3GPP TSG-RAN WG2 #117 R2-2203880

eMeeting, 21st February - 3rd March, 2022

Agenda Item: 8.22.1.3

Source: MediaTek Inc.

**Title: Report of [AT117-e][065][MGE] RRC (MediaTek)**

Document for: Discussion and decision

# 1 Introduction

This is report for the following AT117-e mail discussion.

* [AT117-e][065][MGE] RRC (MediaTek)

Scope: Treat R2-2202877. Determine agreeable parts, points for discussion, open issues if needed. Converge offline if possible. Can also open for comments on R2-2202868.

Intended outcome: Report

Deadline: In time for on-line CB W2 Tuesday

Deadline – 02/28 UTC 23:59 (for open issue C1-4, C1-5, C1-6), CR discussion will continue during and after the meeting

The agreement in first week MGE section is copied below for reference.

* RAN2 confirms that reporting of NCSG for E-UTRA target bands is supported. RAN2 assumes that support for EUTRA target bands can be a separate UE cap
* RAN2 confirms that NCSG could be configured as per FR gap.
* Reuse the legacy GapConfig with some extension for NCSG gap configuration.
* For additional gap configuration in concurrent gap, use ToAddModList and ToReleaseList structure for each gap type to add or release the additional gaps, and gap sharing configuration to be consistent.
* For concurrent gap, RAN2 confirms that there is no need to support coarse granularity association (i.e. per use case such as CSI-RS, SSB measurement) since the agreed fine granularity (per frequency layer) could cover this case.
* FFS the maximum number of measurement gap ID. This could be discussed in gap coordination section.
* Baseline assumption When multiple MOs (with the same SSB frequency) are configured, the network associates the same MG for the SSB measurement in each MO. Details sorted out in CR disc
* RAN2 introduces support of NW-Controlled activation/deactivation pre-configured gap

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| MediaTek (Rapp) | Felix Tsai | chun-fan.tsai@mediatek.com |
| Intel (Rapp) | Candy Yiu | Candy.yiu@intel.com |
| Huawei, HiSilicon | Lili Zheng | zhenglili4@huawei.com |
| Xiaomi | Yi Xiong | xiongyi3@xiaomi.com |
| ZTE | LiuJing | liu.jing30@zte.com.cn |
| Nokia | Ping Yuan | Ping.1.Yuan@nokia-sbell.com |
| Ericsson | Felipe Arraño Scharager | felipe.arrano.scharager@ericsson.com |
| Samsung | Aby K Abraham | Aby.abraham@samsung.com |
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# 3 Discussion

## 3.1 C1-4 - Simultaneously support of legacy gap and concurrent gap

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| **OI Index** | **Open issue** | **Rapporteur comment** |
| **C1-4** | Simultaneously support of legacy gap and concurrent gap | RAN4 LS R4-2202604:   * RAN4 response: From RAN4 requirement perspective, RAN4 would like to ensure that the association of frequency layers or dedicated use cases to measurement gaps shall be clearly understood by both UE and Network for all configured measurements. How the association is up to RAN2. |

For C1-4, it seems that the only RAN4 guideline (green highlight above) is that the association between MG and measured frequency should be clear for both NW and UE. It is rapporteur’s understanding that current ASN.1 definition in the running CR (R2-2201903) already ensure the association no matter the gap is configured by legacy field (i.e. *gapUE*) or new field (e.g. *gapUEToAddModList*). So, it is suggested that no need to further discuss C1-4.

**Question 1: Do companies agree that MGE open issue C1-4 it is already addressed in the baseline MGE running CR? Is it okay that R2 continue to discuss the CR but no need to have specific agreement for C1-4?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agreed or not** | **Comments** |
| MediaTek | Yes |  |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Xiaomi | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
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Summary:

All companies agree that MGE open issue C1-4 it is already addressed in the baseline MGE running CR. So, no specific proposal is made. Companies could provide clarification in the CR if needed.

