**3GPP TSG-RAN WG4 Meeting #97-e R4-201xxxx**

**Electronic Meeting, Nov. 2nd – Nov. 13th 2020**

**Agenda item:** 7.13.1

**Source:** Moderator (ZTE)

**Title:** Email discussion summary for [97e] [219] NR\_RRM\_Enh\_RRM\_2

**Document for:** Information

# Introduction

The scope of this email discussion summary covers following agenda items.

7.13.1 RRM core requirements maintenance (38.133)

* 7.13.1.1 SRS carrier switching requirements
* 7.13.1.2 CGI reading requirements with autonomous gap
* 7.13.1.6 Other requirements maintenance (relevant papers)

7.13.2 RRM perf. requirements (38.133)

* 7.13.2.2 Test cases
* 7.13.2.2.1 SRS carrier switching requirements
* 7.13.2.2.3 CGI reading requirements with autonomous gap
* 7.13.2.2.6 Mandatory MG patterns

# Topic #1: SRS carrier switching requirements

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **RRM Core requirements maintenance** | | |
| [R4-2014646](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014646.zip) | Qualcomm, Inc. | CR: SRS carrier switching condition |
| [R4-2015577](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015577.zip) | ZTE | CR to 38.133 correction to SRS carrier based switching requirements |
| [R4-2016421](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016421.zip) | Ericsson | CR: Missing requirements for LTE SRS carrier-based switching |
| [R4-2016422](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016422.zip) | Ericsson | CR Correction in NR SRS carrier-based switching requirements |
| **RRM test cases** | | |
| [R4-2014227](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014227.zip) | Apple | E-UTRAN – NR FR2 interruptions at NR SRS carrier based switching (A.5.5.2.X) |
| [R4-2014789](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014789.zip) | OPPO | CR to TS 38.133: TC for E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching(A.5.5.2.x) |
| [R4-2015495](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015495.zip) | Huawei, HiSilicon | TC for E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching |
| [R4-2015581](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015581.zip) | ZTE | Proposal 1: For SRS carrier based switching, following test cases are specified.   |  |  |  | | --- | --- | --- | | Test No. | Test | Comment | | TC1 | E-UTRAN – NR interruptions at NR SRS carrier based switching | PSCell in FR1  SCell in FR1 | | TC2 | E-UTRAN – NR interruptions at NR SRS carrier based switching | PSCell in FR2  SCell in FR2 | | TC3 | SA interruptions at NR SRS carrier based switching | PCell in FR1  SCell in FR1 | | TC4 | SA interruptions at NR SRS carrier based switching | PCell in FR2  SCell in FR2 | | TC5 | E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching | PSCell in FR1  E-UTRA SCell | | TC6 | E-UTRAN – NR interruptions at E-UTRA SRS carrier based switching | PSCell in FR2  E-UTRA SCell | |
| [R4-2015584](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015584.zip) | ZTE | Draft CR on test case for SA interruptions at NR SRS carrier based switching |
| [R4-2016052](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016052.zip) | Nokia, Nokia Shanghai Bell | 38133 CR for Test case of E-UTRAN NR FR1 interruptions at NR SRS carrier switching |
| [R4-2016420](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016420.zip) | Ericsson | **Proposal 1**: Do not define delay test cases for SRS carrier-based switching for NR deployments, similar to LTE.  **Proposal 2**: In TS 38.133, RAN4 to define the interruption tests cases for SRS carrier-based switching for the following scenarios:  **Table 1**: Test cases for requirements in 38.133   |  |  | | --- | --- | | **Test Case Type** | **Details** | | NR SRS carrier-based switching impacting NR cells in NR-SA | To/from NR cells in FR1:   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | To/from NR cells in FR2:   * test the impact on FR2 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR1 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | NR SRS carrier-based switching impacting NR cells in NR-DC | To/from NR cells in FR1   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | |  | To/from NR cells in FR2   * test the impact on FR2 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR1 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | NR SRS carrier-based switching impacting NR cells in SCG in EN-DC | To/from NR cells in FR1   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | |  | To/from NR cells in FR2:   * test the impact on FR2 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR1 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | NR SRS carrier-based switching impacting NR cells in MCG in NE-DC | To/from NR cells in FR1   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | |  | To/from NR cells in FR2:   * test the impact on FR2 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR1 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | E-UTRA SRS carrier-based switching impacting NR cells in SCG in EN-DC | To/from E-UTRA cells:   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps | | E-UTRA SRS carrier-based switching impacting NR cells in MCG in NE-DC | To/from E-UTRA cells:   * test the impact on FR1 NR cells, for both UE capable and not capable of per-FR gaps; * FFS: test the impact on FR2 NR cells, for UE configured with per-UE gaps or not-capable of per-FR gaps |   **Proposal 3**: In TS 36.133, RAN4 to define the interruption tests cases for SRS carrier-based switching for the following scenarios:  **Table 2**: Test cases for requirements in 36.133   |  |  | | --- | --- | | **Test Case Type** | **Details** | | NR SRS carrier-based switching impacting E-UTRA cells in SCG in EN-DC | To/from NR cells in FR1 | | To/from NR cells in FR2 (for UE configured with per-UE gaps or not capable of per-FR gaps) | | NR SRS carrier-based switching impacting E-UTRA cells in MCG in NE-DC | To/from NR cells in FR1 | | To/from NR cells in FR2 (for UE configured with per-UE gaps or not capable of per-FR gaps) |   **Proposal 4**: For the interruption requirements with LTE SRS carrier-based switching impacting LTE carriers in EN-DC and NE-DC, RAN4 needs to choose among the two options:   * **Option 1**: no test cases for these scenarios in Rel-16 (preferred). * **Option 2**: reuse the Rel-14 LTE test cases. |
| [R4-2016423](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016423.zip) | Ericsson | On TC2 configuration (SA interruptions at NR SRS carrier-based switching) |

## Open issues summary

### RRM core requirements maintenance

Issue 1-1-1: Whether to introduce requirements in TS 36.133 for interruption on LTE victim cell for LTE SRS carrier based switching under EN-DC and NE-DC

* Proposals
  + Option 1: Yes (Ericsson R4-206421)
* Recommended WF:
  + Option 1

Issue 1-1-2: Whether to add condition on collision of NR SRS carrier based switching and UE BWP switching

* Proposals
  + Option 1: Yes (Qualcomm R4-2014646)
* Recommended WF:
  + FFS

### RRM test cases

Issue 1-2-1: Scenarios for NR SRS carrier based switching tests

* Proposals
  + Option 1 (ZTE)
    - Tests are specified for SA and EN-DC
  + Option 2 (Ericsson)
    - Tests are specified for SA, NR-DC, NE-DC and EN-DC
* Recommended WF:
  + FFS

Issue 1-2-2: Scenarios for E-UTRA SRS carrier based switching tests

* Proposals
  + Option 1 (ZTE)
    - Tests are specified for EN-DC
  + Option 2 (Ericsson)
    - Tests are specified for NE-DC and EN-DC
* Recommended WF:
  + FFS

Issue 1-2-3: Test setup for SA NR SRS carrier based switching

* Proposals
  + Option 1 (ZTE)
    - TC1: PCell in FR1, SCell in FR1
    - TC2: PCell in FR2, SCell in FR2
  + Option 2 (Ericsson)
    - TC1: PCell in FR1, SCell in FR1
      * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2
    - TC2: PCell in FR2, SCell in FR2
      * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1
    - TCX: PCell in FR1, SCell in FR2
* Recommended WF:
  + FFS

Issue 1-2-4: Test setup for EN-DC NR SRS carrier based switching

* Proposals
  + Option 1 (ZTE)
    - TC1: PSCell in FR1, SCell in FR1
    - TC2: PSCell in FR2, SCell in FR2
  + Option 2 (Ericsson)
    - TC1: PSCell in FR1, SCell in FR1
      * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2
    - TC2: PSCell in FR2, SCell in FR2
      * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1
    - TCX: PSCell in FR1, SCell in FR2
* Recommended WF:
  + FFS

Issue 1-2-5: Test setup for EN-DC E-UTRA SRS carrier based switching

* Proposals
  + Option 1 (ZTE)
    - TC1: PSCell in FR1, E-UTRA SCell
    - TC2: PSCell in FR2, E-UTRA SCell
  + Option 2 (Ericsson)
    - TC1: PSCell in FR1, E-UTRA SCell
      * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2
    - TC2: PSCell in FR2, E-UTRA SCell
      * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1
* Recommended WF:
  + FFS

Issue 1-2-6: UE type for test

* Proposals
  + Option 1 (Ericsson)
    - Tests are specified for UE capable of per-UE gap and capable of per-FR gap
* Recommended WF:
  + FFS

Issue 1-2-7: Whether to introduce following test cases in TS 36.133

* Proposals
  + Option 1 (Ericsson)
    - In TS 36.133, RAN4 to define the interruption tests cases for SRS carrier-based switching for the following scenarios
      * NR SRS carrier-based switching impacting E-UTRA cells in SCG in EN-DC
      * NR SRS carrier-based switching impacting E-UTRA cells in MCG in NE-DC
* Recommended WF:
  + FFS

Issue 1-2-8: Whether to define delay test cases for SRS carrier based switching

* Proposals
  + Option 1 (Ericsson)
    - Do not define delay test cases for SRS carrier-based switching for NR deployments, similar to LTE.
* Recommended WF:
  + Option 1

