3GPP TSG-RAN WG2#124 R2-23XXXXX

Chicago, US, 13 – 17 November, 2023

Agenda Item: x.xx.x

Source: Huawei, HiSilicon

Title: Report of [POST123bis][021][NES] 38.331 Running CR (Huawei)

Document for: Discussion and decision

# 1 Introduction

This document is the report of the following discussion:

* [POST123bis][021][NES] 38.331 Running CR (Huawei)

Scope:

- Review running CR

- Identify open issues

- Get inputs for subset of open issues (focus more detailed open issues that would help with CR finalisation).

 Deadline: long (Oct. 27th 1000 UTC)

The intention of this discussion is to provide a running RRC CR for NES and discuss the remaining open issues that need resolving to finalise the CR.

 **Please provide your comments by Thursday October 26th 10:00 UTC to allow 24h for the rapporteur to prepare a summary and update the CR.**

Companies providing input to this email discussion are requested to leave contact information below.

|  |  |  |
| --- | --- | --- |
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# 2 Running RRC CR for NES

The running RRC CR for NES is provided in the discussion folder. Please don’t change the CR text or insert comments to the CR file. Please use the table below for comments and suggestions on procedures or wording changes for clarity of the CR tdoc. If you want to highlight several issues please use numbers, i.e. “issue 1)”, “issue 2)” etc. so it is easier for the rapporteur to respond.

|  |  |  |
| --- | --- | --- |
| **Company** | **Detailed comments** | **Rapporteur response** |
| Apple | Description of ***cellDTXDRX-CycleStartOffset:******cellDTXDRX-CycleStartOffset****cellDTXDRX-Cycle* in ms and *cellDTXDRX-StartOffset* in multiples of 1 ms.*cellDTXDRX-Cycle* is an integer multiple of *drx-longCycle* of all UEs in a cell or vice versa.We think it is weird to use "all UEs in a cell" because such description is from NW perspective but TS 38.331 is actually from UE perspective. Maybe it can be modified to:" The configured *cellDTXDRX-Cycle* is an integer multiple of configured *drx-longCycle* ~~of all UEs in a cell~~ or vice versa." | Agree to this change. |
| Nokia | 1. “capable of NES cell DTX/DRX” – maybe we could refer to UE capability here i.e. “the UE does not support XXX” to be exact and avoid misinterpretation
2. NOTE2 in 5.2.2.4.1 is not needed as behaviour is captured in SIB1 reception, right?
3. “perform cell reselection to other…” is not needed in 5.2.2.4.2 as the behaviourr is described in 38.304 which is already referred from previous bullet

5.3.5.13.3 – “if one event within” – I guess we should not limit that only a event can be associated with NES trigger? Thus maybe follow similar wording as for regular CHO e.g. “if event(s) associated to all *measId*(s) within *condTriggerConfig* for a target candidate cell within the stored *condRRCReconfig* are fulfilled and associated conditional event is configured with *NEScondExecutionCond*”. 1. Then existing bullet for regular CHO “2> if event(s) associated to all *measId*(s) within *condTriggerConfig* for a target candidate cell within the stored *condRRCReconfig* are fulfilled:”- Shouldn’t there be limitation not to be triggered if event is associated with N*EScondExecutionCond? e.g. by adding in the* end “and associated conditional event is not configured with N*EScondExecutionCond*:”
2. L1 trigger bullets “3>” Not following logic here. Could you elaborate how do you consider this works? Shouldn’t this be so that while condition is fulfilled and L1 trigger is received then UE triggers CHO execution? Then what happens if L1 trigger is received no cell fulfllls the criterion? Shouldn’t re-establishment be started in that case?
3. Instead of adding NEScondExecutionCondinto condReconfigToAddMod wouldn’t it be simpler to add it directly to CondTriggerConfig. Then there is no need to configure measId as it is directly linked to event.
 | 1) Yes, we can add a reference to a specific UE capability once they are implemented. I can add an editor’s note that this will be updated. 2) The note is informative, just like for NTN, to be clear that the UE capable of this feature determines the cell barring status after reading SIB1. I think there is no issue with having the note.3) This follows the wording of 5.2.2.4.1 for cell barring, which also refers to 38.304 and “perform cell reselection to other…”. The MIB steps are skipped by NES UEs so it seems fine to have it in the SIB1 section.4) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR. |
| Xiaomi  | 1. In “*CondReconfigToAddModList*”:

