3GPP TSG-RAN WG2 #121 R2-23xxxxx

Athens, Greece, Feburary 27 – March 3, 2023

Agenda Item: 5.1.3.1

Source: ZTE Corporation

Title: Report of [AT121][003][R1516] Corrections on refServCellIndicator (ZTE)

Document for: Discussion, Decision

# Introduction

This document is the report of the following offline discussion:

Measurement Gaps

[R2-2301312](file:///C%3A%5CUsers%5Cjohan%5COneDrive%5CDokument%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CRAN2%5CDocs%5CR2-2301312.zip) Corrections on refServCellIndicator ZTE Corporation, Sanechips CR Rel-15 38.331 15.20.1 3877 - F NR\_newRAT-Core

- QC think this is a NBC change, can accept for Rel17 but not for previous ..

- Apple could also accept a change for rel17

- Ericsson think we could skip the middle of the text

- Intel think we should understand the R1516 vs R17 behaviour then.

* Current proposed text not agreeable for R1516.
* Offline 003 (ZTE), to understand whether some change is needed-acceptable etc for R151617

# Contact Information

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# Clarification

In this section, company are invited to express your understandings of current specification based on existing implementation.

In TS 38.331, gap configuration (i.e. gapUE, gapFR1, gapFR2) are defined as “SetupRelease” structure. In case of NE-DC and NR-DC, refServCellIndicator field is introduced to indicate the timing reference used for gap position calculation.

MeasGapConfig ::= SEQUENCE {

 gapFR2 SetupRelease { GapConfig } OPTIONAL, -- Need M

 ...,

 [[

 gapFR1 SetupRelease { GapConfig } OPTIONAL, -- Need M

 gapUE SetupRelease { GapConfig } OPTIONAL -- Need M

 ]],

 [[

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

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

 posMeasGapPreConfigToAddModList-r17 PosMeasGapPreConfigToAddModList-r17 OPTIONAL, -- Need N

 posMeasGapPreConfigToReleaseList-r17 PosMeasGapPreConfigToReleaseList-r17 OPTIONAL -- Need N

 ]]

}

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

 ]]

}

The condition of *refServCellIndicator* field is copied below:

|  |  |
| --- | --- |
| *NEDCorNRDC* | This field is mandatory present when configuring gap pattern to UE in NE-DC or NR-DC. In case the gap pattern to UE in NE-DC and NR-DC is already configured, then the field is absent, need M. Otherwise, it is absent. |

Based on the online discussion, companies may have different understandings on the sentences. In this document, we collect companies views regarding the gap configuration for following scenarios:

* Scenario 1: upon SN addition;
* Scenario 2: before SN release;
* Scenario 3: upon SN release

## Scenario 1: Upon SN addition

The gap pattern is already configured before SN addition, in SN addition RRC message, can the network reconfigure the gap configuration by including refServCellIndicator for this gap pattern?

* Understanding 1: Yes, the network can.
* Understanding 2: No, this implies that upon SN addition, the network has to release all configured gap pattern(s) and configures new gap pattern with refServCellIndicator field.

**Q1.1: Which understanding do you think is correct and aligned with your current implementation?**

|  |  |  |
| --- | --- | --- |
| Company | Understanding 1or Understanding 2 | Comments |
| Huawei, HiSilicon | Understanding 1 | There doesn’t seem to be restriction for RAN to do this. |
| ZTE | Understanding 1 | literally, we think there is ambiguity based on the yellow and green sentences.“This field is mandatory present when configuring gap pattern to UE in NE-DC or NR-DC.” “In case the gap pattern to UE in NE-DC and NR-DC is already configured, then the field is absent, need M.”But we think it is reasonable to allow the network to provide the additional field without releasing/adding the gap pattern.  |
| Nokia | Understanding 1 | We agree with Huawei  |
| Samsung | Understanding 1 | We don’t think there is no such restriction. |
| Qualcomm Inc | Understanding 1 | To ensure we have the same understanding, when network reconfigure the gap configuration, it will include all the GapConfig Child IE (same or different values) as they are mandatory fields, in addition to the refServCellIndicator, correct? |
| Apple | Understanding 1 | We can summarize as below:1) Upon SN addition in NE-DC or NR-DC, network should always set the field refServCellIndicator, if the gap pattern is already configured;2) When UE in NE-DC or NR-DC is already configured with gap pattern together with refServCellIndicator, the network is allowed to update the refServCellIndicator, if needed; 3) Allow the network to release the field when releasing the SN and keeping the gap pattern unchanged. |
| CATT | Understanding 2 | According to current spec, for the SA case, the default cell is used for the gap calculation as following description. So for the scenario, the NW should not configure the refServCellIndicator, or if the NW provides the refServCellIndicator, the UE should ignore it: NOTE 1: For FR2 gap configuration with synchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculationNOTE 2: For FR1 gap or per UE gap configuration, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* in is used in the gap calculation. Otherwise, the SFN and subframe of the PCell is used in the gap calculation. |
| MediaTek | Understanding 1 | And no SPEC change is needed for this one. |