Issue 1-2-9: Whether to define test cases for the interruption requirements with E-UTRA SRS carrier-based switching impacting E-UTRA carriers in EN-DC and NE-DC

* Proposals
  + Option 1 (Ericsson preferred)
    - No test cases for these scenarios in Rel-16
  + Option 2 (Ericsson)
    - Reuse the Rel-14 LTE test cases.
* Recommended WF:
  + Option 1

## Companies views’ collection for 1st round

### Open issues for RRM core requirements maintenance

Issue 1-1-1: Whether to introduce requirements in TS 36.133 for interruption on LTE victim cell for LTE SRS carrier based switching under EN-DC and NE-DC

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| **Company** | **Comments** |
| Huawei | No strong view.  If agree to introduce, a simple description is needed, like, the requirements in clause xxxx shall apply. |
| Ericsson | Agree with recommended WF |
| QC | We agree that this interruption requirement is needed for EN-DC and NE-DC, but in fact, all the interruptions define for LTE SA applies to EN-DC and NE-DC. Instead of copy and paste the whole sections, we suggest to add a sentence in 7.32.1 and 7.36.1 specifying that any interruption defined in LTE SA applies to EN-DC (NE-DC). |
| MTK | In current stage, only EN-DC case can be defined. |
| Apple | Agree that interruption requirements are needed for EN-DC and NE-DC. |
| ZTE | Agree with the recommended WF. |
| Nokia | It is out of the scope of this WI.  We understood this WI focuses on the interruption due to NR SRS carrier switching and the interruption to NR carriers. This scenario is purely LTE related and may be better discussed in Rel16 LTE RRM maintenance WI. |

Issue 1-1-2: Whether to add condition on collision of NR SRS carrier based switching and UE BWP switching

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| **Company** | **Comments** |
| Huawei | We understand the motivation. However multiple procedures can result in RF retuning, for example, SCell activation/deactivation, do we need to list all cases? |
| Ericsson | unclear, the BWP switching is not a time point but an interval during which the UE is expected to switch. Ok to have this FFS |
| QC | To Huawei: if there is any procedure that may conflict, in our opinion, they should be listed on the spec, especially the retuning happens on the same chain used for SRS carrier switching. Scell activation may not have conflict, since the SRS carrier switching can only happens at the already activated cell.  To Ericsson: we want to resolve the conflict between SRS carrier switching with UL BWP switching in the entire switching period, all this period should be blocked from SRS carrier switching. If the wording is not clear, we are welcome any clarification suggestions. |
| MTK | Don’t agree.  Generally, in RAN4, we don’t define the combination requirement for two independent procedures (otherwise, there are lots of combinations on each topic) and this does not restrict UE’s implementation on how to handle the issue when two procedures come together.  The reason for defining the impact to measurement with other procedures is that measurement is a long term procedure, |
| Apple | Concern from QC is valid. However, we also agree with HW’s comment that there are other procedures which can also cause interruption. SCell activation might also have conflict, e.g. the SCell being activated is another carrier, not the one on which there is SRS carrier switching. If RAN4 is to resolve all the combination, that may take quite a long time and potentially result in some restriction on UE implementation (UE may have to prioritize some operation over others). Since this overlapped case is not going to be tested, we are fine with no further clarification. |
| ZTE | We think this would already be addressed by the interruption requirements for BWP switching that UE is not expected to transmit during the interruption period. No such condition should be added to SRS carrier based switching. |
| Nokia | Support the proposal.  Just the wording of “on either carrier” is not clear enough. Could we change to “switch-to and switch-from carriers”? |

### Open issues for RRM test cases

Issue 1-2-1: Scenarios for NR SRS carrier based switching tests

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| **Company** | **Comments** |
| Huawei | Support option 1.  In current spec, no test cases are specified for NE-DC and NR-DC. We suggest to follow the legacy principle. |
| Ericsson | In addition to the initial list discussed already on the RAN4 reflector, we see a need for NR-DC and NE-DC tests (option 2). |
| QC | We support option 1. For option 2 from Ericsson proposal, we have the following comments:   1. Do not need to test NR-DC if NR SA is tested, same as all the other interruption requirement defined previously. 2. Do not need to define NE-DC if EN-DC is tested, same as all the other interruption requirement defined previously. |
| MTK | Option 1. |
| Apple | Support option 1. No NE-DC and NR-DC test in current spec. on the other hand, no further tests are needed if UE can survive EN-DC and SA tests. Testing point is the same. |
| ZTE | We support Option 1. There is no test specified for other features under NE-DC and NR-DC. |
| Nokia | Support Option1.  As the same interruption requirements are applied for EN-DC, NE-DC and NR-DC, we don’t see strong motivation to define the test cases for each scenario. |

Issue 1-2-2: Scenarios for E-UTRA SRS carrier based switching tests

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| **Company** | **Comments** |
| Huawei | Support option1.  In current spec, no test cases are specified for NE-DC. We suggest to follow the legacy principle. |
| Ericsson | In addition to the initial list discussed already on the RAN4 reflector. In addition to the initial list discussed already on the RAN4 reflector, we see a need for NE-DC tests (option 2). |
| QC | We support option 1. Do not need to define NE-DC if EN-DC is tested, same as all the other interruption requirement defined previously. |
| MTK | Option 1. |
| Apple | Support option 1. |
| ZTE | Support option 1. |
| Nokia | Support Option1.  As the same interruption requirements are applied for EN-DC, NE-DC and NR-DC, we don’t see strong motivation to define the test cases for each scenario. |

Issue 1-2-3: Test setup for SA NR SRS carrier based switching

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| **Company** | **Comments** |
| Huawei | Support option1.  To simplify the test, the interruption on FR2 carrier due to FR1 SRS carrier switching is suggested not to be test. |
| Ericsson | For UE not capable of per FR gap or configured with per UE gap, it would seem beneficial to test the interruption impact of SRS carrier switching to SCells on FR2 with an FR1 PCell but we seek feedback from other companies. Not necessary to test the other way around because there are no band combinations with PCell on FR2 and SCells on FR1.  Our original proposal was not correctly captured, so we corrected.  Furthermore, our more specific proposals for SA test cases [R4-2016423]:   * ***Proposal 1 [R4-2016423]****: RAN4 develops 4 test cases (or 3 if the FR2/FR1 case in the last row below is deprioritized) for NR SRS switching in SA NR, each covering multiple applicable test configurations with different SCS combinations for <aggressor SCS, victim SCS> and duplex modes:*  |  |  |  | | --- | --- | --- | | **NR Cell 1 (PCell)** | **NR Cell 2 (SCell)** | **Comments** | | FR1   * FDD 15 kHz 10 MHz * TDD 15 kHz 10 MHz * TDD 30 kHz 40 MHz | FR1   * FDD 15 kHz 10 MHz * TDD 15 kHz 10 MHz * TDD 30 kHz 40 MHz | Verify scenario 1a  (SRS switching to/from NR cells in FR1, to verify the impact on FR1 NR cells) | | FR2   * TDD 120 kHz 100 MHz | FR2   * TDD 120 kHz 100 MHz | Verify scenario 2a (SRS switching to/from NR cells in FR2, to verify the impact on FR2 NR cells) | | FR1   * FDD 15 kHz 10 MHz * TDD 15 kHz 10 MHz * TDD 30 kHz 40 MHz | FR2   * TDD 120 kHz 100 MHz | Verify scenario 2b (SRS switching to/from NR cells in FR2, to verify the impact on FR1 NR cells) | | FR2   * TDD 120 kHz 100 MHz | FR1   * FDD 15 kHz 10 MHz * TDD 15 kHz 10 MHz * TDD 30 kHz 40 MHz | Verify scenario 1b (SRS switching to/from NR cells in FR1, to verify the impact on FR2 NR cells) |  * ***Proposal 2 [R4-2016423]****: The test cases for NR SRS switching in SA NR are developed in a generic way to allow testing UEs with different NR SRS carrier-based switching time capability (indicated by higher layer parameter SRS-SwitchingTimeNR), i.e., SRS-SwitchingTimeNR is used as a test parameter.* * ***Proposal 3 [R4-2016423]****: The test cases for NR SRS switching in SA NR are developed under the following further assumptions:*    + *DRX: OFF*   + *SSB configuration: 1 SSB per SSB burst, 20 ms SSB periodicity.*   *SRS configuration: full bandwidth* |
| QC | Support option 1. |
| MTK | Option 2.  We think it should test FR1+FR2 scenario especially for the UE claiming per-FR gap. |
| Apple | Prefer option 1. |
| ZTE | We support option 1. Additional test to verify FR1+FR2 for UE capable of per-FR gap can be further considered if it is test feasible. |
| Nokia | Support Option2.  As the interruption on the victim SCells are different for the four cases, it would be good to define the test cases for all of them in SA scenario. |

Issue 1-2-4: Test setup for EN-DC NR SRS carrier based switching

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| **Company** | **Comments** |
| Huawei | Support option 1 to simplify the test. |
| Ericsson | For UE not capable of per FR gap or configured with per UE gap, it would seem beneficial to test the interruption impact of NR SRS carrier switching to SCells on FR2 with an LTE PCell + FR1 PSCell. Seek feedback from other companies  Our original proposal was not correctly captured, so we corrected. |
| QC | Support option 1. |
| MTK | Option 2.  We think it should test FR1+FR2 scenario especially for the UE claiming per-FR gap. |
| Apple | Prefer option 1. |
| ZTE | We support option 1. Additional test to verify FR1+FR2 for UE capable of per-FR gap can be further considered if it is test feasible. |
| Nokia | Support Option1.  If the complete test cases would be defined in SA scenario, we don’t see the need to define same set of test cases in EN-DC. The two test cases in Option 1 would be sufficient. |

