**3GPP TSG-RAN WG4 Meeting # 110bis R4-24xxxxx**

**Changsha, China, 15 April – 19 April, 2024**

**Agenda item:** 6.24.2 and 6.24.3

**Source:** Moderator (Huawei)

**Title:** Topic summary for [110bis][228] Netw\_Energy\_NR

**Document for:** Information

# Introduction

This topic summary includes RRM core/perf requirements for Rel-18 network energy saving (6.24.2 and 6.24.3).

**Recommended Topics to be treated online:**

Issue 3-1-1: Whether to define TC for Cell DTX

Issue 2-1-1: Test configurations for SSB-less

Issue 1-1-5: Intra-band non-contiguous CA

Issue 1-1-7: Multiple SSB-less SCells activation

Issue 1-2-1: Whether to differentiate requirements w.r.t Cell turning off.

Issue 1-1-2: QCL/TCI indication and reference Cell determination

# Topic #1: Core requirements maintenance

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2404364**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404364.zip) | Apple | **Proposal 1: For power difference conditions in SSB-less SCell activation requirement, RAN4 to keep “EPRE after pre-compensation” in the spec text.****Proposal 2: For the case of more than one QCL typeC source cells, either of following alternative can be adopted:****Alt1: if network doesn’t indicate the reference cell, UE to assume: the reference cell shall be the active serving cell who is QCL typeC with the ‘active TRS’ used for PDCCH reception at target SCell, i.e., TRS in the active TCI for PDCCH of target SCell.****Alt2: No requirement shall be applied if network doesn’t explicitly indicate the reference cell for the case of more than one QCL typeC source cells, i.e., UE expects network to indicate the reference cell for the case of more than one QCL typeC source cells.****Proposal 3: send LS to RAN2 to request the revision on existing AperiodicCSI-RS-FastScellActivation-r17 in TS38.306 for A-TRS based inter-band SSB-less SCell activation.****Proposal 4: for intra-band FR1 NCCA case, the side condition of RTD for SSB-less SCell activation shall be defined as:*** **The RTD between the target SSB-less intra-band NCCA SCell and the collocated reference serving cell is within CP where CP is corresponding to the max SCS between reference cell and target SCell.**

**Proposal 5: for intra-band FR1 NCCA case, the side condition of power imbalance for SSB-less SCell activation shall be defined as:*** **The [EPRE] difference at the UE is smaller than or equal to [6] dB, where, [EPRE] difference is the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell [after the compensation for AGC].**