NEScondExecutionCond-r18 INTEGER (1..2) should be changed as “NEScondExecutionCond-r18 SEQUENCE (SIZE (1..2)) OF MeasId”1. In section 5.3.5.13.4 Conditional reconfiguration evaluation

2> for each *measId* included in the *measIdList* within *VarMeasConfig* indicated in the *condExecutionCond* or *condExecutionCondSCG* or *NEScondExecutionCond* associated to *condReconfigId:*or *NEScondExecutionCond is missing*1. In section 5.3.5.13.4 Conditional reconfiguration evaluation

More events as legacy CHO should be allowed.I am confused with the L1 command for NES CHO,Option 1: L1 command will trigger the CHO configuration evaluation or execution?Option 2: CHO configuration evaluation is performed once receive the configuration, only when NES CHO meeting the condition and L1 command is received, then perform CHO execution?Which understanding is correct??1. For “*ServingCellConfigCommon*” to configure cellDTXDRX-Config

In this case, how to configure the PCell’s cellDTXDRX?I also confused with this configuration, in my understanding, the agreement we made in last RAN2 meeting means to configure the cell DTX/DRX in MAC configure, and at most two cell DTX/DRX will be configured and one serving cell will associate one of them. If no, how to restrict the at most “two” cell DTX/DRX? | 1, 2) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR.3) On the following issue, my understanding is that UE measurements can be performed before the L1 command, but the CHO execution is only after L1 command.4) We agreed that “Cell DTX/DRX configuration is provided per Serving Cell”, so the cellDTXDRX-Config was moved from MAC to serving cell. The restriction of two configurations is captured in the field description. I don’t see any issues with using ServingCellConfigCommon for PCell. |
| Samsung | **Issue 1) definition of NES UE w.r.t. barring.** We believe that the agreement is barring ‘at least cell DTX/DRX’, not limiting the barring for only cell DTX/DRX. Hence, if we maintain the current modification, along with the future RAN2 progress, there could be possibility of having multiple NES barring behaviors and parameters in the RRC w.r.t. additional features of NES, such as spatial/ power/ bw domain etc. So we suggest 1. to maintain the architecture on cell barring as the previous version, with simply adding a note that this is at least for UE supporting cell DTX/DRX.
2. or just delete ‘(not) supporting cell DTX/DRX’ from the current version and adding a note that this is at least for UE supporting cell DTX/DRX.

**Issue 2) NEScondExecutionCond.** We understand the proposed CR for CHO triggering is using one condReconfigId to handle both NES CHO (if NEScondExecutionCond indicated) and regular CHO (if NEScondExecutionCond not indicated). However, the proposed architecture cannot specify a case if a network wants to configure a single condReconfig having two MeasId conditions as a condExecutionCond for the NES CHO, so we have a concern that this is the intended behaviour. Instead, we propose NEScondExecutionCond to be a simpler flag of on/off, such as ‘ENUMERATED {true}’ Then, we can also eliminate the second bullet “3>” for regular CHO.**Issue 3) L1 trigger signal reception**Here we understand ‘L1 trigger signal’ = ‘one bit in the received DCI2-9 that indicates to trigger NES CHO’.In general RRC does not specify received L1 signal directly, so we propose to change as follows: ‘if the L1 trigger signaling is received’ 🡪’if the NES CHO triggering is indicated by lower layers’. Here the ‘NES CHO triggering’ denotes the ‘RAN2 agreed one bit in the received DCI2-9 that indicates to trigger NES CHO’ and may include this detail as a Note. **Issue 4) Architecture of NES CHO trigger config.** With the above changes, the bullets of “3>” could be simplified as: 3> if the NES CHO triggering is indicated by lower layers and the event configured with *NEScondExecutionCond* is fulfilled; 4> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5; | 1) We agreed that other features will be added to NES cell barring only “if legacy impact is found”. So I believe the current state is cell DTX/DRX UE, which needs to be updated later by a reference to a new UE capability, as agreed with Nokia’s issue 1). I can remove “cell DTX/DRX” from the normative text and add a note to refer to a UE capability in the future. 2, 3, 4) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR. |
| Qualcomm | 1. Agree with Nokia that specific cell DTX/DRX capability would be cleaner, but in our view, it is fine to leave the wording this way and refine with exact capability once capability CR is stable
2. In this part :