Issue 1-2-5: Test setup for EN-DC E-UTRA SRS carrier based switching

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| **Company** | **Comments** |
| Huawei | Support option 1 to simplify the test. |
| Ericsson | For UE not capable of per FR gap or configured with per UE gap, it would seem beneficial to test the interruption impact of LTE SRS carrier switching to SCells on FR2 with an LTE PCell + FR1 PSCell. Seek feedback from other companies  Our original proposal was not correctly captured, so we corrected. |
| QC | Support option 1. |
| MTK | Option 2.  We think it should test FR1+FR2 scenario especially for the UE claiming per-FR gap. |
| Apple | Prefer option 1. |
| ZTE | We support option 1. Additional test to verify FR1+FR2 for UE capable of per-FR gap can be further considered if it is test feasible. |
| Nokia | Support Option1.  The two cases can well cover the interruption to NR FR1 and FR2 cells. We don’t see the need to define additional test cases with the combination of FR1 and FR2 NR cells. |

Issue 1-2-6: UE type for test

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| **Company** | **Comments** |
| Huawei | The legacy interruption related test cases don’t mention whether UE capable of per-UE gap and capable of per-FR gap. Prefer to follow the existing way. |
| Ericsson | Support option 1 since we need to be able to test UEs with different capabilities |
| QC | We don’t agree with option 1. For both per-UE and per-FR, we either have no interruption or interruption specified in core requirement. Since we define tests for the with interruption case, there is no need to distinguish the two types of UEs. |
| MTK | We think it should test FR1+FR2 scenario especially for the UE claiming per-FR gap. |
| ZTE | In the test there is no need to mention per-FR gap UE or per-UE gap UE. Only under FR1+FR2 scenario the interruption requirements are different for different type of UEs. |
| Nokia | Support Option1.  It is fine to define two test cases with per-UE gap and per-FR gap capability respectively. But it would be sufficient define them in e.g. SA scenario. There is no need to repeat in all scenarios. |

Issue 1-2-7: Whether to introduce following test cases in TS 36.133

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| **Company** | **Comments** |
| Huawei | -For NR SRS carrier-based switching impacting E-UTRA cells in SCG in EN-DC, the interruption on LTE carrier can be verified together in NR SRS carrier-based switching test in A.4 in TS 38.133;  - For NR SRS carrier-based switching impacting E-UTRA cells in MCG in NE-DC, as we mentioned above, there is no test case for NE-DC. |
| Ericsson | Support option 1 |
| QC | No need to define EN-DC test in TS 36.133, following all the other interruption requirements. |
| Apple | Prefer to align with other test cases, i.e. only captured in TS38.133. |
| ZTE | No test in TS 36.133. |
| Nokia | No.  During RAN#89, it has been agreed “Any RRM test case involving NR cells shall be defined in annex of TS 38.133 regardless of whether the RRM requirement to be tested is defined in TS 36.133 or in TS 38.133 or in any other specification.” Hence these test cases shall be defined in 38.133. |

Issue 1-2-8: Whether to define delay test cases for SRS carrier based switching

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| --- | --- |
| **Company** | **Comments** |
| Huawei | Agree with option 1 |
| Ericsson | Follow approach of LTE SA SRS carrier switching, OK not to test delay |
| QC | No need to define the tests. |
| MTK | Option 1 |
| Apple | Support option 1. |
| ZTE | Agree Option 1 |
| Nokia | No.  No delay requirements are defined for SRS carrier switching. |

Issue 1-2-9: Whether to define test cases for the interruption requirements with E-UTRA SRS carrier-based switching impacting E-UTRA carriers in EN-DC and NE-DC

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| **Company** | **Comments** |
| Huawei | Support option 1. |
| Ericsson | Preference not to define further tests, since the switching and interruption impact to the E-UTRA carriers is the same as in the rel14 LTE tests, the difference being the UE has an NR SpCell in addition. |
| QC | No need to define the tests in Rel-16. |
| MTK | Option 1. |
| Apple | Option 1. |
| ZTE | Option 1. |
| Nokia | It is out of the scope of this WI.  We understood this WI focuses on the interruption due to NR SRS carrier switching and the interruption to NR carriers. This scenario is purely LTE related and may be better discussed in Rel16 LTE RRM maintenance WI. |

### CRs/TPs comments collection

#### RRM core requirements maintenance

**CR to TS 38.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2014646](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Qualcomm | Huawei: depending on the outcome of issue 1-1-2. |
| Ericsson : unclear, the BWP switching is not a time point but an interval during which the UE is expected to switch. |
| ZTE: Depending on outcome of Issue 1-1-2. |
| Nokia: Ok in general. Just the wording of “on either carrier” is not clear enough. Could we change to “switch-to and switch-from carriers”? |

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| **CR/TP number** | **Comments collection** |
| [R4-2015577](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | Nokia: OK. There is also duplicated u=0 in Table 8.2.1.2.12-1. It shall be cleaned as well. |
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| **CR/TP number** | **Comments collection** |
| [R4-2016422](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Ericsson | Nokia: Ok |
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**CR to TS 36.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2016421](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Ericsson | Huawei: depending on outcome of Issue 1-1-1. |
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#### RRM test cases