**Proposal 6: if neighbor cells on carrier of SSB-less SCell have SSB transmission, the measurement for those neighbor cells shall be treated as inter-frequency measurement without MG as long as the SSBs from those neighbor cells can be contained in the active BWP of SSB-less SCell.** **Proposal 7: RAN4 to discuss the multiple SSB-less SCell activation requirement in R18 maintenance stage.****Proposal 8: if the being-activated SSB-less SCells are on intra-band contiguous CCs, to prioritize the SCell with the smallest TRS periodicity for activation, and then treat the other SCell(s) activation by reusing all the AGC and T/F information (no additional time is needed for activation), and the total delay for multiple SCell activation would still be: Tfirst\_TRS + TTRS +[5]ms.****Proposal 9: before going into the detailed discussion, RAN4 needs to double confirm internally if DCI2-9 can also indicate cell turning off.**  |
| [**R4-2404365**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404365.zip) | Apple |  **LS to RAN2 on capability for A-TRS based inter-band SSB-less SCell activation** |
| [**R4-2404374**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404374.zip) | Nokia, Nokia Shanghai Bell | **Proposal 1: The requirements for inter-band SSB-less operation apply provided that [EPRE] difference at UE side is less than [12]dB after pre-compensation for AGC.****Proposal 2: Network is expected to explicitly indicate the reference cell if there are more than one QCL-typeC source cell configured for the SSB-less SCell.** **Proposal 3: For P-TRS based SSB-less SCell activation, do not define the SCell activation delay requirement if multiple TRSs are configured in SSB-less SCell.** **Proposal 4: For FR1 intra-band non-contiguous CA, reuse the SSB-less SCell activation delay requirement defined for FR1 collocated inter-band CA with the same RTD side condition i.e. RTD within CP.****Proposal 5: Do not discuss the neighbor cell measurement on the carrier of SSB-less SCell.****Proposal 6: For the case DCI 2-X command comes after TEvent\_DU + Tidentify\_intra\_with\_index, the NES-based CHO shall be executed only if the condition of NES-based CHO is met when receiving the DCI 2-X command.****Proposal 7: RAN4 to wait for RAN2 conclusion and decides if defining the handover delay requirement if the CHO condition is not met when receiving the DCI 2-X command.**  |
| [**R4-2404375**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404375.zip) | Nokia, Nokia Shanghai Bell | **38.133 CR on handover delays for NES-based CHO** |
| [**R4-2404685**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404685.zip) | CMCC | **Proposal 1: Keep the“EPRE after pre-compensation for AGC” in the spec text.****Proposal 2: Define two sets of requirement and side condition, reuse the intra-band contiguous CA case and inter-band CA case respectively.****Proposal 3: Define two UE capabilities for intra-band NCCA scenario, which corresponding to two set of requirements respectively, the granularity could be per FS indication.****Proposal 4: For the case of the neighbour cell(s) is on the carrier of SSB-less SCell and the SSB from neighbour cell(s) can be contained in the active BWP of SSB-less SCell, the measurement for such neighbour cell(s) can be treated as intra-frequency measurement.****Proposal 5: Support to further study the multiple SSB-less SCells case. The side condition from single SSB-less SCell case can be reused, the requirement could be defined as:****If all to-be activated SSB-less SCells are operated in intra-band contiguous CCs:****- Tfirst\_TRS\_MIN\_multiple\_scells + TTRS\_MIN\_multiple\_scells +5 ms, [if aperiodic CSI-RS resources are not configured for SCell activation for all SSB-less SCells or UE do not support [ATRS based SSB-less operation]]****- Tfirst\_ATRS\_MIN\_multiple\_scells + Tgap + TATRS\_MIN\_multiple\_scells + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for all SSB-less SCells and UE supporting [ATRS based SSB-less operation]]****- min(Tfirst\_TRS\_MIN\_multiple\_scells + TTRS\_MIN\_multiple\_scells, Tfirst\_ATRS\_MIN\_multiple\_scells + Tgap + TATRS\_MIN\_multiple\_scells ) + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for part of SSB-less SCells and UE supporting [ATRS based SSB-less operation]]****Otherwise:****- Tfirst\_TRS\_MAX\_multiple\_scells + TTRS\_MAX\_multiple\_scells +5 ms, [if aperiodic CSI-RS resources are not configured for SCell activation for all SSB-less SCells or UE do not support [ATRS based SSB-less operation]]****- Tfirst\_ATRS\_MAX\_multiple\_scells + Tgap + TATRS\_MAX\_multiple\_scells + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for all SSB-less SCells and UE supporting [ATRS based SSB-less operation]]****- max(Tfirst\_TRS\_MAX\_multiple\_scells + TTRS\_MAX\_multiple\_scells, Tfirst\_ATRS\_MAX\_multiple\_scells + Tgap + TATRS\_MAX\_multiple\_scells ) + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for part of SSB-less SCells and UE supporting [ATRS based SSB-less operation]]****Proposal 6: Before going into the detailed discussion, RAN4 needs to double confirm whether DCI 2-9 could indicate the cell turning off and how does DCI 2-9 indicate the cell turning off.****Proposal 7: Capture the scenario that CHO condition is not fulfilled anymore when receiving the DCI 2-9 into the spec by using following revised content:****TEvent\_DU is the delay uncertainty which is the time from when the UE successfully decodes a conditional handover command until** **- a condition exists at the measurement reference point which will trigger the conditional handover, or** **- a condition exists at the measurement reference point when later than UE successfully decodes DCI 2-9 command or not earlier than Tidentify before UE successfully decodes DCI 2-9 which will trigger the NES-based conditional handover**  |
| [**R4-2404738**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404738.zip) | Intel Corporation | **Proposal 1: Activation requirements specified for inter-band CA SSB-less SCell also apply to intra-band non-contiguous CA SSB-less SCell activation.****Proposal 2: Introduce the optional with capability signalling with per FS granularity for UE supporting intra-band NCCA SSB-less SCell operation in Rel-18.**  |
| [**R4-2404739**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404739.zip) | Intel Corporation | **DraftCR on intra-band NCCA SSB-less Scell activation** |
| [**R4-2404769**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404769.zip) | ZTE Corporation | **Proposal 1: To keep the “EPRE after pre-compensation” in the spec.****Proposal 2: For the case of more than one QCLtypeC source cells, UE is not expected to handle the scenario that: 1) If there are more than one QCL-typeC source cells and 2) the Rel-18 network indication is not provided.****Proposal 3: If the SSB of neighbour cell is fully contained by the active BWP of the SSB-less SCell, the SSB based neighbour cell measurment is defined as intra-frequency measurement, and no gap is needed. Otherwise, the SSB based neighbour cell measurement is defined as inter-frequency measurement and gap is needed.****Proposal 4:The delay requirements of SSB-less SCell activation for intra-band non-contiguous CA can be same as that for legacy intra-band contiguous CA provided the UE impelmentation architecture are same for the two scenarios. The exact side conditions for intra-band non-contiguous CA can be further discussed.** |
| [**R4-2404808**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404808.zip) | Huawei, HiSilicon | **Proposal 1: Keep the current description of “after the compensation for AGC” as it is.****Proposal 2: No requirement is applied for the case of more than one QCLtypeC source cells and without Rel-18 network indication in Rel-18.****Proposal 3: No need to further discuss on neighbor cells on carrier of SSB-less SCell in R18 inter-band SSB less.****Proposal 4: For FR1 intra-band NCCA with SSB-less operation, EPRE difference at UE side shall be NOT larger than 6dB.****Proposal 5: For FR1 intra-band NCCA with SSB-less operation, RTD between the target SCell and the intra-band NCCA collocated reference serving cell can be within CP.****Proposal 6: No need to further discuss UE behavior/requirements for NES-based CHO with respect to Cell switch off.****Proposal 7: Whether the event is fulfilled or not when the condition changed shall follow RAN2 specification.** |
| [**R4-2404809**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404809.zip) | Huawei, HiSilicon | **CR on SCell activation/deactivation requirements for inter-band SSB-less** |
| [**R4-2404853**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404853.zip) | China Telecom | **Proposal 1: Keep“EPRE after pre-compensation for AGC” in the spec text.** |
| [**R4-2404973**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404973.zip) | Ericsson | **Proposal 1: RAN4 to agree that the EPRE should be defined as the power per RE at the antenna connector as averaged over the respective SSB and TRS bandwidth and then normalized to the SCS.****Proposal 2: RAN4 to agree that EPRE side condition for reference cell and SSB-less SCell as [12 dB].****Proposal 3: When a reference cell indication is not provided by the NW and multiple QCL type-C source cells are active, UE shall select the cell which has highest signal quality such as L1/L3-RSRP as default cell.****Proposal 4: Two options to solve the cell switch off issue in RAN4 are:*** **When NES CHO condition is met before the DCI indication, UE shall execute the handover immediately after receiving the DCI indication.**
* **When NES CHO condition is met after the DCI indication, UE shall perform measurement based on SMTC only once receiving the DCI indication.**