**Summary**:

Based on the received comments and further offline feedback from company (CATT). All companies are OK to accept Understanding 1 from Rel-15.

See proposal at the end of section 2.

**Q1.2: If answers “Understanding 2” to Q1.1, do you think the spec can be updated to support “Understanding 1” based approach since Rel-17?**

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| --- | --- | --- |
| Company | Yes or No | Comments |
| CATT | No | Considering for SA case, the refServCellIndicator is not used, so it seems no issue need to be solved. |
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## Scenario 2: Before SN release

The gap pattern with refServCellIndicator is already configured when UE is in NE-DC or NR-DC, can the network reconfigure/modify the refServCellIndicator field for this gap pattern?

* Understanding 1: Yes, the network can.
* Understanding 2: No, if the network wants to change the value of refServCellIndicator, the network has to release the gap pattern and configures a new one.

**Q2.1: Which understanding do you think is correct and aligned with your current implementation?**

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| --- | --- | --- |
| Company | Understanding 1or Understanding 2 | Comments |
| Huawei, HiSilicon |  | The current spec doesn’t allow the network to change/reconfigure it. But it is fine to us to allow the network to do this change, if it doesn’t introduce problem to others. |
| ZTE | Spec implies Understanding 2 | We understand based on current specification, Understanding1 is not allowed, but we would be happy to support the “modification” if UE vendors can confirm the feasibility.  |
| Nokia |  | We agree with Huawei  |
| Samsung | Understanding 2 | Same view with ZTE, it may be desirable to correct this in R17, but it also brings additional complexities as answered by ZTE in Q2.2. However network has an option of following the current way and upgrade at a later point of time. |
| Qualcomm Inc |  | We’re fine if the majority is interested in modifying the spec behavior, by allowing the modification of the refServCellIndicator IE, without gap config release.Again, to confirm we have the same understanding for “1”, the network will send GapConfig with all the mandatory child IEs (same or different values) with a modified refServCellIndicator IE value. |
| Apple |  | Pls see above. |
| CATT | Understanding 2 | According to current spec, it should be understanding2.I.e., it doesn’t allow NW to change the refServCellIndicator, if the NW wants to change it, the NW should release and add the gap pattern. |
| MediaTek |  | Current SPEC is understanding 2 but we are fine to change to “optional present, Need M” to allow Understanding 1. |

**Summary:**

Based on the received comments and further offline feedback from companies (Samsung, CATT). All companies are OK to accept Understanding 1 from Rel-15.

See proposal at the end of section 2.

**Q2.2: If answers “Understanding 2” to Q1.1, do you think the spec can be updated to support “Understanding 1” based approach since Rel-17?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| ZTE | No with comments | Even though we prefer the flexible solution (understanding 1), we would like to avoid different implementation for handling different versions of UEs.If companies confirm Understanding 2, we would prefer to keep it consistently for R15/16/17+ UEs. |
| CATT | No | Considering for SA case, the refServCellIndicator is not used, so it seems no issue need to be solved. |
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## Scenario 3: Upon SN release

The gap pattern with refServCellIndicator is configured when UE is in NE-DC or NR-DC, in SN release RRC message, can the network reconfigure the gap pattern by removing the refServCellIndicator field for this gap pattern?

* Understanding 1: Yes, the network can.
* Understanding 2: No, this implies that upon SN release, the network has to release all configured gap pattern and configures new gap pattern without including refServCellIndicator field.