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| **CR/TP number** | **Comments collection** |
| [R4-2014227](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Apple | Ericsson : first we need to discuss and agree on the test case list and the common set of configuration parameters (including SRS configuration) |
| QC: In the core section, the specified interruption is only “to” or “from”, since the test procedure includes switch “to” and “back” from the target carriers, the interruption length in the test requirement should be multiplied by two. |
| Nokia: As same requirements are applied to synchronous and async scenarios, at least the worse scenario shall be tested. We suggest defining the test case at least for asynchronous EN-DC. |
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| **CR/TP number** | **Comments collection** |
| [R4-2014789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  OPPO | Ericsson : first we need to discuss and agree on the test case list and the common set of configuration parameters (including SRS configuration) |
| QC: In Table A.5.5.2.7.2-1, the interruption is only “to” or “from”, since the test procedure includes switch “to” and “back” from the target carriers, the interruption length in the table should be multiplied by two. |
| Nokia: Ok. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015495](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Huawei | Ericsson : first we need to discuss and agree on the test case list and the common set of configuration parameters (including SRS configuration) |
| QC: Same comments for [R4-2014789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) applies to this CR |
| Nokia: Ok. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015584](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | Ericsson : first we need to discuss and agree on the test case list and the common set of configuration parameters (including SRS configuration) |
| QC: (1) Missing Scell configuration (2) Typo: TDD configuration should be 2.1, and same comments as above 3 CRs. |
| Nokia: It depends on the discussion in Issue 1-2-3. |
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| **CR/TP number** | **Comments collection** |
| [R4-2016052](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Nokia | Ericsson : first we need to discuss and agree on the test case list and the common set of configuration parameters (including SRS configuration) |
| QC: Same comments for R4-2014227 applies to this CR |
| Nokia: Ok. |
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| **CR/TP number** | **Comments collection** |
| [R4-2016423](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Ericsson | QC: Only FR2/FR2 is within scope of TC2. SRS carrier switching from FR1 to FR2 is not a common case, UE with no Tx in FR2 or no Tx in FR1 is rarely seen. We prefer not to introduce the test. |
| Nokia: It depends on the discussion in Issue 1-2-7. |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic #1-1**  **RRM core requirements maintenance** | *Tentative agreements:*  Introduce requirements in TS 36.133 for interruption on LTE victim cell for LTE SRS carrier based switching under EN-DC and NE-DC  *Candidate options:*  *For Issue 1-1-1, one company thinks this is out of scope of this Rel-16 WI and is better discussed in Rel-16 LTE RRM maintenance WI. All other companies think this is necessary or has no strong view. Since there is no technical concern to have the interruption requirements in 36.133, moderator would like to suggest introducing the requirements. Chair may decide which AI is better for handling the issue.*  *There are also comments on how to define requirements, e.g. new clause with full text or reference to existing one. This can be further discussed in the 2nd round.*  Issue 1-1-1a: How to introduce requirements in TS 36.133 for interruption on LTE victim cell for LTE SRS carrier based switching under EN-DC and NE-DC   * Proposals   + Option 1: Interruption requirements refer to existing LTE SA corresponding requirements.   + Option 2: Interruption requirements with full text   *For Issue 1-1-2, views from companies are diverse. This needs further discussion in the 2nd round and GTW session.*  Issue 1-1-2: Whether to add condition on collision of NR SRS carrier based switching and UE BWP switching   * Proposals   + Option 1: Yes   + Option 2: No   + Option 3: FFS   *Recommendations for 2nd round:*  *Further discuss open issues 1-1-1a and Issue 1-1-2* |
| **Sub-topic #1-1**  **RRM test cases** | *Tentative agreements:*   * Do not define delay test cases for SRS carrier-based switching for NR deployments, similar to LTE.   For Issue 1-2-9, one company think it is out of scope of the WI and should be handled in other AI. All other companies agree no test for the interruption requirements with E-UTRA SRS carrier-based switching impacting E-UTRA carriers in EN-DC and NE-DC. Since there is no technical concern moderator would like to suggest that there is no test for the scenarios. Chair may further decide under which AI the issue should be handled.   * No test for the interruption requirements with E-UTRA SRS carrier-based switching impacting E-UTRA carriers in EN-DC and NE-DC.   [Nokia]: On SRS carrier switching, though we doubted if this is the proper WI to discuss such interruption, we are fine to define the requirements in 36.133 for this case. But If requirements are defined, we need define the corresponding test cases to verify the performance. Why do we agreed on requirements but not the test case?  *Candidate options:*  Issue 1-2-1: Scenarios for NR SRS carrier based switching tests   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Tests are specified for SA and EN-DC   + Option 2 (Ericsson)     - Tests are specified for SA, NR-DC, NE-DC and EN-DC   Issue 1-2-2: Scenarios for E-UTRA SRS carrier based switching tests   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Tests are specified for EN-DC   + Option 2 (Ericsson)     - Tests are specified for NE-DC and EN-DC   Issue 1-2-3: Test setup for SA NR SRS carrier based switching   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, Apple)     - TC1: PCell in FR1, SCell in FR1     - TC2: PCell in FR2, SCell in FR2   + Option 2 (Ericsson, MediaTek, Nokia)     - TC1: PCell in FR1, SCell in FR1       * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2     - TC2: PCell in FR2, SCell in FR2       * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1     - TCX: PCell in FR1, SCell in FR2   Issue 1-2-4: Test setup for EN-DC NR SRS carrier based switching   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, Apple)     - TC1: PSCell in FR1, SCell in FR1     - TC2: PSCell in FR2, SCell in FR2   + Option 2 (Ericsson, MediaTek)     - TC1: PSCell in FR1, SCell in FR1       * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2     - TC2: PSCell in FR2, SCell in FR2       * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1     - TCX: PSCell in FR1, SCell in FR2   Issue 1-2-5: Test setup for EN-DC E-UTRA SRS carrier based switching   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, Apple)     - TC1: PSCell in FR1, E-UTRA SCell     - TC2: PSCell in FR2, E-UTRA SCell   + Option 2 (Ericsson, MediaTek)     - TC1: PSCell in FR1, E-UTRA SCell       * FFS whether to test the impact on FR2 NR cells, e.g. by adding an SCell in FR2     - TC2: PSCell in FR2, E-UTRA SCell       * FFS whether to test the impact on FR1 NR cells, e.g. by adding an SCell in FR1   Issue 1-2-6: UE type for test   * Proposals   + Option 1 (Ericsson, MediaTek, Nokia)     - Tests are specified for UE capable of per-UE gap and capable of per-FR gap   *For Issue 1-2-6, there are views from companies that there is no need to mention UE type in test as in existing tests. Moderator thinks it is related to if we will have tests for FR1+FR2 cases. So this can be discussed together in the 2nd round.*  Issue 1-2-7: Whether to introduce following test cases in TS 36.133   * Proposals   + Option 1 (Ericsson)     - In TS 36.133, RAN4 to define the interruption tests cases for SRS carrier-based switching for the following scenarios       * NR SRS carrier-based switching impacting E-UTRA cells in SCG in EN-DC       * NR SRS carrier-based switching impacting E-UTRA cells in MCG in NE-DC   + Option 2 (Huawei, Qualcomm, Apple, ZTE, Nokia)     - All the tests are captured in TS 38.133   *Recommendations for 2nd round:*   1. Make decisions on Issue 1-2-1, 1-2-2 and 1-2-7   Issue 1-2-1: Scenarios for NR SRS carrier based switching tests   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Tests are specified for SA and EN-DC   + Option 2 (Ericsson)     - Tests are specified for SA, NR-DC, NE-DC and EN-DC   Issue 1-2-2: Scenarios for E-UTRA SRS carrier based switching tests   * Proposals   + Option 1 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Tests are specified for EN-DC   + Option 2 (Ericsson)     - Tests are specified for NE-DC and EN-DC   Issue 1-2-7: Whether to introduce following test cases in TS 36.133   * Proposals   + Option 1 (Ericsson)     - In TS 36.133, RAN4 to define the interruption tests cases for SRS carrier-based switching for the following scenarios       * NR SRS carrier-based switching impacting E-UTRA cells in SCG in EN-DC       * NR SRS carrier-based switching impacting E-UTRA cells in MCG in NE-DC   + Option 2 (Huawei, Qualcomm, Apple, ZTE, Nokia)     - All the tests are captured in TS 38.133  1. Further discussions on issues 1-2-3, 1-2-4 1-2-5 and 1-2-6   Based on comments in the 1st round, moderator would like to re-organize these issues.  Issue 1-2-3a: Whether to specify test for SA NR SRS carrier based switching under scenarios FR1+FR2 from necessity and test feasibility perspective   * + Option 1     - Yes   + Option 2     - No   Issue 1-2-3b: If answer to issue 1-2-3a is Yes, then if following test cases for SA is agreeable   * + Option 1     - TC1: PCell in FR1, SCell in FR1     - TC2: PCell in FR2, SCell in FR2     - TC3: PCell in FR1, SCell in FR2   Issue 1-2-3c: If answer to issue 1-2-3a is No, then if following test cases for SA is agreeable   * + Option 1     - TC1: PCell in FR1, SCell in FR1     - TC2: PCell in FR2, SCell in FR2   Issue 1-2-4a: Whether to specify test for EN-DC NR SRS carrier based switching under scenarios FR1+FR2 from necessity and test feasibility perspective   * + Option 1     - Yes   + Option 2     - No   Issue 1-2-4b: If answer to issue 1-2-4a is Yes, then if following test cases for EN-DC is agreeable   * + Option 1     - TC1: PSCell in FR1, SCell in FR1     - TC2: PSCell in FR2, SCell in FR2     - TC3: PSCell in FR1, SCell in FR2   Issue 1-2-4c: If answer to issue 1-2-4a is No, then if following test cases for EN-DC is agreeable   * + Option 1     - TC1: PSCell in FR1, SCell in FR1     - TC2: PSCell in FR2, SCell in FR2   Issue 1-2-5a: Whether to specify test for EN-DC E-UTRA SRS carrier based switching under scenarios FR1+FR2 from necessity and test feasibility perspective   * + Option 1     - Yes   + Option 2     - No   Issue 1-2-5b: If answer to issue 1-2-5a is Yes, then if following test cases for EN-DC is agreeable   * + Option 1     - TC1: PSCell in FR1, E-UTRA SCell     - TC2: PSCell in FR2, E-UTRA SCell     - TC3: PSCell in FR1, E-UTRA SCell, SCell in FR2   Issue 1-2-5c: If answer to issue 1-2-5a is No, then if following test cases for EN-DC is agreeable   * + Option 1     - TC1: PSCell in FR1, E-UTRA SCell     - TC2: PSCell in FR2, E-UTRA SCell   Issue 1-2-6: UE type for test   * + Option 1     - Tests are specified for UE capable of per-UE gap and capable of per-FR gap   + Option 2     - No mention of UE type in the test |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
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### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [R4-2014646](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2015577](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2016421](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Return to* |
| [R4-2016422](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Agreeable* |
| [R4-2014227](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014227.zip) | *Revised* |
| [R4-2014789](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014789.zip) | *Revised* |
| [R4-2015495](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015495.zip) | *Revised* |
| [R4-2015584](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015584.zip) | *Revised* |
| [R4-2016052](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016052.zip) | *Revised* |
| [R4-2016423](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016423.zip) | *Revised* |

## Discussion on 2nd round

## Summary on 2nd round

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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# Topic #2: CGI reading requirements with autonomous gap