**Proposal 5: When UE has received NES CHO configuration and a candidate cell fulfils the NES CHO condition, but the candidate cell no longer filfills the NES CHO condition when NES enabled DCI indicatated, UE shall continue the measurement and evaluation and is not allowed to handover to the original candidate cell if it doesn’t meet the NES CHO condition.****Proposal 6: RAN4 to study UE behaviour when serving cell will switch off but the handover channel condition hasn’t met.** |
| [**R4-2404975**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404975.zip) | Ericsson | **draft CR to 38.133 Draft CR on NES CHO** |
| [**R4-2405109**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405109.zip) | vivo | **Proposal 1: Clarify the agreements from last meeting as:*** **For each band within the BC, UE indicates if it supports the SSB-less operation between this band and any other band(s) in the BC**
* **If the UE indicates “support” for any band in a CA band combination, this band can be configured as the reference band while all other band(s) within the BC can be configured as SSB-less band(s), or configured as an SSB-less band if any other band within the BC is configured as the reference band.**
* **If the UE indicates support of inter-band SSB-less SCell operation between two bands within the BC by scellWithoutSSB-InterBandCA-r18, the UE also supports inter-band SSB-less SCell operation between these two bands contained in any of its parent BC.**

**Proposal 2: If RAN2 discussion on detailed UE capabilities design is not triggered in this meeting, an LS to RAN2 enclosing RAN4 agreements is preferred.****Proposal 3: RAN4 to suspend the discussion on RRM impact on cell switching off case unless RAN2 agrees to introduce certain procedure and specify UE behaviour for this case****Proposal 4: RAN4 not to define RRM requirements on the case that the CHO condition has been met but is not any more fulfilled when receiving the DCI 2-X command.** |
| [**R4-2405724**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405724.zip) | Qualcomm Incorporated | **Proposal: RAN4 will not consider SSBless SCell operation for intra-band NCCA in R18.** **Proposal : Remove “[after the compensation for AGC]” in spec****Proposal : RAN4 will not consider multiple QCL source cell scenario.**  |
| [**R4-2405725**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405725.zip) | Qualcomm Incorporated | **CR on R18 NES core requirements** |
| [**R4-2405436**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405436.zip) | MediaTek inc. | Proposal 1: No need to further clarify EPRE comparison whether it is performed after AGC. No need to capture in spec. (Option 2). |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 SSB-less related

**Issue 1-1-1: Power difference conditions**

*Background*

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| ***RAN4#109 R4-2321562*****Online session (Thursday Nov 16, 2023)**Agreement:* + The requirements apply provided that [EPRE] difference at UE side is less than [9] dB.
		- EPRE difference is based on power difference between TRS symbol on SSB-less SCell and SSB symbol on reference cell
		- Capture in the WF that RAN4 assumes that UE carries out pre-compensation for AGC considering [BW difference and carrier frequency difference].

Further discuss whether/how to capture the EPRE after pre-compensation in the spec.***RAN4#110 R4-2403526*****Issue 1-1-1: Power difference conditions** * Proposals
	+ Option 1: keep “EPRE after pre-compensation for AGC” in the spec text. (Apple, Ericsson, Huawei, Nokia, Vivo, ZTE)
		- Option 1a: RAN4 to agree that EPRE side condition for reference cell and SSB less SCell as [12] dB. (Ericsson, Nokia)
		- Option 1b: RAN4 to agree that the EPRE should be defined as the power per RE at the antenna connector as averaged over the respective SSB and TRS bandwidth and then normalized to the SCS. (Ericsson)
		- Option 1c: The EPRE difference at UE side is smaller than or equal to [9] dB, where, EPRE difference is the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell*, which excludes the uncertainty of power difference that caused by non-ideal UE compensation for AGC considering BW difference and carrier frequency difference between SSB-less SCell and the reference serving cell*. (Vivo)
		- Option 1d: The side condition of power difference can be captured as “post-power difference”, which is interpreted as the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell after the compensation for AGC. (ZTE)
	+ Option 2: No need to further clarify EPRE comparison whether it is performed after AGC. No need to capture in spec. (QC)
 |

* Proposals
	+ Option 1: keep “EPRE after pre-compensation for AGC” in the spec text. (Apple, Nokia, CMCC, ZTE, Huawei, CTC, Ericsson)
		- Option 1a: RAN4 to agree that EPRE side condition for reference cell and SSB less SCell as [12] dB. (Ericsson, Nokia)
		- Option 1b: RAN4 to agree that the EPRE should be defined as the power per RE at the antenna connector as averaged over the respective SSB and TRS bandwidth and then normalized to the SCS. (Ericsson)
	+ Option 2: Remove “after pre-compensation for AGC”. (QC, MTK)
* Moderator: Majority (7/9) supports keep the EPRE after per-compensation with different proposals on how to descript the pre-compensation.
* Recommended WF:
	+ Keep “after the compensation for AGC” in the spec
	+ Discuss whether to extend 9dB to 12dB.
	+ Discuss whether EPRE is normalized to the SCS.
	+ Detailed wording to be discussed in the CR.

**Issue 1-1-2: QCL/TCI indication and reference Cell determination**

*For* ***TCI/QCL assumptions and reference Cell determination****, following agreements were reached in RAN4#109 R4-2321562*

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| **Online session (Tuesday Nov 14, 2023)**Agreement:QCL/TCI indication (as side condition for the requirement)RS of SCell without SSB is QCL-A with TRS of the SCell without SSB, and the TRS(s) of the SCell is (are) further QCL-TypeC with SSB(s) of an inter-band active serving cell, and the inter-band active serving cell shall be same as the reference cell.**Online session (Tuesday Nov 14, 2023)**Agreement: * For the case of one active QCLtypeC source cell, QCLtypeC source cell shall be the reference cell if the Rel-18 network indication is not provided.

Under the following contion:* RS of SCell without SSB is QCL-A with TRS of the SCell without SSB, and the TRS(s) of the SCell is (are) further QCL-TypeC with SSB(s) of an inter-band active serving cell, and the inter-band active serving cell shall be same as the reference cell.
* For the case of more than one QCLtypeC source cells
	1. Option 1: UE is not expected to handle the scenario that: 1) If there are more than one QCL source cells and 2) the Rel-18 network indication is not provided.
	2. Option 2: up to UE to decide
	3. Option 3: No requirement is applied for the case of more than one QCLtypeC source cells and without Rel-18 network indication in Rel-18.

