_req\_enh2 LATE

Chair: This CR was provided at the meeting.

# 2 Discussion

## 2.1 Discussion on the LS

In the LS [1], RAN4 indicates two updates. First one is about UE capability copied below.

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| ***UL gap for Tx power management:***  On UE capability, for inter-band FR2-FR2 CA/DC to indicate if UL transmission is feasible during UL gap when it is configured/activated   1. UE capability type: per band per band combination and optional 2. RAN4 confirm that this UE capability applies to inter-band FR2-FR2 CA/DC with CBM or IBM. 3. When UE indicates it supports this UE capability for a band in a band combination, it means it supports UL transmission during the configured UL gap in the band of the band combination. When UE indicates it does not support this UE capability for a band in a band combination, it means UL transmission is not feasible during the configured UL gap in the band of the band combination, except the transmission of UL signals defined in clause 9.1.X1 of 38.133. |

Rapporteur’s understanding is this has already been captured in the current TS38.306 spec excerpted below.

| ***tx-Support-UL-GapFR2-r17***  Indicates whether the UE supports UL transmission in FR2 bands within an FR2 UL gap when the FR2 UL gap is activated in inter-band UL CA. The UE which indicates support for *tx-Support-UL-GapFR2-r17*shall also indicate support for *ul-GapFR2-r17* in an FR2 band. | FS | No | No | FR2 only |
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One possible glitch is that FR2-FR2 DC was not captured in TS38.306. However, RAN4 has agreed in [3] that there is no FR2-FR2 band combination specified for NR-DC in RAN4 and it is up to RAN2 if FR2-FR2 NR-DC should be supported from signalling perspective. And RAN2 then agreed to not support NR-DC with FR2-FR2 for NR-DC.

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| Excerpted from RAN2#117 meeting:   * [058] FR2 UL gap design does not support NR-DC with FR2-FR2 band combination. FFS how to capture the restriction in spec. |

So, rapporteur thinks there is no necessity to update current UE capability *tx-Support-UL-GapFR2-r17*captured in TS38.306.

**Question 1: Do companies agree that the field description of *tx-Support-UL-GapFR2-r17* captured in TS38.306 do not need update?**

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| **Company** | **Yes / No** | **Comments** |
| OPPO | Not really | We are fine not to capture FR2-FR2 NR-DC case. In addition RAN4 LS also indicate that in case UE doesn’t support this feature, it can still conduct exceptional uplink transmission as listed in 9.1.11 of 38.133. We think this should be reflected in the UE capability too. |
| Intel | Yes | We think that since FR2-FR2 DC is not supported, current spec is ok. As for the part related to 9.1.11, we think that it is not needed in the UE capability description because it described when UE doesn’t support case. It is ok just in the Q2 CR. |
| Huawei, HiSilicon | Yes | We understand the current spec is already clear and therefore see no need to add sth. which is not supported. Usually we only capture what is supported in the spec. |
| LGE | Yes | Agree to rapporteur’s analysis |
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The second point from the LS is on UE behavior regarding the allowed UL transmission during the UL gap.

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| ***Procedure to be prioritized over UL gap:***  When an UL gap overlaps with an uplink transmission in NR serving cells in FR2 single CC or FR2 intra-band CA, then the UE is not required to conduct any transmission during the UL gap on the NR serving cells other than those listed below:   * UL signals belonging to random access procedure according to TS 38.321. * the PUSCH transmissions due to configured grant (CG-PUSCH (type 1 and 2)). * the valid CSI report and/or valid L1-RSRP report during SCell activation procedure, where the valid CSI report is valid CQI with non-zero CQI index defined in clause 5.2.2.1, TS 38.214 and the valid L1-RSRP report is non lowest L1-RSRP defined in clause 10.1.6. * The UE need not apply UL gap prioritization rules specified above for SCell activation procedure if the time period between UL gap colliding with CSI report of non-zero CQI or L1-RSRP and the slot where the SCell activation MAC CE or CSI report activation command is received is less than [X, and X is >=10 ms].   the PUCCH allocations for scheduling request (SR) and link recovery request (LRR) defined in clause 8.5. |

The CR in [2] proposed to remove the detailed description in TS38.321 and to only refer to TS38.133.

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| 5.30 Handling of FR2 UL gap During the FR2 UL gap configured by *ul-GapFR2-Config* as specified in TS 38.331 [5], the MAC entity shall not conduct uplink transmission other than the exceptions listed in TS 38.133 [11], clause 9.1.11, on the Serving Cell(s) of FR2 single CC and intra-band CA, or on the Serving Cell(s) in FR2 band(s) where UE does not support UL transmission within FR2 UL gap. |

**Question 2: Please companies indicate if they have comments on the change proposed in [2] as above.**

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| **Company** | **CR to TS38.321 is needed?** | **Comments** |
| OPPO | Yes | We are fine to refer to RAN4 which is actually cleaner. In addition original wording about inter-band CA is not so clear as such that it may cover FR2-FR2 NR-DC and may refer to part of the serving cells. Here is suggestion from our side:  During the FR2 UL gap configured by *ul-GapFR2-Config* as specified in TS 38.331 [5], the MAC entity shall not conduct uplink transmission other than the exceptions listed in TS 38.133 [11], clause 9.1.11, on the Serving Cell(s) of FR2 single CC and intra-band CA, or on the Serving Cell(s) of FR2 inter-band CA where UE does not support UL transmission within FR2 UL gap |
| Intel | Yes | We are fine with the change. |
| Huawei, HiSilicon | Yes | We think reference to RAN4 is better, if the conditions would be modified or extended in the future, only one place needs to be updated. |
| LGE | Yes | We are fine with the change. It seems beneficial for spec. maintenance and consistency with the related spec. |
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# 3 Conclusions

[TBA]

# 4 References

[1] R2-2206959 LS to RAN2 on UL gap in FR2 RF enhancement (R4-2211222; contact: Apple) RAN4 LS in Rel-17 NR\_RF\_FR2\_req\_enh2 To:RAN2 Cc:RAN1

[2] R2-2208931 Correction on FR2 UL gap Apple CR Rel-17 38.321 17.1.0 1399 - F NR\_RF\_FR2\_req\_enh2 LATE

[3] R4-2202419 LS from RAN4 on FR2 UL gap