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **RRM core requirements maintenance** | | |
| [R4-2015575](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015575.zip) | ZTE | CR to 38.133 correction to CGI reading requirements |
| [R4-2015576](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015576.zip) | ZTE | CR to 36.133 correction to NR CGI reading interruption requirements |
| [R4-2015774](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015774.zip) | Huawei, HiSilicon | CR on CGI reading requirements 38.133 |
| [R4-2015775](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015775.zip) | Huawei, HiSilicon | CR on CGI reading requirements 36.133 |
| [R4-2016379](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016379.zip) | Nokia, Nokia Shanghai Bell | Maintenance CR on NR CGI reading in 36133 |
| **RRM test cases** | | |
| [R4-2014642](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014642.zip) | Qualcomm, Inc. | Proposal 1: Test requirement should be defined by counting number of total missing ACK/NACKs during the CGI reading procedure. Number of missing ACK/NACK is the number of interrupted slots plus K1.  Proposal 2: Introduce the following tests:   * NR SA   + FR1 serving cell, FR1 target CGI reading cell   + FR1 serving cell, LTE target CGI reading cell   + FR2 serving cell, FR2 target CGI reading cell * EN-DC   + FR1 PSCell cell, FR1 target CGI reading cell   + FR2 PSCell cell, FR2 target CGI reading cell |
| [R4-2014776](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014776.zip) | MediaTek inc. | CR on CGI reading test case |
| [R4-2015171](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015171.zip) | Ericsson | Proposal 1 : Introduce CGI reading test cases for  InterRAT CGI reading   * Test 1a : NR CGI reading in LTE SA, FR1 target cell * Test 1b : NR CGI reading in LTE SA, FR2 target cell * Test 2a : LTE CGI reading in NR SA, FR1 serving cell * Test 2b : LTE CGI reading in NR SA, FR2 serving cell   NR CGI reading   * Test 3a : NR intra-frequency CGI reading in NR SA, FR1 serving and target cell * Test 3b : NR intra-frequency CGI reading in NR SA, FR2 serving and target cell * Test 4a : NR inter-frequency CGI reading in NR SA, FR1 serving and target cell * Test 4b : NR inter-frequency CGI reading in NR SA, FR2 serving and target cell * Test 5 : NR intrafrequency CGI reading in EN-DC   Proposal 2 : Do not introduce new CGI reading tests for:   * NR inter-frequency CGI reading in NR SA, FR2 serving and FR1 target cell * NR inter-frequency CGI reading in NR SA, FR1 serving and FR2 target cell * LTE CGI reading in EN-DC   Proposal 3 : 20ms NR SMTC periodicity is used in CGI tests  Proposal 4 : 160ms SI-RNTI scheduling is used in CGI tests  Proposal 5 : Requirements for both CGI reading delay, and interruptions to serving cell during CGI reading should be verified by the same tests. |
| [R4-2015172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015172.zip) | Ericsson | CR to introduce interfrequency FR2 CGI reading test for SA NR (TC2) |
| [R4-2015580](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015580.zip) | ZTE | ***Proposal 1: For CGI reading of an NR or E-UTRE neighbor cell, following test cases should be specified.***   |  |  |  | | --- | --- | --- | | Test No. | Test | Comment | | TC1 | SA intra-frequency CGI identification of NR neighbor cell in FR1 | PCell in FR1 | | TC2 | SA inter-frequency CGI identification of NR neighbor cell in FR2 | PCell in FR2 | | TC3 | EN-DC intra-frequency CGI identification of NR neighbor cell in FR1 |  | | TC4 | EN-DC inter-frequency CGI identification of NR neighbor cell in FR2 |  | | TC5 | SA CGI identification of E-UTRA neighbor cell | PCell in FR1 | |
| [R4-2015583](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015583.zip) | ZTE | Draft CR on test case for SA intra-frequency CGI identification of NR neighbor cell in FR1 |
| [R4-2015776](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015776.zip) | Huawei, HiSilicon | draftCR on TC for EN-DC inter-frequency CGI identification of NR neighbor cell in FR2 |
| [R4-2016380](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016380.zip) | Nokia, Nokia Shanghai Bell | TC on EN-DC intra-F CGI reading of FR1 NR cell |

## Open issues summary

### RRM test cases

All the test cases proposed by companies are taken into account as candidate test cases. Company may share views whether down-selection is needed.

Issue 2-1-1: Test cases for CGI reading in LTE SA

* Proposals
  + Option 1
    - Test 1a : NR CGI reading in LTE SA, FR1 target cell
    - Test 1b : NR CGI reading in LTE SA, FR2 target cell
* Recommended WF:
  + FFS

Issue 2-1-2: Test cases for CGI reading in NR SA

* Proposals
  + Option 1
    - Test 2a : LTE CGI reading in NR SA, FR1 PCell
    - Test 2b : LTE CGI reading in NR SA, FR2 PCell
    - Test 3a : NR intra-frequency CGI reading in NR SA, FR1 PCell and FR1 target cell
    - Test 3b : NR intra-frequency CGI reading in NR SA, FR2 PCell and FR2 target cell
    - Test 4a : NR inter-frequency CGI reading in NR SA, FR1 PCell and FR1 target cell
    - Test 4b : NR inter-frequency CGI reading in NR SA, FR2 PCell and FR2 target cell
* Recommended WF:
  + FFS.

Issue 2-1-3: Test cases for CGI reading in EN-DC

* Proposals
  + Option 1
    - Test 5a : NR intra-frequency CGI reading in EN-DC, FR1 PSCell and FR1 target cell
    - Test 5b : NR intra-frequency CGI reading in EN-DC, FR2 PSCell and FR2 target cell
    - Test 6a : NR inter-frequency CGI reading in EN-DC, FR1 PSCell and FR1 target cell
    - Test 6b : NR inter-frequency CGI reading in EN-DC, FR2 PSCell and FR2 target cell
* Recommended WF:
  + FFS

Issue 2-1-4: Test design

* Proposals
  + - Option 1: Requirements for both CGI reading delay, and interruptions to serving cell during CGI reading should be verified by the same tests
* Recommended WF:
  + Option 1 is agreeable.

Issue 2-1-5: How to test interruption during CGI reading

* Proposals
  + Option 1: Test requirement should be defined by counting number of total missing ACK/NACKs during the CGI reading procedure. Number of missing ACK/NACK is the number of interrupted slots plus K1.
* Recommended WF:
  + FFS

Issue 2-1-6: Test configuration

* Proposals
  + Option 1:
    - 20ms NR SMTC periodicity is used
    - 160ms SI-RNTI scheduling is used
* Recommended WF:
  + FFS

## Companies views’ collection for 1st round

### Open issues

Issue 2-1-1: Test cases for CGI reading in LTE SA

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| **Company** | **Comments** |
| Huawei | In our view, Test 1a/1b serves very similar test purpose as Test 6a/6b, and we only need one of them. Whether UE is configured with an NR PSCell or not would not impact the CGI reading performance. We prefer to keep Test 6a/6b as there are already draft CRs, so Test 1a/1b can be skipped. |
| Ericsson | Both target FR are necessary since a UE may only support FR1 bands, or may only support FR2 bands. In case the UE supports both, the CGI reading implementation is quite different (RX beam sweep vs no beam sweep) |
| QC | Agree with Huawei’s comment, keep test 6a/6b, and not introducing 1a/1b. |
| MTK | We have the same view with Huawei. |
| Apple | Agree with Huawei. |
| ZTE | No strong view. If we have Test 6a/6b, it may be fine not to have test 1a/1b. |
| Nokia | We have the same view with Huawei, Test 1a/1b should be similar as 6a/6b, the core requirements are no difference for them. |

Issue 2-1-2: Test cases for CGI reading in NR SA

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| **Company** | **Comments** |
| Huawei | We only need one of Test 2a and 2b but not both, as whether the serving cell is in FR1 or FR2 should not impact the CGI reading performance. For simplicity we prefer to keep Test 2a and it is noted there is already draft CR for it.  We do not see a need to test intra and inter-frequency target cell exhaustively. CGI reading is based on auto gap, and the core requirements are not differentiating intra and inter-frequency, either. It is therefore reasonable to randomly test intra and inter-frequency for FR1 and FR2, and we can keep Test 3a and 4b as the Rapporteur suggested on reflector before the meeting. |
| Ericsson | All proposed tests are needed; the interruption impact of LTE CGI reading on an NR serving cell needs to be verified and within NR we need to verify both NR-intra and NR-inter requirements for CGI reading |
| QC | In order to reduce number of TCs, we would like to propose choose 2a and not 2b, since UE is using gap to read LTE CGI, interruptions on FR1 and FR2 are quite similar.  Since CGI reading discussed in this release is executed within gap, inter-frequency and intra-frequency are very similar, the only difference is probably whether frequency retuning is needed, which is tested in inter-frequency measurement TCs already. Therefore, we believe only one in 3a/4a (prefer 3a) and one 3b/4b (prefer 4b) are needed. |
| MTK | Agree with Huawei. |
| Apple | No need to test all. Suggestions from HW and QC are fine, i.e. keep only 2a, 3a and 4b. |
| ZTE | Agree with other companies it is not necessary to test all the cases as the UE processing are quite similar. Based on our proposal we cap support to have 2a, 3a and 4b. |
| Nokia | We do not need to test all the listed cases since some of the cases will test the same core requirements, considering the test cases discussion by moderator before this meeting, We support to have 2a, 3a and 4b. |

Issue 2-1-3: Test cases for CGI reading in EN-DC

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| **Company** | **Comments** |
| Huawei | Similar as for SA case, we do not see a need to test intra and inter-frequency target cell exhaustively. It is therefore reasonable to randomly test intra and inter-frequency for FR1 and FR2, and we can keep Test 5a and 6b as the Rapporteur suggested on reflector before the meeting. |
| Ericsson | Tests are needed, however if the UE also supports NR SA and passes tests in 2-1-2 the tests could be skipped according to applicability rule |
| QC | Same reasoning for 3a/4a and 3b/4b, only one of 5a/6a and one in 5b/6b are needed. We prefer to have 5a and 6b, but open to discuss the combinations. |
| MTK | Agree with Huawei. |
| Apple | Similar as above, 5a and 6b are enough. |
| ZTE | Support to have test 5a/6b |
| Nokia | Same view for SA case, we support to have 5a and 6b. |

Issue 2-1-4: Test design

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| **Company** | **Comments** |
| Huawei | Support the Recommended WF |
| Ericsson | Agree with the recommended WF |
| QC | Support recommended WF |
| MTK | Agree with Recommended WF |
| Apple | Recommended WF is OK |
| ZTE | Agree with recommended WF. |
| Nokia | We support the recommended WF. |