Other option is not precluded. |

* Proposals
	+ Option 1: RAN4 will not consider multiple QCL source cell scenario (QC)
	+ Option 2: No requirement is applied for the case of more than one QCLtypeC source cells and without Rel-18 network indication. (Apple, Huawei, Nokia, ZTE)
		- Option 2a: Network is expected to explicitly indicate the reference cell if there are more than one QCL-typeC source cell configured for the SSB-less SCell. (Nokia)
	+ Option 3: For more than one QCL typeC source Cells without network indicated reference Cell: (Apple, Ericsson)
		- Option 3a: The reference cell shall be the active serving cell who is QCL typeC with the ‘active TRS’ used for PDCCH reception at target SCell, i.e., TRS in the active TCI for PDCCH of target SCell. (Apple)
		- Option 3b: When reference cell is not provided and multiple QCL type-C source cells are active, UE shall select cell which has highest signal quality such as L1/L3-RSRP as default cell. (Ericsson)
* Moderator: 1 company support not to consider the case at all when there are more than one QCL source Cells. 4 companies support no requirements when there is no network indicate. 2 companies support to determine the reference Cell by UE itself with additional rules. It seems option 2 could be the middle ground.
* Recommended WF:
	+ No requirement is applied for the case of more than one QCLtypeC source cells and without Rel-18 network indication.

**Issue 1-1-3: Requirements applicability when multiple P-TRS are configured.**

* Proposals
	+ Option 1: For P-TRS based SSB-less SCell activation, do not define the SCell activation delay requirement if multiple TRSs are configured in SSB-less SCell. (Nokia)
* Recommended WF:
	+ Discuss above issue.

**Issue 1-1-4: UE capability related**

* Proposals
	+ Option 1: Send LS to RAN2 to request the revision on existing AperiodicCSI-RS-FastScellActivation-r17 in TS38.306 for A-TRS based inter-band SSB-less SCell activation. (Apple)
	+ Option 2: Clarify the agreements from last meeting as: (Vivo)
		- For each band within the BC, UE indicates if it supports the SSB-less operation between this band and any other band(s) in the BC
		- If the UE indicates “support” for any band in a CA band combination, this band can be configured as the reference band while all other band(s) within the BC can be configured as SSB-less band(s), or configured as an SSB-less band if any other band within the BC is configured as the reference band.
		- If the UE indicates support of inter-band SSB-less SCell operation between two bands within the BC by scellWithoutSSB-InterBandCA-r18, the UE also supports inter-band SSB-less SCell operation between these two bands contained in any of its parent BC.
	+ If RAN2 discussion on detailed UE capabilities design is not triggered in this meeting, an LS to RAN2 enclosing RAN4 agreements is preferred.
* Recommended WF:
	+ Discuss whether to send LS to RAN2 about clarification on R17 existing AperiodicCSI-RS-FastScellActivation-r17
	+ Discuss whether to clarify and agreements and send LS to RAN2 about the UE capability for inter-band SSB-less operation.

**Issue 1-1-5: Intra-band non-contiguous CA**

*Background*

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| ***RAN4#110 R4-2403526*****Issue 1-3-1: Intra-band NCCA**Agreement:Regarding FR1 intra-band NCCA with SSB-less operation, further study whether we can reuse or not the SSB-less activation delay requirement specified for FR1 inter-band CA.The study does not impact the completion timeline of the WI.  |

* Proposals
	+ Option 1 For FR1 intra-band non-contiguous CA, reuse the SSB-less SCell activation delay requirement defined for FR1 collocated inter-band CA with the same RTD side condition i.e. RTD within CP (Nokia, Intel)
		- Option 1a: Introduce the optional with capability signalling with per FS granularity for UE supporting intra-band NCCA SSB-less SCell operation in Rel-18. (Intel)
	+ Option 2: The delay requirements of SSB-less SCell activation for intra-band non-contiguous CA can be same as that for legacy intra-band contiguous CA provided the UE impelmentation architecture are same for the two scenarios. The exact side conditions for intra-band non-contiguous CA can be further discussed. (ZTE)
	+ Option 3: RAN4 will not consider SSBless SCell operation for intra-band NCCA in R18. (QC)
	+ Option 4: (Apple, Huawei)
		- For FR1 intra-band NCCA with SSB-less operation, EPRE difference at UE side shall be NOT larger than 6dB
		- For FR1 intra-band NCCA with SSB-less operation, RTD between the target SCell and the intra-band NCCA collocated reference serving cell can be within CP
	+ Option 5: (CMCC)
		- Define two sets of requirement and side condition, reuse the intra-band contiguous CA case and inter-band CA case respectively.
		- Define two UE capabilities for intra-band NCCA scenario, which corresponding to two set of requirements respectively, the granularity could be per FS indication
* Recommended WF:
	+ Discuss above issue in this meeting.

**Issue 1-1-6: Neighbour cells on carrier of SSB-less SCell**

* Proposals
	+ Option 1: If neighbor cells on carrier of SSB-less SCell have SSB transmission, the measurement for those neighbor cells shall be treated as inter-frequency measurement without MG as long as the SSBs from those neighbor cells can be contained in the active BWP of SSB-less SCell (Apple)
	+ Option 2: For the case of the neighbour cell(s) is on the carrier of SSB-less SCell and the SSB from neighbour cell(s) can be contained in the active BWP of SSB-less SCell, the measurement for such neighbour cell(s) can be treated as intra-frequency measurement. (CMCC, ZTE)
	+ Option 3: Do not discuss the neighbor cell measurement on the carrier of SSB-less SCell. (Nokia, Huawei)
* Recommended WF:
	+ Discuss above issue in this meeting.