**Observation 1: All companies agree that MGE open issue C1-4 it is already addressed in the baseline MGE running CR.**

## 3.2 C1-5 - Simultaneously support of per-UE gap and per-FR gap

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| **OI Index** | **Open issue** | **Rapporteur comment** |
| **C1-5** | Simultaneously support of per-UE gap and per-FR gap | RAN4 LS R4-2202604:   * ~~Up to 2 gaps can be configured to UE which does not support per-FR gap.~~ * ~~Up to 3 gaps cross all FRs can be configured to UE which supports per-FR gap in SA case. FFS for MR-DC case if it is supported.~~ * In Rel-17, UE can be configured with per-UE gap and per-FR gap simultaneously when   + UE is capable of per-FR gap and concurrent gaps, and   + Per-UE gap is associated with PRS measurements |

For C1-5, there seems some copy-paste error in the open issue document R2-2202054. The correct reference text from R4 LS should be the green highlighted as above.

According to RAN4 response, simultaneous configuration of per-UE and per-FR gap is allowed while the per UE gap is associated with PRS measurement. This could be found in index 3 to 5 in below table (from RAN4 LS R4-2202604).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Combinations of different gap types for per-FR gap capable UE | | | | |
| Index | # of simultaneous MG | | | RAN4 conclusion |
| Per-FR1 | Per-FR2 | Per-UE |
| 0 | 2 | 1 | 0 | Supported |
| 1 | 1 | 2 | 0 | Supported |
| 2 | 0 | 0 | 2 | Supported |
| 3 | 1 | 0 | 1 | Supported when per-UE gap is associated to PRS measurement |
| 4 | 0 | 1 | 1 |
| 5 | 1 | 1 | 1 |
| 6 | 0 | 0 | 1 | Supported |
| 7 | 1 | 1 | 0 | Supported |
| 8 | 1 | 0 | 0 | Supported |
| 9 | 0 | 1 | 0 | Supported |
| 10 | 2 | 0 | 0 | Supported |
| 11 | 0 | 2 | 0 | Supported |

The current ASN.1 define in the baseline running CR R2-2201903 already supported all combination in above table. The rapporteur suggest that we only have to capture the configuration limitation in field description.

**Question 2: For MGE open issue C1-5, do companies agree to** **clarify in the MGE RRC CR that simultaneous configuration of per-UE and per-FR gap is allowed while PRS measurement is associated with the per UE gap.**

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| --- | --- | --- |
| **Company** | **Agreed or not** | **Comments** |
| MediaTek | Yes | The wording and other details could be further discussed in the CR discussion. |
| Intel | Yes | But note that the PRS measurement here is for Rel16 legacy PRS. |
| Huawei, HiSilicon | Yes |  |
| Xiaomi | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Samsung | Yes |  |
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Summary:

For MGE open issue C1-5, all companies agree to clarify in the MGE RRC CR that simultaneous configuration of per-UE and per-FR gap is allowed while PRS measurement is associated with the per UE gap

**Proposal 1: Clarify in the MGE RRC CR that simultaneous configuration of per-UE and per-FR gap is allowed while PRS measurement is associated with the per UE gap.**

Please note that P1 is reflected in the draft CR as below.

|  |
| --- |
| ***gapUE***  Indicates measurement gap configuration that applies to all frequencies (FR1 and FR2). In (NG)EN-DC, *gapUE* cannot be set up by NR RRC (i.e. only LTE RRC can configure per UE measurement gap). In NE-DC, *gapUE* can only be set up by NR RRC (i.e. LTE RRC cannot configure per UE gap). In NR-DC, *gapUE* can only be set up in the *measConfig* associated with MCG. If *gapUE* is configured, then neither *gapFR1* nor *gapFR2* can be configured. The per UE measurement gap is configured with other FR1 gap or FR2 gap simultaneously only while this per UE gap is associated with PRS measurement. The applicability of the per UE measurement gap is according to Table 9.1.2-2 and Table 9.1.2-3 in TS 38.133 [14]. |
| ***gapUEToAddModList***  A list of per UE measurement gap configuartion to be added or modified. A per UE measurement gap can be configured with other FR1 gap or FR2 gap simultaneously only while this per UE gap is associated with PRS measurement. In this version of the specification, the network configures this field only in NR standalone. |