**Q3.1: Which understanding do you think is correct and aligned with your current implementation?**

|  |  |  |
| --- | --- | --- |
| Company | Understanding 1or Understanding 2 | Comments |
| Huawei, HiSilicon | Understanding 1? | There doesn’t seem to be restriction for RAN to do this.[Huawei2] I may have misunderstood what “removing” means here. If “removing” means to totally remove the refServCellIndicator, it is not supported by existing spec, as it is Need M. But it doesn’t seem to be a problem to just maintain this field upon SN release.We don’t support the add of “Need R”. |
| ZTE | Understanding 1 | Similar to Scenario 1, we think it is beneficial to support understanding1, the only problem is the missing code in current specification.“Otherwise, it is absent, Need R.” |
| Nokia | Understanding 1 | There doesn’t seem to be restriction for RAN to do this. |
| Samsung | Understanding 1 | As ZTE suggested, adding need code (i.e. Need R) is required. |
| Qualcomm Inc |  | Understanding 1 should be fine to support. Suggested modification for the condition:*In NE-DC or NR-DC, this field is optionally present need M, upon gap pattern configuration or reconfiguration. In NR-SA, this field is absent, Need R.* |
| CATT | Understanding 2 | According to current spec, for the SA case, the default cell is used for the gap calculation as following description. So for the scenario, the NW should not configure the refServCellIndicator, or if the NW provides the refServCellIndicator, the UE should ignore it. so for the scenario, it doesn’t matter whether the refServCellIndicator is released: NOTE 1: For FR2 gap configuration with synchronous CA, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* is used in the gap calculation. Otherwise, the SFN and subframe of a serving cell on FR2 frequency is used in the gap calculationNOTE 2: For FR1 gap or per UE gap configuration, for the UE in NE-DC or NR-DC, the SFN and subframe of the serving cell indicated by the *refServCellIndicator* in is used in the gap calculation. Otherwise, the SFN and subframe of the PCell is used in the gap calculation. |
| MediaTek |  | We think adding Need R is needed if NR-DC or NE-DC is released. It will be strange for UE to keep the configuration after SN is released. So we support below proposal.“Otherwise, it is absent, need R. “ |

**Summary:**

Based on the received comments and further offline feedback from company (CATT). All companies are OK to accept Understanding 1 from Rel-15.

**Proposal RAN2 confirms the following behaviours are supported since Rel-15.**

* **Upon SN addition in NE-DC or NR-DC, network should always set the field *refServCellIndicator*, if the gap pattern is already configured;**
* **When UE in NE-DC or NR-DC is already configured with gap pattern together with refServCellIndicator, the network is allowed to update the refServCellIndicator, if needed;**
* **Allow the network to release the field when releasing the SN and keeping the gap pattern unchanged.**

**Q3.2: If answers “Understanding 2” to Q3.1, do you think the spec can be updated to support “Understanding 1” based approach since Rel-17?**

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| --- | --- | --- |
| Company | Yes or No | Comments |
| CATT | No | Considering for SA case, the refServCellIndicator is not used, so it seems no issue need to be solved. |
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# About potential spec change

In R2-2301312, it is proposed to update the condition as below, the modifications are aligned with “Understanding 1 series” in section 2.

|  |  |
| --- | --- |
| **Conditional Presence** | **Explanation** |
| *NEDCorNRDC* | This field is mandatory present when configuring gap pattern to UE in NE-DC or NR-DC. In case the gap pattern including this field to UE in NE-DC and NR-DC is already configured, then the field is optional present, need M. Otherwise, it is absent, need R. |

Based on the feedback from companies to Q2.1~Q3.2, we can further discuss whether and how to update the condition explanation.

Updated CRs are discussed separately.

# Conclusion

Based on companies’ input, proposals are listed as follows.

**Proposal RAN2 confirms the following behaviours can be supported since Rel-15.**

* **Upon SN addition in NE-DC or NR-DC, network should always set the field *refServCellIndicator*, if the gap pattern is already configured;**
* **When UE in NE-DC or NR-DC is already configured with gap pattern together with refServCellIndicator, the network is allowed to update the refServCellIndicator, if needed;**
* **Allow the network to release the field when releasing the SN and keeping the gap pattern unchanged.**

Updated CRs are discussed separately.