**Issue 1-1-7: Multiple SSB-less SCells activation**

* Proposals
	+ Option 1: RAN4 to discuss the multiple SSB-less SCell activation requirement in R18 maintenance stage (Apple, CMCC)
		- Option 1a: If the being-activated SSB-less SCells are on intra-band contiguous CCs, to prioritize the SCell with the smallest TRS periodicity for activation, and then treat the other SCell(s) activation by reusing all the AGC and T/F information (no additional time is needed for activation), and the total delay for multiple SCell activation would still be: Tfirst\_TRS + TTRS +[5]ms. (Apple)
		- Option 1b: (CMCC)

If all to-be activated SSB-less SCells are operated in intra-band contiguous CCs:

- Tfirst\_TRS\_MIN\_multiple\_scells + TTRS\_MIN\_multiple\_scells +5 ms, [if aperiodic CSI-RS resources are not configured for SCell activation for all SSB-less SCells or UE do not support [ATRS based SSB-less operation]]

- Tfirst\_ATRS\_MIN\_multiple\_scells + Tgap + TATRS\_MIN\_multiple\_scells + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for all SSB-less SCells and UE supporting [ATRS based SSB-less operation]]

- min(Tfirst\_TRS\_MIN\_multiple\_scells + TTRS\_MIN\_multiple\_scells, Tfirst\_ATRS\_MIN\_multiple\_scells + Tgap + TATRS\_MIN\_multiple\_scells ) + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for part of SSB-less SCells and UE supporting [ATRS based SSB-less operation]]

Otherwise:

- Tfirst\_TRS\_MAX\_multiple\_scells + TTRS\_MAX\_multiple\_scells +5 ms, [if aperiodic CSI-RS resources are not configured for SCell activation for all SSB-less SCells or UE do not support [ATRS based SSB-less operation]]

- Tfirst\_ATRS\_MAX\_multiple\_scells + Tgap + TATRS\_MAX\_multiple\_scells + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for all SSB-less SCells and UE supporting [ATRS based SSB-less operation]]

- max(Tfirst\_TRS\_MAX\_multiple\_scells + TTRS\_MAX\_multiple\_scells, Tfirst\_ATRS\_MAX\_multiple\_scells + Tgap + TATRS\_MAX\_multiple\_scells ) + 5 ms [if aperiodic CSI-RS resources are configured for Scell activation for part of SSB-less SCells and UE supporting [ATRS based SSB-less operation]]

* Recommended WF:
	+ Discuss Multiple SSB-less SCell activation requirements in maintenance stage, and considering following cases:
		- When to-be-activated SSB-less SCells are in different bands
			* Exiting single CC requirement can apply to each to-be-activated SSB-less SCells respectively.
		- FFS whether to define requirements when to-be-activated SSB-less SCells are on intra-band contiguous CA.

### Sub-topic 1-2 NES-based CHO related

**Issue 1-2-1: Whether to differentiate requirements wrt Cell turning off.**

* Proposals
	+ Option 1: before going into the detailed discussion, RAN4 needs to double confirm internally if DCI2-9 can also indicate cell turning off (Apple, CMCC)
		- Option 1: if DCI2-9 can also imply cell turning off, after receiving the DCI2-9 during CHO, UE may stop or relax L1 measurement on current serving cell as well as triggering the neighbor cell measurement based on measurement objects regardless of serving cell quality. (Apple)
	+ Option 2: No need to further discuss UE behavior/requirements for NES-based CHO with respect to Cell switch off. (Huawei, Vivo)
		- Option 2a: RAN4 to suspend the discussion on RRM impact on cell switching off case unless RAN2 agrees to introduce certain procedure and specify UE behaviour for this case (Vivo)
	+ Option 3: (Ericsson)

Two options to solve the cell switch off issue in RAN4 are:

* + - When NES CHO condition is met before the DCI indication, UE shall execute the handover immediately after receiving the DCI indication.
		- When NES CHO condition is met after the DCI indication, UE shall perform measurement based on SMTC only once receiving the DCI indication.
	+ Option 4: RAN4 to study UE behaviour when serving cell will switch off but the handover channel condition hasn’t met (Ericsson)
* Moderator: Majority companies (4/5) have concerns on whether there is explicit indication/procedure for “Cell turning off”. Companies are encouraged to check this internally in this meeting.
* Recommended WF:
	+ RAN4 will not discuss cell switching off specific requirements/behaviour unless there is new agreement from working group which can explicitly indicate “cell turning off”.

**Issue 1-2-2: When CHO condition is not met anymore**

* Proposals
	+ Option 1: For the case DCI 2-X command comes after TEvent\_DU + Tidentify\_intra\_with\_index, the NES-based CHO shall be executed only if the condition of NES-based CHO is met when receiving the DCI 2-X command
		- Option 1a:
		- Capture the scenario that CHO condition is not fulfilled anymore when receiving the DCI 2-9 into the spec by using following revised content:
		- TEvent\_DU is the delay uncertainty which is the time from when the UE successfully decodes a conditional handover command until
			* - a condition exists at the measurement reference point which will trigger the conditional handover, or
			* - a condition exists at the measurement reference point when later than UE successfully decodes DCI 2-9 command or not earlier than Tidentify before UE successfully decodes DCI 2-9 which will trigger the NES-based conditional handover
	+ Option 2: RAN4 to wait for RAN2 conclusion and decides if defining the handover delay requirement if the CHO condition is not met when receiving the DCI 2-X command.
	+ Option 3: Whether the event is fulfilled or not when the condition changed shall follow RAN2 specification. (Huawei)
	+ Option 4: When UE has received NES CHO configuration and a candidate cell fulfils the NES CHO condition, but the candidate cell no longer filfills the NES CHO condition when NES enabled DCI indicatated, UE shall continue the measurement and evaluation and is not allowed to handover to the original candidate cell if it doesn’t meet the NES CHO condition. (Ericsson)
	+ Option 5: RAN4 not to define RRM requirements on the case that the CHO condition has been met but is not any more fulfilled when receiving the DCI 2-X command (Vivo)
* Recommended WF:
	+ Check whether following is the common understanding and whether it is agreeable:
		- For the case DCI 2-9 command is received after CHO condition is met, the requirements apply provided that the CHO condition is still met when DCI 2-9 command is received.