## 3.3 C1-6 - Support of gap sharing for concurrent gap

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| **OI Index** | **Open issue** | **Rapporteur comment** |
| **C1-6** | Support of gap sharing for concurrent gap | RAN4 LS R4-2202604:   * Each gap is configured with separate MeasGapSharingConfig which has the same configurable range of parameters. |

For C1-6, the replied LS from RAN4 is quite clear. For concurrent gaps, each gap could be associated with one gap sharing configuration (as in Legacy). And during the online discussion, it is also agreed that gap sharing configuration will be consistent with the ASN.1 structure (as below).

* For additional gap configuration in concurrent gap, use ToAddModList and ToReleaseList structure for each gap type to add or release the additional gaps, and gap sharing configuration to be consistent.

Therefore, it seems quite straightforward that we should introduce the gap sharing configuration and details could be discussed in the CR.

**Question 3: For MGE open issue C1-6, do companies agree to add the gap sharing configuration for each additional current gap in the MGE RRC CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agreed or not** | **Comments** |
| MediaTek | Yes | The wording and other details could be further discussed in the CR discussion. |
| Intel | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Xiaomi | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes |  |
| Ericsson | Yes |  |
| Samsung | Yes |  |
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Summary:

For MGE open issue C1-6, all companies agree to add the gap sharing configuration for each additional concurrent gap.

**Proposal 2: R2 agree to add the gap sharing configuration for each additional concurrent gap (as suggested by R4).**

Please note that the draft CR is already include gap sharing configuration for concurrent gap

## 3.4 RRC CR

An updated running 38.331 CR is provided in the draft folder.

Main change compared to R2-2202868 is summarized as below.

<1> Remove the following FFS as it is concluded

*Editor Note: It is FFS whether to support the reporting of NCSG for E-UTRA target bands*

*Editor Note: It is FFS whether to support use case association that associated a gap to SSB measurement, CSI-RS measurement, or E-UTRAN measurement*

*Editor Note: It is FFS on how to configure the NCSG gap and whether the NCSG could be per FR gap*

*Editor Note: It is FFS whether to use ToAddMod and ToRelase to add the additional GapConfig for per UE, FR1 gap, and FR2 gap*

<2> Add NCSG gap pattern configuration.

GapConfig ::= SEQUENCE {

gapOffset INTEGER (0..159),

mgl ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},

mgrp ENUMERATED {ms20, ms40, ms80, ms160},

mgta ENUMERATED {ms0, ms0dot25, ms0dot5},

...,

[[

refServCellIndicator ENUMERATED {pCell, pSCell, mcg-FR2} OPTIONAL -- Cond NEDCorNRDC

]],

[[

refFR2ServCellAsyncCA-r16 ServCellIndex OPTIONAL, -- Cond AsyncCA

mgl-r16 ENUMERATED {ms10, ms20} OPTIONAL -- Cond PRS

]],

[[

measGapId-r17 MeasGapId-r17 OPTIONAL, -- Cond ConcurrentGap

preConfigInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

nscgInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

mgta-r17 ENUMERATED {ms0dot75} OPTIONAL, -- Cond NCSG

mgl-r17 ENUMERATED {ms1, ms2} OPTIONAL, -- Cond NCSG

gapAssociation-r17 MeasGapAssociation-r17 OPTIONAL -- Need R

gapSharing MeasGapSharingScheme OPTIONAL -- Need R

]]

}

MeasGapAssociation-r17 ::= SEQUENCE {

prsMeas-r17 ENUMERATED {true} OPTIONAL -- Need R

}

<3> Introduces support of NW-Controlled activation/deactivation pre-configured gap

