**3GPP TSG- Meeting #123 *xxxxx***

**Toulouse, France, 21st – 25th August 2023**

Agenda Item: 6.1.3.2

Source: Qualcomm Inc

Title: [Post123][044][NR17] independentGapConfig-maxCC (Qualcomm)

Document for: Discussion, Decision

# Introduction

During the meeting, we deliberated the necessity of amending the existing description of the parameters outlined within the independentGapConfig-maxCC feature. It was observed that the current description does not comprehensively address all potential scenarios. Although there was unanimous consensus among the attending companies regarding the need for modification, certain companies initially expressed reservations regarding the proposed alterations presented in Qualcomm CRs [1][2]. Subsequently, these apprehensive companies were reassured and came to an agreement after additional clarifications were provided. However, because we had reached the conclusion of the meeting, it became impractical to secure a consensus and finalize these CRs.

[Post123][044][NR17] independentGapConfig-maxCC (Qualcomm)

Scope: Continuation of offline 011, determine unclarities in current signaling if any, e.g. interpretation of parameters, and if applicable converge on solution, e.g. decide if new parameters are needed. Make CRs if applicable.

Intended outcome: Report, Agreeable CRs

Deadline: Long

Although it is a long discussion, please provide your feedback by the 15th of September, as CR may need to be prepared and shared with other companies.

# Discussion

## Contact information

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| --- | --- | --- |
| Company | Name | Email Address |
| Qualcomm Inc | Mouaffac | [mambriss@qti.qualcomm.com](mailto:mambriss@qti.qualcomm.com) |
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## Issue Details

### DC cases:

In the current spec, this feature has 3 parameters defined. Each of these 3 paramter is independently configured by UE in 3 different containers to address the followign cases cases: NR-SA, NR-DC and MR-DC. Hence when UE reports the support of this feature, it will be provide **9 independent values** to the network.

Based on the current definition of these 3 parameters only NR-SA and NR-DC cases are considered:

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Description automatically generated

Nevertheless, the previously mentioned definition does not hold true in the context of MR-DC scenarios, such as EN-DC, (NG)EN-DC, and NE-DC. In MR-DC, not all of the serving cells are NR cells, as there are consistently EUTRA serving cells configured alongside them.

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| --- | --- | --- | --- | --- | --- |
| UE Capability Container | UE capability fields | LTE serving cell counted? | NR FR1 serving cell counted? | NR FR1 serving cell counted? | Applicable scenario |
| NR SA | fr1-Only-r17 |  | YES |  | NR FR1 |
| fr2-Only-r17 |  |  | YES | NR FR2 |
| fr1-AndFR2-r17 |  | YES | YES | NR FR1+NR FR2 |
| NR-DC | fr1-Only-r17 |  | YES |  | NR FR1 |
| fr2-Only-r17 |  |  | YES | NR FR2 |
| fr1-AndFR2-r17 |  | YES | YES | NR FR1+NR FR2 |
| MR-DC | fr1-Only-r17 | YES | YES |  | LTE+NR FR1 |
| fr2-Only-r17 | YES |  | YES | LTE+NR FR2 |
| fr1-AndFR2-r17 | YES | YES | YES | LTE+NR FR1+NR FR2 |

### LTE SA case:

In the current capability description, we specified that if feature is supported, UE is capable of performing gapless measurements on NR FR2 cells while UE is in LTE SA.

Due to the recent introduction of the independentGapConfig-maxCC feature, where we have implemented a limit on the number of serving cells beyond which this feature is not supported in NR SA, NR-DC, and MR-DC scenarios, it is now imperative to extend this limitation to the LTE SA case as well. In other words, when the number of EUTRA serving cells exceeds a certain threshold, the UE is not anticipated to support gapless measurements to NR frequencies in the FR2 band. We have 2 options:

* Option-1: as suggested in our CR ([[1]](#_Reference), [[2]](#_In-sequence_SDU_delivery)), by introducing a new parameter “*eutra-Only-r17"* under the same capability, where it will be used exculsively to describe the number of EUTRA serving cell when UE is in LTE. This parmeter will only be valid or reported by the UE under “UE-MRDC-Capability”. The caveat of this approat is the need to dummify the exsiting capability and create a new one after introducing the additional parameter.

- *eutra-Only-r17* indicates the maximum number of configured serving cells when only E-UTRA serving cells are configured.

* Option-2: introduce a new separate capaibility, with one parameter “*eutra-Only-r17”* with similar descripton as above. If this capability is not supported by the UE, network should assume gap is required when performing measurements on NR FR2 frequencies (even when reporting the support of the independentGapConfig-maxCC). There are 2 flavors of this option:
  1. New capability to be introduced in the LTE spec.
  2. New capability to be introduced in the NR spec.

# Discussion

The suggested change per CR [1], is to modify the existing definition as provided in the current spec by introducing the part related to the **MR-DC** case as follow:

- *fr1-Only-r17* indicates the maximum number of configured serving cells when only FR1 serving cells are configured for NR SA and NR-DC or when only FR1 and E-UTRA serving cells are configured for EN-DC.

- *fr2-Only-r17* indicates the maximum number of configured serving cells when only FR2 serving cells are configured for NR SA and NR-DC or when only FR2 and E-UTRA serving cells are configured for EN-DC.

- *fr1-AndFR2-r17* indicates the maximum number of configured serving cells when both FR1 and FR2 serving cells are configured for NR SA and NR-DC or when both FR1, FR2 and E-UTRA serving cells are configured for EN-DC.

**Q1: Do companies agree with the suggested modification? If not, please provide an alternative in the comment section.**

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| Company | Yes or No | Comments |
| Qualcomm Inc | Yes |  |
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**Rapporteur summary TBD**

For the part related to the LTE SA, we have 2 options to select from in order to introduce a sub-capability (***eutra-only***) that indicates the max number of LTE serving cell beyond which inter-RAT gapless FR2 measurement is not supported by the UE.

**Q2: provide your preferred option used to specify the max number of LTE serving cells beyond which UE does not support the gapless measurements to NR FR2 cells?**

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| Company | Yes or No | Comments |
| Qualcomm Inc. | Option-2b | Between option-1 and option-2, we are fine either way, will go with the majority.  Between option-2a and option-2b, we are leaning more into option-2b for the following reasons:   * A precedent exists: the same original inter-RAT gap-less FR2 measurement capability (UE-MRDC-Capability🡪 MeasAndMobParametersMRDC🡪independentGapConfig) for LTE SA is already defined in MR-DC container. * it was acceptable to use MR-DC container because it is visible to eNB, given this capability is applicable only when the UE supports EN-DC. * Defining ‘eutra-only’ in TS36.306 may make it difficult for readers to get full context on all the related UE capabilities. |
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**Q3: if companies has other alternate solution, please provide it below?**

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| Company | Alternate solution |
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**Rapporteur summary TBD**

# Conclusion

We have the following proposal:

[Proposal 1 xxxxxxx.](#_Toc143548235)

[Proposal 2 xxxxxxx.](#_Toc143548236)

[Proposal 3 xxxxxxx.](#_Toc143548237)

# Reference

[1] R2-2308826 Correction of the capability independentGapConfig-maxCC Qualcomm Incorporated, Ericsson CR Rel-17 38.306 17.5.0 0947 - F NR\_MG\_enh-Core

[2] R2-2308827 Correction of the capability independentGapConfig-maxCC Qualcomm Incorporated, Ericsson CR Rel-17 38.331 17.5.0 4290 - F NR\_MG\_enh-Core