### CR handling

Discuss following CR during the meeting.

**CR for SSB-less operation**

|  |  |  |
| --- | --- | --- |
| R4-2404739 | Intel Corporation | Change#1 Add intra-band NCCA in existing Inter-band requirementsFor a UE supporting [*scellWithoutSSB-interband*] or [*scellWithoutSSB-NCCA*], if the SCell being activated belongs to FR1 and if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) in the target Scell (FrequencyInfoDL) nor SMTC configuration for the target Scell, and if there is one collocated active reference serving cell on a different FR1 band or on a non-contiguous carrier in the same band, when the following conditions are fulfilled,- The RTD between the target SCell and the collocated reference serving cell is within CP where CP is corresponding to the SCS of SSB-less SCell, and - The [EPRE] difference at the UE is smaller than or equal to [9] dB, where, [EPRE] difference is the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell [after the compensation for AGC], and- The RS(s) of the SSB-less SCell being activated is (are) QCL-TypeA with TRS(s) of the SSB-less SCell being activated, and the TRS(s) of the SSB-less SCell being activated is (are) further QCL-TypeC with SSB(s) of an inter-band or intra-band non-contiguous active serving cell, and the inter-band or intra-band non-contiguous active serving cell shall be same as the reference serving cell. |
| R4-2404809 | Huawei, HiSilicon | Change#1 Change#2 |
| R4-2405725 | Qualcomm Incorporated | Change#1 The [EPRE] difference at the UE is smaller than or equal to [9] dB, where, [EPRE] difference is the power difference between TRS/A-TRS symbol on the SSB-less SCell and SSB symbol on the reference serving cell, andChange#2Change#3 |

**CR for NES-based CHO**

|  |  |  |
| --- | --- | --- |
| R4-2404375 | Nokia, Nokia Shanghai Bell | Change#1  If UE successfully decodes DCI 2-9 command later than the time at the end of TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, and the condition of NES-based CHO is met when receiving the DCI 2-9 command, then the measurement time delay equals to the time from the end of Tevent\_DU until UE successfully decodes DCI 2-9 command.- FFS if UE successfully decodes DCI 2-X command later than TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index and the condition of NES-based CHO is not met when receiving the DCI 2-9 command.Change#2  |
| R4-2404975 | Ericsson | Change#1 - If UE successfully decodes DCI 2-9 command earlier than the time at the end of TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, then the measurement time delay shall be less than Tidentify\_intra\_with\_index or Tidentify\_intra\_without\_index- If UE successfully decodes DCI 2-9 command later than the time at the end of TEvent\_DU + Tidentify\_intra\_with\_index or TEvent\_DU + Tidentify\_intra\_without\_index, then the measurement time delay shall be less than the time from the end of Tevent\_DU until UE successfully decodes DCI 2-9 command. Change#2 - Tidentify\_intra\_with\_index and Tidentify\_intra\_without\_index refers on the requirement based on the condition of no DRX, no measurement gap and CSSF =1.Change#3 When UE successfully decodes DCI 2-9 command, the UE shall execute the measurements of all candidate cells indicated by the serving cell within [1]s, regardless of the measurement rules and configurations currently limiting UE measurement activities. Change#4 Change#5 Change#6When TTT or L3 filtering is used an additional delay can be expected for conditional handover only. |
| R4-2405725 | Qualcomm Incorporated | Change#1 When UE receives a RRC message implying NES-based conditional handover but no NES indication in DCI 2-9 command, no NES-based conditional handover requirement is applied. Change#2 The NES indication is specified in clause [5.5.4] in TS 38.331[2]. |

