3GPP TSG-RAN WG2 Meeting #116-e R2-21xxxxx

Electronic, November 1 - November 12, 2021

Agenda item: 8.22

Source: Apple

Title: Summary of [AT116-e][023][NR17] FR2 UL Gap (Apple)

Document for: Discussion

# 1 Introduction

This is the summary of the following offline email discussion.

**[AT116-e][023][NR17] FR2 UL Gap (Apple)**

 Scope: Treat R2-2109358, R2-2110076, R2-2109798, R2-2109570, R2-2109571

 Determine agreeable parts, Identify discussion points for online (if needed).

 Intended outcome: Report (Reply LS in ph2)

 Deadline: Friday W1 (CB online). Rapporteur suggests that the Phase 1 comment collection stops at Thursday 10:00AM UTC, Week 1 (Oct. 4), to get ready for Friday comeback.

# 2 Contact info

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| Company Name | Contact Person | Email Address |
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# 3 Phase 1 Discussion

For companies to better understand the background, as mentioned by [2], one major use case for FR2 UL gap is UE can detect whether or not human body is close to Tx antennas by doing sensing during UL gaps, and thus avoid unnecessary P-MPR when human targets are not close to the Tx antennas.

## 3.1 Discussion on FR2 UL gap configuration

**Topic 1: RRC signaling design on FR2 UL gap configuration**

Contribution [2] presented that the FR2 UL gap should be configured by dedicated RRC signaling. [3] specifically proposed to add it into MeasGapConfig. It was also mentioned in both [2] and [3] that the configuration on FR2 UL gap can be based on existing measurement gap configuration.

Regarding the detailed FR2 UL gap configuration, [2] and [3] propose that it should comprise *gapOffset*, *ugl*, *ugrp*. In addition, [2] also proposes to indicate *refFR2ServCellAsyncCA.*

**Question 1: Do companies agree to introduce the UL gap configuration into dedicated RRC signaling, with following potential parameters:**

**a) *gapOffset***

***b) ugl***

***c) ugrp***

**d) *refFR2ServCellAsyncCA***

**e) others (Please elaborate)**

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| Company | Parameters needed for FR2 UL gap configuraion | Comments |
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It was further discussed in [2] that instead of explicit configuration on *ugl* and *ugrp*, whether to consider referring to UL gap pattern ID (as in LTE meas gap configuration) since it’s likely only a few gap patterns will be introduced.

**Question 2: Which option do companies prefer:**

**Option 1 - Explicit configuration on *ugl* and *ugrp* (same as in NR meas gap configuration)**

**Option 2 - Referring to UL gap pattern ID (same as in LTE meas gap configuration)**

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| Company | Option preferred | Comments |
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In addition, [4] has the following proposal regarding the LS to RAN4:

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| R2-2109570 [4] | **Proposal4: In the response LS to RAN4, RAN4 is asked to clarify about the detail parameters of UL gap pattern including the time domain unit e.g. in ms or slot or symbol etc. And whether the defined parameters can be applicable for all intended cases.** |

**Question 3: Should we ask RAN4 the following question: RAN4 is asked to clarify about the detail parameters of UL gap pattern including the time domain unit e.g. in ms or slot or symbol etc. And whether the defined parameters can be applicable for all intended cases.**

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| Company | Yes/No | Comments |
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**Topic 2: UE assistance on FR2 UL gap**

[2] mentions that UL gap is for UE sensing on proximity of human body, which means the selection on UGL and UGRP would largely depend on UE implementation. It is then proposed in [2] and [4]:

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| R2-2110076 [2] | **Proposal 6: RAN2 to discuss introducing a UE assistance information reporting on preferred UL gap patterns.** |
| R2-2109570 [4] | **Proposal2: Reuse RRC message UEAssistanceInformation to incorporate UE assistant information.** |

**Question 4: Do companies think it’s helpful to have a UE assistance information reporting on preferred UL gap patterns?**

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| Company | Yes/No  | Comments |
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**Topic 3: FR2 UL gap configuration in MR-DC/NR-DC deployment**

In dual connectivity deployment, regarding which node provides the FR2 UL gap configuration to UE, [2] discusses which node should configure the FR2 UL gap in MR-DC and NR-DC and proposes the following:

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| R2-2110076 [2] | * **In (NG) EN-DC, UL gap is configured by SN to UE;**
* **In NE-DC, UL gap is configured by MN to UE;**
* **In NR-DC, either MN or SN can configure UL gap to UE, depending on which CG is configured with FR2.**
 |

**Question 5: Do companies agree with the following statement on which node should configure UL gap to UE?**

**a) In (NG) EN-DC, UL gap is configured by SN to UE;**

**b) In NE-DC, UL gap is configured by MN to UE;**

**c) In NR-DC, either MN or SN can configure UL gap to UE, depending on which CG is configured with FR2.**

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| Company | Which are agreeable?  | Comments |
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[2] then presents that there is no need for MN and SN to coordinate FR2 UL gap configuration as FR2-FR2 DC is not supported.