Issue 2-1-5: How to test interruption during CGI reading

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| **Company** | **Comments** |
| Huawei | Support option 1. |
| Ericsson | Agree with the proposal; however we want to say that calculating the missed ACK-NACK for a particular test case configuration needs consideration of the HARQ feedback because missed ACK-NACK can occur both because the UE did not receive the downlink, or it received the DL but the UL happened in an interruption. Since we did not cover missed ACK/NACK explicitly in the core requirement it needs to be done in the tests. |
| QC | This is our proposal, but since majority companies are specifying the interruption as core requirement, we are open for further discussion.  We discuss the issue raised in Ericsson’s comment in our contribution:  Number of missing ACK/NACK is the number of interrupted slots plus K1 (Delay in slots between DL data (PDSCH) reception and corresponding ACK transmission on UL), since in addition to the ACK/NACK being sent on UL during the interruption, the ACK/NACK in K1 slots after interruption are missing, due to the interruption on the DL slots. |
| MTK | We think one general question is whether RAN4 needs to consider both interruption in UL and DL in test case. In legacy LTE, the ACK/NACK will be counted twice due to both DL and UL side.  Thus, we suggest to also consider both side in NR CGI interruption.  Whether we use interrupted slots plus K1 or 2\* interrupted slots depends on the HARQ configuration.  Another general issue is how to defining the test requirement.   1. Option 1: Defining based on total permitted ACK/NACK number 2. Option 2: Defining based on permitted ACK/NACK number in each interruption   We support to use option 1 to define the requirement based on total interruption number. |
| Apple | Agree with MTK that both UL/DL should be considered. Testing total permitted ACK/NACK number is enough. |
| ZTE | We think it is enough to test total permitted ACK/NACK number. How to calculate the number is FFS. |

Issue 2-1-6: Test configuration

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| **Company** | **Comments** |
| Huawei | We are fine with 20ms SMTC periodicity. For SIB1 scheduling periodicity, we suggest to use the default value, i.e. 20ms. |
| Ericsson | Option 1 uses typical setting for SMTC and schedules SI-RNTI at minimum periodicity which we think is reasonable for CGI reading test. |
| QC | We propose to schedule SI-RNTI with all SSBs, i.e., SI-RNTI 20ms scheduling, to reduce test time. |
| Apple | 20ms SI-RNTI is preferred. |
| ZTE | SMTC periodicity should be fine. For SI-RNTI scheduling, we may need to find some balance between test time and SI-RNTI scheduling flexibility, e.g. 40ms. |
| Nokia | We are fine with 20ms SMTC periodicity and 20ms for SI-RNTI scheduling. |

### CRs/TPs comments collection

#### RRM core requirements maintenance

**CR to TS 38.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2015575](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | Ericsson : In EN-DC could the PSCell configure LTE CGI reading? I looked in 38.331 and saw no limitation that ReportCGI-EUTRAN is configured only by an NR PCell. |
| ZTE: To Ericsson,  Our understanding is no. PSCell can only configure measurement on the same RAT.  Another example is UE capability in 38.133  Nfreq, EN-DC, E-UTRA is the number of E-UTRA inter-frequency carriers being monitored (FDD and TDD) as configured by E-UTRA PCell or via LPP [22],  And there is no E-UTRA inter-RAT carriers under EN-DC. |
| Nokia: OK |
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| **CR/TP number** | **Comments collection** |
| [R4-2015774](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Huawei | Ericsson : Similar comment as 5575, could the PSCell configure LTE CGI reading? |
| MTK: support this CR. |
| ZTE: Okay. The change #2 in R4-2015575 can be merged into this CR. |
| Nokia: General are fine. Maybe we can consider to remove the second bullet since all scenarios will be supported. |
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**CR to TS 36.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2015576](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | Huawei: We have a conflict change in our CR R4-2015775 for clause 8.1.2.4.27.2. In our view, the bullet "Clause 7.32.2.y 15 and Clause 7.377.36.2.14 if the UE is configured with EN-DC or NE-DC operation mode" should be removed as the clause in for LTE SA. |
| Ericsson : OK to add one sample for AGC setting as agreed. |
| ZTE: Okay to merge change#4 and #5 into CR R4-2015775. |
| Nokia: Changes are fine. some overlapping with Nokia’s R4-2016379. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015775](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Huawei | Ericsson : Similar comment to 38.133 CR in 15774, could the LTE PSCell request NR CGI reading? |
| Nokia: Changes are fine. some overlapping with Nokia’s R4-2016379. |
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| **CR/TP number** | **Comments collection** |
| [R4-2016379](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Nokia | Huawei: We have a conflict change in our CR R4-2015775 for clause 8.1.2.4.27.2. The SIB1 decoding delay should be based on SIB1 Scheduling period but not SMTC period. |
| Ericsson: We think that an LTE PSCell could configure CGI reading in NE-DC as well, should be checked from RAN2. |
| QC: Overlapped with Huawei R4-2015775 CR, need to combine into one. For this CR, we don’t agree to remove the additional 20ms for FR2, as it is agreed in previous meetings already. |
| MTK: Don’t support this CR to delete additional 20ms margin if target cell is on FR2. |
| Nokia: To Huawei, we agree with the change on SIB1 decoding delay should be based on SIB1 scheduling period. To Ericsson, we can update after check with RAN2. To QC and MTK, this CR did not delete 20ms margin for FR2 target cell. It is already defined in the sub-clause 8.1.2.4.27.3, we just update the reference to the sub-clause 8.1.2.4.27.3, the 20ms margin for FR2 target cell is still there. |
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#### RRM test cases

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| **CR/TP number** | **Comments collection** |
| [R4-2014776](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  MediaTek | QC: LTE power up/off time needs to be taken into consideration, note that CGI reading requires demod/decoding modules to power up, not only searcher as in other inter-RAT measurement. We have the following suggestions:  Issue 1: LTE power up time, as defined in 6.1.2.1.2 inter-RAT HO, 30ms is needed for LTE power up. There are two possible places to capture this time  1a. In test requirement, add 30ms LTE power up time  1b. In core requirement, embedded in RRC procedure delay, specifying that 15ms RRC procedure delay for intra-RAT CGI reading, additional 30ms is added for inter-RAT CGI reading.  Issue 2: LTE power off time, since HO doesn’t happen immediately, UE needs to turn off LTE to save power, takes another 20ms. We are open to discuss where this can be captured. |
| MTK: Thank you for QC to raise this issue. We agree to introduce this additional RRC processing time similar as inter-RAT HO, but we think this is an issue in core requirement.  To moderator ZTE,  Can we capture QC’s issue in core part discussion other than in test case CR? |
| ZTE (moderator): Okay to capture the issue in the core part for further discussion in the 2nd round. |
| Nokia: 10MHz BW was given for LTE cell in table -1, but in table -4 it is given different BW configuration like 5MHz, 10MHz, 20MHz. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015172](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Ericsson | QC: (1) Decoding time only counts MIB (24+1)\*SMTC, missing SIB decoding time (2) 2ms reporting delay is missing |
| Nokia: Should we consider to include CGI reading test cases in the same section as measurement test cases? In table A.7.x.1.1-3, the second “Cell 1” should be “Cell 2”. for cell 2, AoA setup is AoA2 what's the meaning? if it means 2 AoAs, then OP.1 for Cell 2 is not applicable. In A.7.x.1.1, CGI reading delay is only considering MIB decoding time 25\*T\_SMTC = 500ms, missing SIB1 decoding time. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015583](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | QC: Decoding time only counts MIB (5+1)\*SMTC, missing SIB decoding time |
| Nokia: CGI reading delay is only considering MIB decoding time 6\*T\_SMTC = 120ms, missing SIB1 decoding time. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015776](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Huawei | Ericsson : We want to discuss the rough beam assumption in this testcase; RAN4 has never explicitly concluded that rough beam would be used in CGI reading and since this is a decoding test our initial thought is that the UE would actually use fine beams. Moreover, the scaling by N=8 independent of power class also points in the direction of implicitly assuming fine beam in the past (although we have never explicitly said it), since for cell measurement procedures in PC3 we did not scale by as much as N=8 to allow for a rough beam sweep. |
| QC: (1) Decoding time is calculated based on RMSI period = 20ms, need to specify. (2) 2ms reporting delay is missing. |
| Nokia: could it be explained more about the given 650ms? |
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| **CR/TP number** | **Comments collection** |
| [R4-2016380](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Nokia | QC: (1) Decoding time is calculated based on RMSI period = 20ms, need to specify. (2) 2ms reporting delay is missing. |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic #2-1**  **RRM test cases** | *Tentative agreements:*   * Requirements for both CGI reading delay, and interruptions to serving cell during CGI reading should be verified by the same tests * Test requirement for interruption during CGI reading should be defined by counting number of total missed ACK/NACKs during the CGI reading procedure. * 20ms NR SMTC periodicity is used in the test   [Nokia]: the second bullet above is for the test requirement interruption during CGI reading, Suggest to add “for interruption during CGI reading” to make the agreement clear.  *Candidate options:*  *For Issue 2-1-1, one company thinks test 1a/1b is needed, other companies think it can be skipped if test 6a/6b is introduced.*  Issue 2-1-1: Test cases for CGI reading in LTE SA   * Proposals   + Option 1 (Ericsson)     - Test 1a : NR CGI reading in LTE SA, FR1 target cell     - Test 1b : NR CGI reading in LTE SA, FR2 target cell   + Option 2 (Huawei, Qualcomm, MediaTek, Apple, ZTE, Nokia)     - No test if test 6a/6b is introduced.   Issue 2-1-2: Test cases for CGI reading in NR SA   * Proposals   + Option 1 (Ericsson)     - Test 2a : LTE CGI reading in NR SA, FR1 PCell     - Test 2b : LTE CGI reading in NR SA, FR2 PCell     - Test 3a : NR intra-frequency CGI reading in NR SA, FR1 PCell and FR1 target cell     - Test 3b : NR intra-frequency CGI reading in NR SA, FR2 PCell and FR2 target cell     - Test 4a : NR inter-frequency CGI reading in NR SA, FR1 PCell and FR1 target cell     - Test 4b : NR inter-frequency CGI reading in NR SA, FR2 PCell and FR2 target cell   + Option 2 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Test 2a : LTE CGI reading in NR SA, FR1 PCell     - Test 3a : NR intra-frequency CGI reading in NR SA, FR1 PCell and FR1 target cell     - Test 4b : NR inter-frequency CGI reading in NR SA, FR2 PCell and FR2 target cell   Issue 2-1-3: Test cases for CGI reading in EN-DC   * Proposals   + Option 1 (Ericsson)     - Test 5a : NR intra-frequency CGI reading in EN-DC, FR1 PSCell and FR1 target cell     - Test 5b : NR intra-frequency CGI reading in EN-DC, FR2 PSCell and FR2 target cell     - Test 6a : NR inter-frequency CGI reading in EN-DC, FR1 PSCell and FR1 target cell     - Test 6b : NR inter-frequency CGI reading in EN-DC, FR2 PSCell and FR2 target cell   + Option 2 (ZTE, Huawei, Qualcomm, MediaTek, Apple, Nokia)     - Test 5a : NR intra-frequency CGI reading in EN-DC, FR1 PSCell and FR1 target cell     - Test 6b : NR inter-frequency CGI reading in EN-DC, FR2 PSCell and FR2 target cell   *For Issue 2-1-5 companies agree to test interruption by counting number of total missing ACK/NACKs during the CGI reading procedure. But how to calculate ACK/NACK needs FFS.*  Issue 2-1-5a: How to calculate missed ACK/NACK during CGI reading   * Proposals   + Option 1: Missed ACK/NACK is tested based on total allowed interruption during entire CGI reading, with the total number     - Option 1a: number of interrupted slots + K1     - Option 1b: 2 \* number of interrupted slots     - Option 1c: FFS   Issue 2-1-6a: Test configuration for SI-RNTI scheduling periodicity   * Proposals   + Option 1: 20ms   + Option 2: 40ms   + Option 1: 160ms   *Following issues were raised by company during 1st round comment collection*  Issue 2-1-7a: LTE power up time, as defined in 6.1.2.1.2 inter-RAT HO, 30ms is needed for LTE power up. How to capture in the spec?   * Proposals   + Option 1: In test requirement, add 30ms LTE power up time   + Option 2: In core requirement, embedded in RRC procedure delay, specifying that 15ms RRC procedure delay for intra-RAT CGI reading, additional 30ms is added for inter-RAT CGI reading.   Issue 2-1-7b: LTE power off time takes another 20ms. How to capture in the spec?   * Proposals   + Option 1: In test requirement, add 20ms LTE power off time   + Option 2: In core requirement   *Recommendations for 2nd round:*  *Further discussion and made decision for candidate options for issues 2-1-1, 2-1-2, 2-1-3, 2-1-5a, 2-1-6a, 2-1-7a and 2-1-7b.* |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |
| #2 |  |  |