# Topic #2: Perf: Performance part for NES – SSB-less

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2404376**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404376.zip) | Nokia, Nokia Shanghai Bell | **Proposal 1: Test cases shall be defined to verify the SCell activation delay for SSB-less SCell, assuming side conditions are all fulfilled.** **Proposal 2: Single TRS is configured in SSB-less SCell at least in the TRS-based SSB-less SCell activation TCs.** |
| [**R4-2404378**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404378.zip) | Nokia, Nokia Shanghai Bell | **draftCR on TC1-3 for TRS-based SSB-less SCell activation** |
| [**R4-2404686**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404686.zip) | CMCC | **Proposal 1: Generally, guarantee the RTD<=CP corresponding to the SCS of SSB-less Cell. Specifically, consider timing offset from Cell 2 to Cell 1 as 4µs for SCell 15kHz SCS and 2µs for SCell 30kHz SCS.****Proposal 2: Set EPRE difference as [9 dB] + ΔPL in the test cases, where ΔPL is the pathloss difference caused by frequency difference between two Cells.****Proposal 3: The TCI.State.2 could be used for the RS(s) of the SSB-less SCell.** **Proposal 4: The TCI.State.0 could be used for the TRS of the SSB-less SCell with an additional note that the reference signal is SSB0 from PCell.****Proposal 5: Don’t configure the parameter SCell measurement cycle (measCycleSCell), SSB configuration and SMTC configuration for SSB-less SCell.** |
| [**R4-2404854**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404854.zip) | China Telecom | **Proposal 1: RTD for the test cases can be defined with RTD<=CP corresponding to the SCS of SSB-less SCell.****Proposal 2: Power difference for the test cases can be defined as smaller than or equal to [9] dB between SSB-less SCell and reference serving cell.** |
| [**R4-2405007**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405007.zip) | Huawei, HiSilicon | **Proposal 1: The RTD for SSB-less TC is configured as the length of CP corresponding to the SCS of SSB-less Cell****Proposal 2: The EPRE difference between the reference Cell and SSB-less Cell is configured as 9 dB + ΔPL in the test cases, where ΔPL is the pathloss difference caused by frequency difference between two Cells (i.e. PLRef - PLSSB-less ).** **Observation 1: The SSB configuration and SMTC configuration of the target SCell is not provided.****Observation 2: The reference Cell is explicitly indicated via referenceCell when the reference Cell is the PCell/PSCell for test in NR SA/EN-DC.****Observation 3: The SSB indicated in referenceSignal in the TCI state shall be the one from the reference Cell.** |
| [**R4-2405008**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405008.zip) | Huawei, HiSilicon | **Draft CR on TC for SSB-less SCell activation** |
| [**R4-2405368**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405368.zip) | vivo | **Proposal 1 Following legacy test cases for SCell activation, the power difference between PCC and SCC are set by Noc and the Es/IoT. The same as legacy, almost 0dB power difference between PCC and SCC is preferred.****Proposal 2 For SSB-less SCell, calculate TRS\_RP instead of SSB\_RSRP in the test case parameters.****Proposal 3 Update Table A.3.16.2-1 to also include cross-carrier TCI state definition.** **Proposal 4 Clarify the TCI of the TRS/A-TRS in the test cases for SSB-less SCell operation.** |
| [**R4-2405784**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405784.zip) | Ericsson | **draft CR to 38.133 on TC for A-TRS based inter-band SSB-less Scell activation delay for EN-DC** |
| [**R4-2404777**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404777.zip) | ZTE Corporation | **[Netw\_Energy\_NR-Perf] Draft CR on TC of TRS based inter-band SSB-less SCell activation delay** |
| [**R4-2405437**](https://urldefense.com/v3/__https%3A/www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405437.zip__;!!CTRNKA9wMg0ARbw!hhT4AIFdEbj7jZ9nculE-ZZGuVKwPbqI67ZL2b4TBjboeWl6naxxttUvkU2UjHPR6-9_bYoEo4wZO8IroYg4WT-zcQ$) | MediaTek Inc. | **Proposal 1:** **Configure the target inter-band SSB-less SCell to have a power level that is [< 9 dB] higher than that of the PCell and use an AWGN channel for the setup.** |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1 Performance part related to SSB-less

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-1-1: Test configurations for SSB-less**

* TRS
	+ Option 1: Single TRS is configured in SSB-less SCell at least in the TRS-based SSB-less SCell activation TCs. (Nokia)
* Timing offset:
	+ Option 1: Timing offset from Cell 2 to Cell 1 as 4µs for SCell 15kHz SCS and 2µs for SCell 30kHz SCS. (CMCC)
	+ Option 2: The RTD for SSB-less TC is configured as the length of CP corresponding to the SCS of SSB-less Cell. (Huawei, CTC)
* EPRE difference:
	+ Option 1: Set EPRE difference as [9 dB] + ΔPL in the test cases, where ΔPL is the pathloss difference caused by frequency difference between two Cells. (CMCC, Huawei)
	+ Option 2: Power difference for the test cases can be defined as smaller than or equal to [9] dB between SSB-less SCell and reference serving cell. (CTC)
		- Option 2a:Configure the target inter-band SSB-less SCell to have a power level that is [< 9 dB] higher than that of the PCell and use an AWGN channel for the setup. (MTK)
	+ Option 3: Power difference between PCC and SCC are set by Noc and the Es/IoT. The same as legacy, almost 0dB power difference between PCC and SCC is preferred (Vivo)
	+ Option 4: For SSB-less SCell, calculate TRS\_RP instead of SSB\_RSRP in the test case parameters. (Vivo)
* TCI configurations:
	+ Option 1: The TCI.State.2 could be used for the RS(s) of the SSB-less SCell. (CMCC)
	+ Option 2: The TCI.State.0 could be used for the TRS of the SSB-less SCell with an additional note that the reference signal is SSB0 from PCell
	+ Option 3: Update Table A.3.16.2-1 to also include cross-carrier TCI state definition.



* + Option 4: Clarify the TCI of the TRS/A-TRS in the test cases for SSB-less SCell operation.
* Other configurations
	+ Option 1: Don’t configure the parameter SCell measurement cycle (measCycleSCell), SSB configuration and SMTC configuration for SSB-less SCell. (CMCC)
	+ Option 2: Test cases shall be defined to verify the SCell activation delay for SSB-less SCell, assuming side conditions are all fulfilled. (Nokia)
* Recommended WF:
	+ Single TRS is configured in SSB-less SCell at least in the TRS-based SSB-less SCell activation TCs
	+ Don’t configure the parameter SCell measurement cycle (measCycleSCell), SSB configuration and SMTC configuration for SSB-less SCell
	+ FFS following issues in the meeting
		- Timing offset
		- EPRE difference
		- TCI configuration

### Sub-topic 2-2 CR handling

Discuss following CRs during the meeting.

|  |  |  |
| --- | --- | --- |
| 1-1 NR-SA TRS |  ZTE | R4-2404777 |
| 1-2 NR-SA A-TRS | Huawei | R4-2405008 |
| 1-3 EN-DC TRS | Nokia | R4-2404378 |
| 1-4 EN-DC A-TRS | Ericsson | R4-2405784 |