3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];Do we need to cover this agreement? “If the NES UE is barred in the NES cell and the IntraFreqReselection field of the MIB is set to ‘Not Allowed’, the UE cannot reselect to another cell of the same frequency as the barred cell. If it is set to “Allowed” UE follows intra frequency reselection bit in the MIB."1. This part related to NES CHO

2> if one event within *condTriggerConfig* is configured with *NEScondExecutionCond* for a target candidate cell within the stored *condRRCReconfig*:3> if the L1 trigger signaling is received and the event configured with *NEScondExecutionCond* is fulfilled; or3> if the L1 trigger signaling is not received and the other event within *condTriggerConfig* is fulfilled:4> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5; This allows for multiple CHO conditions for the same candidate target cell to be evaluated at the same time. This may violate legacy spec, we will cover this in depth next question below. Also, this leaves the UE behaviour undefined when the CHO-bit is set to 1 then set to 0, at which case our understanding is that the UE should stop evaluating NES-CHO conditions. This current CR only allow for a single trigger when this bit flips to 1. 1. I noticed that the CellDTXDRX-config IEs are all optional. Maybe I missed it in the online but what should the UE assume when those parameters are not configured? It is not captured in field description.
 | 1) Agree with this, the reference to a UE capability will be added. I will add an editor’s note on this. 2) My understanding is that this agreement means that if NES UE is barred by MIB (because we agreed it cannot be barred by SIB1) it follows the legacy *IntraFreqReselection* from MIB. This is described in 38.304 for legacy and should be enough. 3) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR.4) It is based on the online discussion on [RRC] Issue 1-7: Whether the fields in cellDTX-config should be optional or mandatory. The idea was that the gNB doesn’t need to change the whole configuration when it only wants to change one parameter (e.g. the periodicity) and leave the others the same. I agree that some description should be captured for this case in the field description. |
| NEC | Issue 1) The following RAN2#123 agreement is categorized to “**Grey -** no 38.331 impact, or superseded by agreements of later meetings;”* The gNB should ensures that there is at least partial overlapping between UE C-DRX on-duration and cell DTX/DRX on-duration. It is up to network implementation to ensure the alignment. We will capture this in stage 2 specification.

However, with the RAN2#123bis agreement that Cell DTX/DRX configuration is provided per Serving Cell with restrictions of maximum of two cell DTX/DRX patterns per MAC entity, we think there may have RRC spec impacts. For example, how to align UE C-DRX for the following case ・the network configures Pcell w/o Cell DTX whereas Scell w/ Cell DTX config.1 in a 2CC CA case・there is no overlapping between UE C-DRX configured under *MAC-CellGroupConfig* and Scell DTX on-durationWe suggest listing it as an open issue.Issue 2) Regarding the NES specific CHO (e.g. changes in 5.3.5.13.4), we have some comments. But we explained them in 3.1, as we see some discussions/agreements needed before reflecting in running CR. | 1) I understand the issue but since the spec is written from UE perspective there is no real impact on RRC spec of this agreement. The alignment must be done internally by the NW. 2) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR. |
| Fujitsu | For CHO evaluation and triggering:1. “L1 trigger signalling” is not defined and unclear, it may be described whether indication has been received or not, e.g., “if the indication of entering NES mode has been received from lower layers and …”.
2. The following condition is also included: “if the L1 trigger signaling has not been received and the event configured with *NEScondExecutionCond* is fulfilled;”, in this case the event should not be fulfilled then add “consider the event associated to that *measId* to be not fulfilled;” after the above condition.