BWP-DownlinkDedicated ::= SEQUENCE {

pdcch-Config SetupRelease { PDCCH-Config } OPTIONAL, -- Need M

pdsch-Config SetupRelease { PDSCH-Config } OPTIONAL, -- Need M

sps-Config SetupRelease { SPS-Config } OPTIONAL, -- Need M

radioLinkMonitoringConfig SetupRelease { RadioLinkMonitoringConfig } OPTIONAL, -- Need M

...,

[[

sps-ConfigToAddModList-r16 SPS-ConfigToAddModList-r16 OPTIONAL, -- Need N

sps-ConfigToReleaseList-r16 SPS-ConfigToReleaseList-r16 OPTIONAL, -- Need N

sps-ConfigDeactivationStateList-r16 SPS-ConfigDeactivationStateList-r16 OPTIONAL, -- Need R

beamFailureRecoverySCellConfig-r16 SetupRelease {BeamFailureRecoverySCellConfig-r16} OPTIONAL, -- Cond SCellOnly

sl-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL, -- Need M

sl-V2X-PDCCH-Config-r16 SetupRelease { PDCCH-Config } OPTIONAL -- Need M

]],

[[

deactivatedMeasGapList-r17 SEQUENCE (SIZE (1..maxNrofGapId-r17)) OF MeasGapId-r17 OPTIONAL -- Cond PreMG

]]

}

<4> Use ToAddMod list to configure the additional gap and gap sharing

MeasGapConfig ::= SEQUENCE {

gapFR2 SetupRelease { GapConfig } OPTIONAL, -- Need M

...,

[[

gapFR1 SetupRelease { GapConfig } OPTIONAL, -- Need M

gapUE SetupRelease { GapConfig } OPTIONAL -- Need M

]], [[

gapUEToAddModList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r17)) OF GapConfig OPTIONAL, -- Need N

gapUEToReleaseList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r1)) OF MeasGapId-r17 OPTIONAL, -- Need N

gapFR1ToAddModList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r1)) OF GapConfig OPTIONAL, -- Need N

gapFR1ToReleaseList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r1)) OF MeasGapId-r17 OPTIONAL, -- Need N

gapFR2ToAddModList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r1)) OF GapConfig OPTIONAL, -- Need N

gapFR2ToReleaseList-r17 SEQUENCE (SIZE (1.. maxNrofGapId-1-r1)) OF MeasGapId-r17 OPTIONAL -- Need N

]]

}

<5> Add gap sharing configuration for each gap pattern

GapConfig ::= SEQUENCE {

gapOffset INTEGER (0..159),

mgl ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6},

mgrp ENUMERATED {ms20, ms40, ms80, ms160},

mgta ENUMERATED {ms0, ms0dot25, ms0dot5},

...,

[[

refServCellIndicator ENUMERATED {pCell, pSCell, mcg-FR2} OPTIONAL -- Cond NEDCorNRDC

]],

[[

refFR2ServCellAsyncCA-r16 ServCellIndex OPTIONAL, -- Cond AsyncCA

mgl-r16 ENUMERATED {ms10, ms20} OPTIONAL -- Cond PRS

]],

[[

measGapId-r17 MeasGapId-r17 OPTIONAL, -- Cond ConcurrentGap

preConfigInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

nscgInd-r17 ENUMERATED {true} OPTIONAL, -- Need R

mgta-r17 ENUMERATED {ms0dot75} OPTIONAL, -- Cond NCSG

mgl-r17 ENUMERATED {ms1, ms2} OPTIONAL, -- Cond NCSG

gapAssociation-r17 MeasGapAssociation-r17 OPTIONAL -- Need R

gapSharing MeasGapSharingScheme OPTIONAL -- Need R

]]

}

For gap sharing, rapporteur think the association of gap sharing and multiple gap configuration is easier if we just add the gap sharing configuration within *GapConfig*. This is different from legacy way that put gap sharing outside gap configuration. So, companies are invited to provide view on this.