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [R4-2015575](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015575.zip) | *Revised* |
| [R4-2015576](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015576.zip) | *Revised* |
| [R4-2015774](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015774.zip) | *Revised* |
| [R4-2015775](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015775.zip) | *Revised* |
| [R4-2016379](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016379.zip) | *Return to*  *Overlapped with CR 2015575 (ZTE) and R4-2015775(Huawei).*  [Nokia]: This CR included the corrections for all the related sections for NR CGI reading requirements defined in 36.133, including the overlapping CR R4-2015575 (ZTE) and R4-2015775(Huawei). |
| [R4-2014776](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2015172](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2015583](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2015776](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2016380](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |

## Discussion on 2nd round

## Summary on 2nd round

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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# Topic #3: Mandatory gap pattern

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **RRM Core requirements maintenance** | | |
| [R4-2015578](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015578.zip) | ZTE | CR to 38.133 correction to mandatory gap pattern |
| [R4-2015579](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015579.zip) | ZTE | CR to 36.133 introduce requirements for mandatory gap pattern |
| **RRM test cases** | | |
| [R4-2014228](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014228.zip) | Apple | Observation 1: gap pattern #1 and #14 are also mandatory but they are never tested.  Proposal 1: consider introducing test cases only for some of the new mandatory gap patterns, e.g. #2 and #17.  Proposal 2: introduce test applicability to allow UE to skip some existing test cases configured with gap pattern #0 or #13:   * All release 16 and later on UE are required to be tested under new test cases, in which new mandatory measurement gap patterns are configured (#2, #3 and #11 for FR1, #17, #18 and #19 for FR2 if supported) * If the new introduced test case is to verify the same RRM requirement as some existing test case in which measurement gap pattern #0 or #13 is used, then UE is only required to pass the test in which new mandatory gap pattern is configured (#2, #3, #11, #17, #18 or #19) |
| [R4-2014643](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014643.zip) | Qualcomm, Inc. | Proposal 1: New tests with identical procedure and appropriate gap and SMTC configuration can be added in addition to release 15 test. Corresponding applicability rule should be introduced: if UE passes new release 16 test, the same test (with different gap pattern and SMTC) in release 15 can be skipped.  Proposal 2: Gap pattern 2 and 17 can be added to new release 16 tests. |
| [R4-2014644](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014644.zip) | Qualcomm, Inc. | Mandatory gap pattern test |
| [R4-2015174](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015174.zip) | Ericsson | Proposal 1 : Additional testing is performed using mandatory measurement gap patterns 2,3,11, 17,18, and 19 in NR SA mode with an NR target cell  Proposal 2 : The following test case list is proposed 1. SA event triggered reporting tests for FR1 and additional gap patterns without SSB time index detection when DRX is not used  * Using GP2, GP3 and GP11  2. SA event triggered reporting tests For FR2 and additional gap patterns without SSB time index detection when DRX is not used (PCell in FR2)  * Using GP17, GP18 and GP19 |
| [R4-2015175](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015175.zip) | Ericsson | Test cases for mandatory measurement gap |
| [R4-2015582](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015582.zip) | ZTE | Proposal 1: For additional mandatory gap patterns, following test cases are specified.   |  |  |  | | --- | --- | --- | | Test No. | Test | Comment | | TC1 | SA event triggered reporting tests with additional mandatory gap pattern | PCell in FR1  Neighbor cell in FR1 | | TC2 | SA event triggered reporting tests with additional mandatory gap pattern | PCell in FR2  Neighbor cell in FR2 | |
| [R4-2015585](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015585.zip) | ZTE | Draft CR on test case for SA event triggered reporting tests with additional mandatory gap pattern |

## Open issues summary

### RRM test cases

Issue 3-1-1: Test scope and applicability

* Proposals
  + Option 1
    - Introduce test cases only for some of the new mandatory gap patterns, i.e. #2 and #17.
    - Rel-16 UE needs to pass both release 15 and release 16 tests
  + Option 2
    - All release 16 and later on UE are required to be tested under new test cases, in which new mandatory measurement gap patterns are configured (#2, #3 and #11 for FR1, #17, #18 and #19 for FR2 if supported)
    - If the new introduced test case is to verify the same RRM requirement as some existing test case in which measurement gap pattern #0 or #13 is used, then UE is only required to pass the test in which new mandatory gap pattern is configured (#2, #3, #11, #17, #18 or #19)
  + Option 3
    - Gap pattern 2 and 17 can be added to new release 16 tests
    - If UE passes new release 16 test, the same test (with different gap pattern and SMTC) in release 15 can be skipped.
  + Option 4
    - Additional testing is performed using mandatory measurement gap patterns 2,3,11, 17,18, and 19 in NR SA mode with an NR target cell
* Recommended WF:
  + Further discussion

Issue 3-1-2: New tests design for additional mandatory gap pattern

* Proposals
  + Option 1: Using existing tests for inter frequency measurement without SSB index detection and with no DRX as baseline
* Recommended WF:
  + Option 1

Issue 3-1-3: Spec structure for new tests

* Proposals
  + Option 1: Adding test cases in new clauses
  + Option 2: Incorporate new test cases into existing one.
* Recommended WF:
  + Further discussion