For RRC parameter name:1. No strong opinion, but alignment with RAN1 parameters list and Cell DTX/DRX has a lot of common configurations then it may be better to use “DTRX”, for example, *CellDTXDRX-Config* would be modified to *CellDTRX-Config*.

For Cell DTX/DRX configuration:1. In RAN2#123bit, RAN2 agreed C-DRX is configured with Cell DTX but not with Cell DRX. Hence, it could be “Cell DTX is configured only when C-DRX is configured.”
 | 1, 2) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR.3) Open to discuss whether we adopt the RAN1 or RAN2 initial wording, but DTRX is not very clear in my view. 4) Agree with the change. |
| OPPO | 1. The following bullet in clause 5.2.2.4.2 is not needed, since 1) It only covers the case of IntraFreqReselection setting to ‘Allowed’, and 2) The previous bullet already requires the UE to follow 38.304.

3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];1. For cellbarredNES, as agreed, the feature is for the UE that is at least capable of cell DTX/DRX but not only capable of cell DTX/DRX. Thus, 1) we may not need to rename it as “cellBarredNEScellDTXDRX”, 2) we need to add “at least” in the description “the UE is capable of NES cell DTX/DRX”.
2. In 6.3.2, “Cell DTX/DRX is configured only when C-DRX is configured” is added for *CellDTXDRX-Config.* We think it is not aligned with what we agreed below. Our understanding is cell DTX/DRX is allowed to configure without C-DRX. Or, did I miss anything?

11 We focus on the case where DTX in RRC can only be configured when C-DRX is configured. We will not optimize for the case where C-DRX is not configured.1. On the CHO related, we have a similar view as the above comments indicated by Nokia. Maybe the simplest way is to directly add CondReconfigToAddModListforNES/

condReconfigToRemoveListforNES or CondTriggerConfigforNES, to make the logic and linkage clear. | 1) This follows the wording of 5.2.2.4.1 for cell barring, which also refers to 38.304 and “perform cell reselection to other…”. The MIB steps are skipped by NES UEs so it seems fine to have it in the SIB1 section.2) I will add a reference to a specific UE capability. 3) This is based on the discussion on [RRC] Issue 1-9: Whether to capture in RRC that the focus was on the case where cell DTX in RRC can only be configured when C-DRX is configured. The outcome was that => Rapporteurs will capture it in RRC4) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR. |
| ZTE | 1. Only when the DCI 2-X carries a handover indication, the execution condition is evaluated. Hence, the description of *NEScondExecutionCond* can be corrected as below:

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| ***NEScondExecutionCond***To indicate Meas Id whose associated execution condition is applied after reception of common L1 signaling DCI 2-9 triggering a handover. This field is present only when configuring 2 triggering events (Meas Ids) *condEventA3*, *condEventA4* or *condEventA5* for a candidate cell. |

1. RAN2 has agreed that the Cell DTX/DRX are aligned, that the start and slot offset are common and the periodicity of one pattern is an integer multiple of the other. But in current IE structure (see below), the configuration cannot indicate the separate DTX and DRX periodicities. It also cannot show the multiple factor between these two periodicities:

cellDTXDRX-CycleStartOffset-r18 CHOICE { ms10 INTEGER(0..9), ms20 INTEGER(0..19), ms32 INTEGER(0..31), ms40 INTEGER(0..39), ms60 INTEGER(0..59), ms64 INTEGER(0..63), ms70 INTEGER(0..69), ms80 INTEGER(0..79), ms128 INTEGER(0..127), ms160 INTEGER(0..159), ms256 INTEGER(0..255), ms320 INTEGER(0..319), ms512 INTEGER(0..511), ms640 INTEGER(0..639), ms1024 INTEGER(0..1023), ms1280 INTEGER(0..1279), ms2048 INTEGER(0..2047), ms2560 INTEGER(0..2559), ms5120 INTEGER(0..5119),ms10240 INTEGER(0..10239)}The possible way to address this issue may be to additionally introduce a multiple factor or separately configure DTX and DRX periodicities. | 1) On CHO, please refer to the cumulative answer in section 3.1 and the updated CR.2) The alignment agreed is between cell DTX/DRX and C-DRX, not between cell DTX and cell DRX. We have agreed that when both cell DTX and cell DRX are configured, all of their parameters are common (i.e. On-duration, Cycle, Start offset and slot offset). Therefore, the simplification of the IE was introduced in this version and there is no need for separate configurations.  |
| Sharp | We think for NEScondExecutionCond definition, after DCI 2-9 is received the condition is applied, it means NEScondExecutionCond is evaluated after DCI 2-9 is received. Then in procedure description (5.3.5.13.4), there is no need to mention DCI 2-9, since when NEScondExecutionCond is fulfilled, DCI 2-9 must have been received.The entering NES indication bit in DCI 2-9 has been agreed, but the whole procedure for NES CHO evalutation and execution is unclear yet. So maybe more clear agreements are needed before running CR discussion.  | On CHO, please refer to the cumulative answer in section 3.1 and the updated CR. |
| Ericsson | The Cell DTX/DRX configuration is captured in *ServingCellConfigCommon* which is supposed to be used for parameters that the UE would typically acquire when acessing the cell from IDLE, seems more suitable to include it in *ServingCellConfig.* | I think either way is fine. *ServingCellConfigCommon* seems to be more for cell specific parameters and *ServingCellConfig* for UE specific. Since there can be two configurations for one UE *ServingCellConfigCommon* seemed more appropriate. But I am fine to move it. |
| MediaTek | (Comments to CR v02)**Issue 1): Clarification of standalone cell DRX operation**We don’t think that RAN2 had ever discussed UE behavior in the case where standalone cell DRX operates without C-DRX.We would like to clarify whether it is a valid scenarion and whether we need to capture the UE behavior when standalone cell DRX is configured and activated during RRC\_CONNECTED without C-DRX.The IE *CellDTXDRX-Config* is used to configure cell DTX/DRX related parameters. Cell DTX is configured only when C-DRX is configured. **Issue 2): Minor ones**2.1. Suggest to add NES in 3.2 Abbreviation.2.2. Typo in the title of field description table

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| *CellDTXDRX-Config* field descriptions |
| ***cellDTXDRX-CycleStartOffset****cellDTXDRX-Cycle* in ms and *cellDTXDRX-StartOffset* in multiples of 1 ms.The configured *cellDTXDRX-Cycle* is an integer multiple of configured *drx-longCycle* or vice versa.If this field is absent, the UE shall apply the stored value of this parameter. |

 | 1) The wording captures RAN2 agreements. First that the “Standalone cell DRX configuration is possible to configure” and second that “the focus was on the case where cell DTX in RRC can only be configured when C-DRX is configured”. Since the second one didn’t mention DRX, this was removed from the CR. I can add it as an open issue. 2) Agree to the changes. |
| ZTE | 1. A UE capable of NES should acquire SIB1 to determine the cell barring status only when the *cellBarred* in *MIB* is set to *barred.* So, the NOTE2 in section 5.2.2.4.1 should be updated as follows:

NOTE 2: A UE capable of NES should acquire SIB1 to determine the cell barring status when the *cellBarred* in *MIB* is set to *barred*.1. The following description in section 5.2.2.4.2 is legacy cell behaviour, and is not necessary.