# Topic #3: Perf: Performance part for NES – Others

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2404366**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404366.zip) | Apple | **(Netw\_Energy\_NR-Perf) test case of NES triggered inter-frequency CHO from FR1 to FR1** |
| [**R4-2404377**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404377.zip) | Nokia, Nokia Shanghai Bell | **Proposal 1: Define at least one test case for Cell DTX/DRX.****Proposal 2: Define a test case for intra-frequency measurement with Cell DTX e.g. SA event triggered reporting test without gap under non-DRX and Cell DTX.****Proposal 3: Test cases shall be defined to verify the handover delay for NES-based conditional handover for the two cases where the DCI 2-X command comes before and after TEvent\_DU + Tidentify\_intra\_with\_index.** |
| [**R4-2404687**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404687.zip) | CMCC | **Proposal 1: For the test case of DCI occurs earlier than TEvent\_DU + Tidentify, two time duration T1 and T2 should be covered*** **At the start of time duration T1, the UE may not have any timing information of cell 2,**
* **During T1, NR shall configure the NES-based condition implying handover to cell 2 firstly, and then configure DCI 2-9 with NES-mode indication.**
	+ **one conditional execution condition with condEventA3 should be configured in the RRC signaling, that nesEvent set as true and A3-offset set as [0]dB.**
* **During the T1, the NES condition can not be fulfilled, T1 Duration should longer than TRRC.**
* **At the start of T2, the NES condition can be fulfilled.**

**Proposal 2: For the case of DCI occurs later than TEvent\_DU + Tidentify, two time duration T1 and T2 should be covered*** **At the start of time duration T1, the UE have timing information of cell 2, NR shall configure the condition implying handover to cell 2.**
	+ **two conditional execution condition with condEventA3 should be configured in the RRC signaling. One is legacy condition with A3-offset set as [4]dB, the other is NES condition with nesEvent set as true and A3-offset set as [0]dB.**
* **During the T1, the legacy condition can not be fulfilled, T1 duration should longer than TRRC + TEvent\_DU + Tidentify.**
* **At the start of T2, NR shall configure the DCI 2-9 to UE.**
* **During the T2, the legacy condition can not be fulfilled, the NES condition can be fulfilled.**
 |
| [**R4-2404688**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404688.zip) | CMCC | **(Netw\_Energy\_NR-Perf) draftCR to TS 38.133 Introduction of CHO test cases 2-1 for NES** |
| [**R4-2404740**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404740.zip) | Intel Corporation | **Test case requirements for NES triggering inter-frequency target CHO delay from FR2 to FR1** |
| [**R4-2405009**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405009.zip) | Huawei, HiSilicon | **Proposal 1: Not to define TC for Cell DTX/DRX.** |
| [**R4-2405108**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405108.zip) | vivo | **draft CR for test case on NES triggering intra-frequency target CHO delay From FR2 to FR2** |
| [**R4-2405367**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405367.zip) | vivo | **Proposal 1 There is no need to define test cases for Cell DTX/DRX since UE behaviour is not different from legacy.** |
| [**R4-2404974**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404974.zip) | Ericsson | **Proposal 1: RAN4 to define the test cases for Cell DTX/DRX procedure.*** **SA event triggered reporting tests without gap under Cell DTX**

**Proposal 2: RAN4 to define the applicability rule for Cell DTX/DRX test as follow.*** **A UE which fulfils the requirements in Cell DTX test case can skip the test case in A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX.**
 |
| [**R4-2404976**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404976.zip) | Ericsson | **draft CR to 38.133 Test Case of NES Cell DTX** |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1 Performance part related to Cell DTX

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 3-1-1: Whether to define TC for Cell DTX**

* TRS
	+ Option 1: Define follow TC (Nokia, Ericsson):

SA event triggered reporting test without gap under non-DRX and Cell DTX.

* + Option 1a: A UE which fulfils the requirements in Cell DTX test case can skip the test case in A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX. (Ericsson)
	+ Option 2: Do not define TC for Cell DTX/DRX (Huawei, Nokia):
* Recommended WF:
	+ Discuss the issue in this meeting.

### Sub-topic 3-2 Performance part related to NES-based CHO

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 3-2-1: Test configurations for NES-based CHO**

* Proposals
	+ Option 1
		- For the test case of DCI occurs earlier than TEvent\_DU + Tidentify, two time duration T1 and T2 should be covered
		- At the start of time duration T1, the UE may not have any timing information of cell 2,
		- During T1, NR shall configure the NES-based condition implying handover to cell 2 firstly, and then configure DCI 2-9 with NES-mode indication.
			* one conditional execution condition with condEventA3 should be configured in the RRC signaling, that nesEvent set as true and A3-offset set as [0]dB.
		- During the T1, the NES condition can not be fulfilled, T1 Duration should longer than TRRC.
		- At the start of T2, the NES condition can be fulfilled.
	+ Option 2: (CMCC)
		- For the case of DCI occurs later than TEvent\_DU + Tidentify, two time duration T1 and T2 should be covered
		- At the start of time duration T1, the UE have timing information of cell 2, NR shall configure the condition implying handover to cell 2.
			* two conditional execution condition with condEventA3 should be configured in the RRC signaling. One is legacy condition with A3-offset set as [4]dB, the other is NES condition with nesEvent set as true and A3-offset set as [0]dB.
		- During the T1, the legacy condition can not be fulfilled, T1 duration should longer than TRRC + TEvent\_DU + Tidentify.
		- At the start of T2, NR shall configure the DCI 2-9 to UE.
		- During the T2, the legacy condition can not be fulfilled, the NES condition can be fulfilled.
* Recommended WF:
	+ Discuss the issue in this meeting.

### Sub-topic 3-3 CR handling

**Cell DTX**

Discuss following CR during the meeting. which is pending on issue 3-1-1

|  |  |  |
| --- | --- | --- |
| R4-2404976 draft CR to 38.133 Test Case of NES Cell DTX |  Ericsson  | Pending on Issue 3-1-1 |

**NES-based CHO**

Discuss following CR during the meeting.

|  |  |  |
| --- | --- | --- |
| 2-1 Intra-f FR1 to FR1 |  CMCC | R4-2404688 |
| 2-2 Inter-f FR1 to FR1 |  Apple | R4-2404366 |
| 2-3 Intra-f FR2 to FR2 |  Vivo | R4-2405108 |
| 2-4 Inter-f FR2 to FR1 |   Intel | R4-2404740 |