**Question 4: Companies are invited to provide views on how to add gap sharing configuration for concurrent gap. Do you agree to add gap sharing configuration (*MeasGapSharingScheme*) in *GapConfig*?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei, HiSIlicon | No strong view. Moving it to GapConfig looks more readable. |
| Xiaomi | Agree to add the gap sharing configuration within *GapConfig*. |
| ZTE | We agree that the proposed way forward looks more straightforward, but needs to clarify:  Whether network can configure both legacy *MeasConfig*->*MeasGapSharingConfig* field together with this new gap sharing field?   * Option 1: Allowed, in this case, the legacy gap sharing configuration field is only applicable to the gap configured by legacy IEs (*gapUE, gapFR1, gapFR2*); which means the legacy IEs (*gapUE, gapFR1, gapFR2*) shall not include sub IE “*gapSharing*”; * Option 2: Disallowed, in this case, no matter gap is provided by legacy IE(*gapUE, gapFR1, gapFR2*) or gapXToAddModList, the gap sharing configuration can only be provided via sub IE “*gapSharing*”. |
| Nokia | Agree with ZTE. We tend to select Option 1 which has less impact to legacy *gapsharing*. |
| Ericsson | Share views with ZTE and Nokia (i.e., we’d also be inclined towards Option 1). |
| Samsung | Agree with ZTE. Prefers option1 |
| MediaTek | Thanks for the question from ZTE, we also agree option 1. The draft CR is updated to clarify this. |
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Summary:

For MGE open issue C1-6, all companies agree to add the gap sharing configuration for each additional concurrent gap.

**Proposal 3: R2 agree to add gap sharing configuration (*MeasGapSharingScheme*) in IE *GapConfig* and clarify the following for legacy gap sharing configuration.**

* **the legacy gap sharing configuration field is only applicable to the gap configured by legacy IEs (*gapUE*, *gapFR1*, *gapFR2*);**
* **The legacy IEs (gapUE, gapFR1, gapFR2) shall not include sub IE “gapSharing”**

P3 is changed in draft running CR as.

***gapSharing***

Indicates the measurement gap sharing scheme that applies to this *GapConfig*. For applicability of the different gap sharing schemes, see TS 38.133 [14]. Value *scheme00* corresponds to scheme "00", value *scheme01* corresponds to scheme "01", and so on. The network does not include this field if this *GapConfig* is configured by *gapFR1*, *gapFR2*, or *gapUE*.

Finally, companies could provide bubble comment to the updated CR. For comment that request more discussion, it can be included in the following table.

**Question 5: Companies are invited to provide comments/suggestions on the running CR.**

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| --- | --- |
| **Company** | **Comments** |
| Intel | Provide comment directly in CR, it is a bit easier |
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Summary:

Rapporteur suggests to continue the CR discussion.

# 4 Conclusions

Base on the discussion in section 2, we propose the following:

**Observation 1: All companies agree that MGE open issue C1-4 it is already addressed in the baseline MGE running CR.**

**Proposal 1: Clarify in the MGE RRC CR that simultaneous configuration of per-UE and per-FR gap is allowed while PRS measurement is associated with the per UE gap.**

**Proposal 2: R2 agree to add the gap sharing configuration for each additional concurrent gap (as suggested by R4).**

**Proposal 3: R2 agree to add gap sharing configuration (*MeasGapSharingScheme*) in IE *GapConfig* and clarify the following:**

* **the legacy gap sharing configuration field is only applicable to the gap configured by legacy IEs (*gapUE*, *gapFR1*, *gapFR2*);**
* **The legacy IEs (*gapUE*, *gapFR1*, *gapFR2*) shall not include sub field “gapSharing”**

# 5 References

[1] [R2-2202868](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2202_R2_117-e/Docs/R2-2202868.zip), “Introduction of RRC signaling for measurement gap enhancement”, MediaTek

[2] [R2-2202877](file:///D:/Documents/3GPP/tsg_ran/WG2/RAN2/2202_R2_117-e/Docs/R2-2202877.zip), “Rapporteur resolution for MGE open issues”, MediaTek

[3] R2-2202899, “Report of [Pre117-e][010][MGE] MGE Open Issues Input (MediaTek)”, MediaTek