1> if the UE supports NES and it is in RRC\_IDLE or in RRC\_INACTIVE, or if the UE supporting NES is in RRC\_CONNECTED while *T311* is running:2> if *cellBarredNES* is absent in the acquired *SIB1* and the *cellBarred* in the acquired *MIB* is set to *barred*:3> consider the cell as barred in accordance with TS 38.304 [20];3> perform cell re-selection to other cells on the same frequency as the barred cell as specified in TS 38.304 [20];1. Since 480 and 960 kHz subcarrier spacing have been supported from V17.0.0, and the slot number in one subframe is 64 for SCS 960 kHz, the parameters value range for CellDTXDRX-Config-r18 should be updated as follows:

subMilliSeconds INTEGER (1..63),... cellDTXDRX-SlotOffset-r18 INTEGER (0..63) OPTIONAL, -- Need M | 1) Yes, that is true. 2) The MIB steps are skipped by NES UEs so it seems fine to have it in the SIB1 section.3) We would like to keep this feature aligned with C-DRX possible configurations.  |
| CATT | 1) We agree with E/// it is more suitable to include Cell DTX/DRX configuration in *ServingCellConfig*, otherwise the UE needs to perform a reconfiguration with sync if Cell DTX/DRX configuration is configured to the PCell.2) Isn’t it so that the sentence “For CHO in terrestrial networks, the network does not indicate a *MeasId* associated with *condEventA4*” in field description of *condExecutionCond* is no longer valid and can be removed? | 1) I have no strong view, can be moved to *ServingCellConfig*. It will be changed in the next version. |

**Rapporteur’s summary:**

Changes were included in the running CR v03 according to the comments. The rapporteur identifies the following further issues to be resolved:

**Issue 1-13: Should cell DRX be added to the agreement: “We focus on the case where DTX in RRC can only be configured when C-DRX is configured”.**

**Issue 1-14: For cell barring resolve FFS “if other NES features need to be included only if legacy impact is found”.**

Rapporteur recommendation: Confirm no other features have legacy impact.

**Issue 1-15: For cell barring resolve FFS “how we capture it in the CR in terms of wording”.**

Rapporteur recommendation: Refer to UE capability of cell DTX/DRX.

# 3 Identified open issues

The rapporteur identifies the following open issues that need resolving to finalise the CR:

## 3.1 CHO agreement implementation in RRC

In [3] the rapporteur identified a following open issue:

**Issue 4-2: Configuration details for the NES specific CHO execution condition (e.g. whether to add a new offset/threshold or flag to existing CHO events, or add a separate list of MeasIds for NES CHO events).**

RAN2 has agreed to have the NES specific CHO execution condition. How to implement it in the configuration is not decided. At RAN2#123-bis the following options were discussed:

* add a new offset/threshold
* add a flag to existing CHO events
* add a separate list of MeasIds for NES CHO events

After the discussion at RAN2#123-bis, the following was recommended:

=> **the rapporteur will recommend something simple** in email discussion and get company inputs if there are any issues

Thus, the rapporteur has implemented the TP from [4], which was discussed online and had support from other companies. As per Chair’s guidance please indicate in the table below only if you have a real concern and have identified a serious issue with what has been implemented.