## Companies views’ collection for 1st round

### Open issues

Issue 3-1-1: Test scope and applicability

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| **Company** | **Comments** |
| Huawei | Support option3. Option 3 verified the mandatory gap patterns and reduce the test numbers. |
| CMCC | Prefer Option 1.  For the test cases introduced for Rel-16 mandatory measurement gap patterns, our preference is to test all the mandatory MG patterns (#2, #3 and #11 for FR1, #17, #18 and #19 for FR2), but we understand companies’ concern on the number of test cases, we can compromise to introduce test cases only for some of the new mandatory gap patterns, i.e. #2 and #17.  But for the applicability rule between Rel-15 and Rel-16, considering that longest MGL is selected in Rel-15 test cases, we are not sure whether it is a good way to skip Rel-15 test cases with long MGL if UE passes the Rel-16 test cases with short MGL. |
| Ericsson | There seems to be multiple issues covered a single topic. Firstly, since release 15 tests are already certification requirements it creates issues outside of RAN4 and even beyond RAN5 if we say that release 16 UEs do not have to pass these tests. It is totally confusing in GCF/PTCRB if suddenly a certification test for R15 no longer needs to be met in R16 because a different test is passed. It is easier to do applicability rules within a release (although even that may in future cause some confusions external to 3GPP); Moreover although the agreed GP are mandatory for NR measurements, they are still behind capability bits so we can’t say that any release 16 UE can safely skip the release 15 tests.  From a more editorial point of view, RAN5 has a quite different way of capturing different RRM tests for different releases than RAN4 does. They only maintain one release of their specification, and then write into that release which tests apply to only release 16 UEs and don’t apply to R15 (and in the future will add further releases to that). I guess it could be solved, but keep in mind that they have to describe all of this in a single spec, that covers everything from release 15 to the latest release, and there isn’t a RAN5 release 15 spec that you can go and look at if you want to test a release 15 UE.  So what we want to say here is that it is cleaner to add further coverage in R16 in a new test; removing an existing test is a quite unusual situation for the other groups that pick up our tests (and the groups that pick up their tests).  Finally there is the issue of which GP the UE needs to be tested with. We still see merit in verifying different MGRP, although this is not done in R15 gap based tests. |
| QC | We support option 3.   1. New tests in R16 with different GP are the same from functionality perspective except the GP to be tested. Even UE skips one with GP 0 and one with GP 13, R15 has many other tests covers GP 0 and 13. In order to reduce number of tests and avoid repeated tests with same functions, applicability rule should be introduced. 2. R16 should follow R15, introduce tests only for new GPs with different MGLs. |
| MTK | Prefer option 3. |
| Apple | Option 3 is in line with our proposals. Support option 3. Note that in R15 gap pattern #1 and #14 are also mandatory but they are never tested. |
| ZTE | Option 1.  According to Ericsson’s comments, it will cause confusion outside RAN4 if we go with option 3. Also we agree with CMCC there would be issues if a test is tested for Rel-15 UE but not for Rel-16 UE. |
| Nokia | Concerning which new mandatory gaps to test: Our view here that because correct use of gaps is essential for the network and system operation – including the UE – it is important to test the new mandatory GPs. Hence, we support defining test cases for gap patterns 2, 3, 11, 17, 18 and 19.  These tests would not substitute any of the existing tests for testing measurement gaps and should be new additional test cases.  We support option 4. |

Issue 3-1-2: New tests design for additional mandatory gap pattern

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| **Company** | **Comments** |
| Huawei | Support the recommended WF. |
| Ericsson | OK for the recommended WF |
| QC | Support recommended WF. |
| MTK | Agree the recommended WF. |
| Apple | Support the recommended WF. |
| ZTE | Agree with the recommended WF. |
| Nokia | We are fine with the recommended WF. |

Issue 3-1-3: Spec structure for new tests

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| **Company** | **Comments** |
| Huawei | Prefer option 2. Option 2 avoids duplications. However if option 2 has impact on RAN5, option 1 can be considered. |
| Ericsson | Closely linked with issue 3-1-1; Again based on RAN5 maintaining only a single specification it is really not possible for them if an existing RAN4 test is expanded in scope (or modified in scope) for R16 with the same test case number. It would be cleaner to test new functionalities in new testcases, or that is what they have assumed so far. I guess they can always come up with new ways of describing what is tested, like test x..y.z-r15 and test x.y.z.r16 in the same word document (where eg x.y.z.r16 includes further subtests than x.y.z.r15) but before they have done it by adding new tests that then have a sentence saying they are only for Rel-x and later UEs. It fits more easily if we also add a new test in our R16 spec and don’t modify the existing ones. |
| QC | We propose option 2, but open to discuss option 1 if option 2 may have concern from RAN5 perspective. |
| MTK | No strong view |
| Apple | We are open. |
| ZTE | Option 1 |
| Nokia | Support option 1. |

### CRs/TPs comments collection

#### RRM core requirements maintenance

**CR to TS 38.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2015578](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | Huawei: using “supportedGapPattern-NRonly-NEDC” and  “measGapPatterns-NRonly-ENDC-r16” replace the corresponding sentence is ok. However for “*supportedGapPattern-NRonly*”, it is no need to add the applicable scenario “NR SA and NR-DC”.   |  | | --- | | ***supportedGapPattern-NRonly***  Indicates measurement gap pattern(s) optionally supported by the UE for NR SA and NR-DC when the frequencies to be measured within this measurement gap are all NR frequencies. The leading / leftmost bit (bit 0) corresponds to the gap pattern 2, the next bit corresponds to the gap pattern 3 and so on. The UE shall set the bits corresponding to the measurement gap pattern 2, 3 and 11 to 1.  ***supportedGapPattern-NRonly-NEDC***  Indicates whether the UE supports gap patterns 2, 3 and 11 in NE-DC when the frequencies to be measured within this measurement gap are all NR frequencies.  ***measGapPatterns-NRonly-ENDC-r16***  This field indicates whether the UE supports gap patterns 2, 3 and 11 in (NG)EN-DC when the frequencies to be measured within this measurement gap are all NR frequencies. | |
| Ericsson : Almost all of the changes are unnecessary in our view; eg changing the abbreviation MG to measurement gap, or adding NE-DC and NR-DC; that information is already conveyed in the table title. |
| ZTE: Firstly the change is to make the statement more accurate  For UE only supporting supportedGapPattern-NRonly for any gap patterns among GP2-11, the corresponding GPs are not applicable to any measurement in this table. For UE supporting the capability of NR-only measurements with an LTE serving cell in addition to supportedGapPattern-NRonly but not supporting supportedGapPattern for any gap patterns among GP2-11, the corresponding GPs are not applicable to measurement of non-NR RATs as defined in NOTE 1.  For example, ‘For UE supporting the capability of NR only measurement with an LTE serving cell’, it could be a UE only supporting such capability under LTE SA which is not applicable here. It is clearer to indicate which UE capability and it is friendly to readers.  Secondly ‘any gap patterns’ is not correct. The UE capability with LTE serving cell is only for gap patterns 2, 3 and 11 based on 38.331.  Others would be changes to make the Note clearer and consistent. For example there are ‘gap patterns’ and ‘GPs’ being used in this single note. there would be no harm to use same wording.  We are fine with Huawei comments not to add applicable scenario for the UE capability. |
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**CR to TS 36.133**

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| **CR/TP number** | **Comments collection** |
| [R4-2015579](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | Huawei: doubt the necessity of the change. *measGapPatterns-NRonly-r16* has clear description that the to-be-measured frequencies are all NR frequencies.   |  | | --- | | *measGapPatterns-NRonly-r16*  This field indicates whether the UE supports gap patterns 2, 3 and 11 in LTE standalone when the frequencies to be measured within this measurement gap are all NR frequencies. | |
| QC: NR only GP only applies to both \*serving\* and target cells are NR, hence doesn’t apply to LTE |
| MTK: o.k. to this modification |
| ZTE:  To Huawei, Yes. The capability is clear. It is for LTE SA and target cell is NR. The change is to add this capability to applicability table for gap patterns to make it useable. It is the same requirement as in TS 38.133.  To QC, this is different UE capability and for LTE SA. It is optional capability. |
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#### RRM test cases

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| **CR/TP number** | **Comments collection** |
| [R4-2014644](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Qualcomm | Nokia: prefer additional new test (as proposed in Ericsson CR) |
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| **CR/TP number** | **Comments collection** |
| [R4-2015175](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  Ericsson | Nokia: Support this CR and the approach of defining new test cases for testing the new mandatory gap patterns. |
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| **CR/TP number** | **Comments collection** |
| [R4-2015585](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip)  ZTE | QC: What’s the difference between test 1 and 2? Seems only one case is needed |
| ZTE: To QC, Test 1 is for per UE gap UE and test 2 is for per-FR gap UE. There is statement in the test that;  If a UE supports per-FR gap and gap pattern configuration #11, it is only required to pass test 2. Otherwise it is only required to pass test 1. |
| Nokia: this CR is only testing GP 2? Otherwise adding the test as a new additional test is fine. |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic #3-1**  **RRM test cases** | *Tentative agreements:*   * Using existing tests for inter frequency measurement without SSB index detection and with no DRX as baseline   *Candidate options:*  *For Issue 3-1-1, views from companies are diverse. Further discussion is needed in the second round.*  Issue 3-1-1: Test scope and applicability   * Proposals   + Option 1 (CMCC, ZTE, Nokia)     - Introduce test cases only for some of the new mandatory gap patterns, i.e. #2 and #17.     - Rel-16 UE needs to pass both release 15 and release 16 tests   + Option 2     - All release 16 and later on UE are required to be tested under new test cases, in which new mandatory measurement gap patterns are configured (#2, #3 and #11 for FR1, #17, #18 and #19 for FR2 if supported)     - If the new introduced test case is to verify the same RRM requirement as some existing test case in which measurement gap pattern #0 or #13 is used, then UE is only required to pass the test in which new mandatory gap pattern is configured (#2, #3, #11, #17, #18 or #19)   + Option 3 (Qualcomm, Apple, MediaTek, Huawei)     - Gap pattern 2 and 17 can be added to new release 16 tests     - If UE passes new release 16 test, the same test (with different gap pattern and SMTC) in release 15 can be skipped.   + Option 4 (Ericsson, Nokia)     - Additional testing is performed using mandatory measurement gap patterns 2,3,11, 17,18, and 19 in NR SA mode with an NR target cell   *For Issue 3-1-3, it is related to outcome of Issue 3-1-1. So no need for further discussion.*  *Recommendations for 2nd round:*  *Further discussion on Issue 3-1-1 in the 2nd round. Companies are encouraged to take the comments in the 1st round into account.* |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
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| #2 |  |  |

### CRs/TPs

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [R4-2015578](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2015579](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Revised* |
| [R4-2014644](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Return to* |
| [R4-2015175](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Return to* |
| [R4-2015585](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_eBis/Docs/R4-2003966.zip) | *Return to* |

## Discussion on 2nd round

## Summary on 2nd round

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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