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| R2-2110076 [2] | **Proposal 10: There is no need to coordinate UL gap configuration between MN and SN.** |

**Question 6: Do companies agree that there is no need to coordinate FR2 UL gap configuration between MN and SN?**

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| Company | Yes/No?  | Comments |
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## 3.2 Discussion on FR2 UL gap activation/deactivation

**Topic 1: UL gap activation/deactivation status indication**

On FR2 UL gap activation/deactivation, three different views are presented in contributions.

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| R2-2110076 [2] | Both RRC and MAC CE | **Proposal 1: Introduce UL gap configuration with a flag indicating activated/deactivated status into dedicated RRC signaling.****Proposal 2: Introduce a new MAC CE for UL gap activation and deactivation.** |
| R2-2109798 [3] | Only RRC | **Proposal 3:** RAN2 to focus on the RRC-based activation/deactivation in Rel-17. |
| R2-2109570 [4] | Only MAC CE | **Proposal1: RAN2 should go to #2 alternative i.e. MAC signalling will be used to activate or deactivate of RRC configuration** |

**Question 7: Which one should be supported by RAN2 to activate/deactivate FR2 UL gap?**

**Option 1 - Both RRC based on MAC CE based**

**Option 2 - Only RRC based**

**Option 3 - Only MAC CE based**

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| Company | Option Preferred  | Comments |
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On the granularity of FR2 UL gap, [2] mentioned that the activated UL gap would be restricted to all FR2 serving cells inside one CG. [4] mentioned that RAN4 LS doesn’t indicate any flexibility is needed in frequency range level or cell group level or cell level thus suggested to ask RAN4 with this regard.

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| R2-2110076 [2] | **Proposal 8: MAC CE design should guarantee that the activation/deactivation on UL gap apply to all FR2 serving cells.**  |
| R2-2109570 [4] | **Proposal3: RAN2 send response LS to ask RAN4 what is the control granularity of the UL gap for both RRC configuration and UE capability.** |

**Question 8: Do companies agree with that the activated UL gap applies to all FR2 serving cells inside the CG with FR2 bands?**

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| Company | Yes/No | Comments |
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**Topic 2: UE indication on the need of UL gap activation/deactivation**

RAN4 LS has following information with respect to the UE indication on the need of UL gap activation/deactivation.

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| On how can UE indicate to the NW UL gap activation/de-activation is needed: * UL gap should be explicitly activated by NW via signaling
	+ How can UE indicate to the NW UL gap activation is needed?
		- If needed, UE explicitly indicates to NW by signaling
* UL gap should be explicitly deactivated by NW via signaling
	+ How can UE indicate to the NW UL gap deactivation is needed?

If needed, UE explicitly indicates to NW by signaling |

[2] presented that both RRC *UEAssistanceInformation* message and a (new) MAC CE can be utilized. [3] proposes to go with UAI message.

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| R2-2110076 [2] | **Proposal 9: Once the indication of need of UL gap activation/deactivation from UE is agreed in RAN4, RAN2 can discuss which one to use between RRC *UEAssistanceInformation* message or a (new) MAC CE.** |
| R2-2109798 [3] | **Proposal 2:** Support RRC-based request for activation/deactivation of UL gaps by reusing UAI. |

**Question 9: Assuming RAN4 agrees with the need, which option do companies prefer for UE(s) to report the indication of need of UL gap activation/deactivation?**

**Option 1 - *UEAssistanceInformation* message**

**Option 2 - MAC CE**

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| Company | Preferred Option | Comments |
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## 3.3 Discussion on UE capability

In [3], it mentions that the UL gaps are tied to the MPE reporting and has the following proposal.

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| R2-2109798 [3] | **Proposal 4**: UE supporting Rel-17 UL gaps shall also support Rel-16 MPE reporting. |

**Question 10: Is it agreeable that UE supporting Rel-17 UL gaps shall also support Rel-16 MPE reporting?**

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| Company | Yes/No | Comments |
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# 4 Phase 2 Discussion

[TBA]

# 5 Conclusions

Based on the discussion above, below are the summaries.

# 6 References

1. R2-2109358 LS on UL gap in FR2 RF enhancement
2. R2-2110076 RAN2 impact from UL gap in FR2 RF enhancement Apple
3. R2-2109798 UL gaps for FR2 Nokia, Nokia Shanghai Bell
4. R2-2109570 Discussion on UL gap pattern for FR2 TX power management OPPO
5. R2-2109571 Draft LS on UL gap for FR2 TX power management OPPO