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| --- | --- |
| **Company** | **Comments** |
| Nokia | Simplest seems to be to have this just per CondTriggerConfig – this allows maximum flexibiliyt wihtout needing any measId mapping etc.. |
| Xiaomi  | Agree with Nokia |
| Samsung | We suggest that NEScondExecutionCond to have just a simple flag, ‘ENUMERATED {true}’. It is not clear whether each condition A3 to A5 should be modified to have additional parameters. It may affect existing UE implementations and we are reluctant to ruin existing conditions that may have various thresholds for various functions in the future. Conditions A3 to A5 are already configurable with different threshold values. |
| Qualcomm | We think a new CHO offset/threshold is much simpler. We have an issue (issue 1) with the current phrasing in that if the UE is already evaluating a normal CHO configuration (with up to 2 MeasID with candidate cell 1) and a new NES-CHO configuration is activated, the UE has to evaluate two different configurations for CHO (we have the same issue with Nokia’s proposal) for the same target cell. We should not be changing any of the legacy restrictions on CHO configurations. In particular we have an issue with this rule:NOTE: Up to 2 MeasId can be configured for each condReconfigId. The conditional reconfiguration event of the 2 MeasId may have the same or different event conditions, triggering quantity, time to trigger, and triggering threshold.Are we limiting the normal CHO to a single CHO to leave space for the dormant NES-CHO to be activated so that this rule is respected, in this case this needs to be clarified. The other case where the UE simultaneously need to evaluate more than two measIDs or more than one CHO configuration (each with two Meas IDs) is not acceptable. Aside from that, the other issue we have (issue 2) is when the UE stops evaluating this new meas ID. Our understanding is that this NES-CHO is active when the DCI2\_9 designated bit is equal 1 and not active when DCI2\_9 designated bit is equal 0. Current text seems to have this activation happens once with no ability to deactivate. We think the activation state of this CHO configuration should follow this bit for simplicity and flexibility.  We still think new offsets/thresholds is preferable since 1. Allows us to “hide” the NES details into the CHO existing config without impacting any other parts of the spec so the impact is minimal. 2. Automatically disallows all the cases breaking the legacy of configuring too much meas IDs for the UE to evaluate simultaneously. 3. Does not need new explicit procedural text for activation and deactivation of evaluation of NES-CHO.  |
| NEC | Firstly, we agree with the direction (add a separate list of MeasIds). However, there are some comments (including concerns) for the CR (TP).1. Changes in 5.3.5.13.4 below:

2> if one event within *condTriggerConfig* is configured with *NEScondExecutionCond* for a target candidate cell within the stored *condRRCReconfig*:3> if the L1 trigger signaling is received and the event configured with *NEScondExecutionCond* is fulfilled; or3> if the L1 trigger signaling is not received and the other event within *condTriggerConfig* is fulfilled:4> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;This precludes a case where the other event is fulfilled (but NES specific condition is not) after the L1 trigger signalling. This may be corner case, if both conditions are associated with the same criterion (e.g. RSRP or RSRQ), as the NES specific one should be more relaxed value (e.g. lower offset/threshold). However, both conditions may be associated with different criterion and then the case above may still happen. Thus, the case above should be supported, if the current way is kept.Another issue is the current way cannot configure NES specific condition only without the other condition, which can be seen in the field description of NEScondExecutionCond. This is also restrictive from network configuration perspective. In this sense, we share the view from Nokia.

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| ***NEScondExecutionCond***To indicate Meas Id whose associated execution condition is applied after reception of common L1 signaling DCI 2-9. This field is present only when configuring 2 triggering events (Meas Ids) *condEventA3*, *condEventA4* or *condEventA5* for a candidate cell. |

1. Changes in *CondReconfigToAddModList* IE: if the current way is kept as it is (otherwise please ignore), there is one small comment. We understand the “NEScondExecutionCond-r18” corresponds to the index of MeasId configured for NES CHO. To avoid misleading, it is better to rename this with following ASN.1 coding rule, for example as shown below.

[[~~NEScond~~nes-CondExecutionCondId-r18 INTEGER (1..2) OPTIONAL -- Need M]] |
| Fujitsu | As mentioned above, for CHO triggering procedure, definition of L1 triggering and condition (whether it has been received or not) is not clear.For NEScondExecutionCond, we agree with Nokia and Xiaomi. It is moved to CondTriggerConfig and used as a flag, for simplicity. |
| Google | In general, we agree with the direction of the current running CR (add a flag to existing CHO events). We also agree with Samsung that the current CR does NOT allow the NW to configure both *measIDs* in the same *condReconfigId* as the NES execution conditions. To remove such a restriction, we may simply add one more value (e.g., INTEGER (0..2)) in the NEScondExecutionCond-r18, where value 0 means both *meadIds* are configured as the NES execution conditions. On the other hand, if RAN2 can make it clear that the network will never mix a regular CHO execution condition with a NES-CHO execution condition in the same *condReconfigId*, we are also fine with Samsung’s (and also Nokia’s) suggestion that we can turn *NEScondExecutionCond* into a simple flag, ‘ENUMERATED {true}’. This option is more preferable as it could be the simplest among all the other options.  |
| OPPO | To solve the issue existing and make the logic/linkage clear, we suggest directly adding CondReconfigToAddModListforNES/condReconfigToRemoveListforNES or CondTriggerConfigforNES. The latter one is more preferred.  |
| ZTE | We prefer “add a separate list of MeasIds for NES CHO events”. It is up to gNB to flexibly relate the triggering events condEventA3, condEventA4 or condEventA5 with a lower threshold with NES CHO. For example, for CHO, gNB could configure a condEventA3, and for NES CHO, gNB could configure a condEventA4 with a lower threshold. |
| Sharp | We think there is no need for the UE to evaluate legacy CHO and NES CHO simultaneously although legacy CHO configuration and NES CHO configuration can be configured at the same time, DCI 2-9 can be used as switching indication between legacy CHO evaluation and NES CHO evaluation. Then there is no big difference among the options listed. |
| Ericsson | The intended implementation on the CHO if fine for us if the restriction that network needs to always configure two MeasIds in this case is removed. It should be possible to configure only NES specific conditions, or both, depending on scenario e.g. intra /interfreq etc.The procedural text could be improved and updated to not to require 2 MeasIds. The yellow marked is not necessarily clear. 2> if one event within *condTriggerConfig* is configured with *NEScondExecutionCond* for a target candidate cell within the stored *condRRCReconfig*:3> if the L1 trigger signaling is received and the event configured with *NEScondExecutionCond* is fulfilled; or3> if the L1 trigger signaling is not received and the other event within *condTriggerConfig* is fulfilled:4> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;4> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5;Also, as it is field it should not start wth capital letter. |
| LGE | We think a new CHO offset/threshold is simpleCondTriggerConfig for normal mode and CondTriggerConfig for NES mode have the same parameters in common but only different threshold(s). |

**Rapporteur responses to CHO implementation comments:**

Based on the comments, there are different preferences of indicating that a CHO event is NES-specific:

1) Add an index, indicating which of the 2 events is NES (as in the current running CR)

2) Add a flag to event configuration (as suggested by Nokia)

3) Add a new list of MeasIds for NES (as suggested by Xiaomi)

4) Add an “ENMUERATED {true}” to the existing MeasId list (as suggested by Samsung)

5) Add separate offsets/thresholds to events (as suggested by QC)

6) Add a new list of CondReconfigToAddModList for NES (as suggested by OPPO)

7) Add an index, indicating which of the 2 events is NES and use value 0 for indicating both (as suggested by Google)

The issue lies in whether we want to allow all the possible combinations including

* 1 NES-CHO event + 1 normal event (this excludes Option 3, Option 4 and Option 6)
* 2 NES-CHO events (this excludes Option 1)

The rapporteur does not consider it useful to configure 2 NES-CHO events because the motivation is to HO the UE as soon as possible while the UE needs to satisfy two events simultaneously, if two are configured. However, it seems companies still want to keep this flexibility. In this case, option 2, Option 6 and Option 7 can be considered. Option 2 seems to have the most support, therefore the CR is updated based on Option 2.

A related issue is that, if “1 NES-CHO event + 1 normal event” are configured, what is the intended behaviour:

1) UE triggers CHO execution as long as one of the events is satisfied

2) UE triggers CHO execution only when both events are satisfied

Understanding 2) is more in line with the legacy CHO, if two events are configured. However, we think that in the context of NES, 1) should be the correct understanding. Otherwise, it is useless to configure a normal CHO event to the UE (it will never be triggered before receiving NES triggering).

Therefore, the procedural text is updated based on the first understanding.

**If any issues are identified with the updated CHO procedures, please indicate them in the table below.**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Although we still prefer previous CR, this version is acceptable to us if majority prefer. Let me clarify assumptions of previous CR:1) As Rapporteur clarified, there are below two understandings on allowed combinations of NES CHO condition configuration:* Case 1: 1 NES-CHO event + 1 normal event (this excludes Option 3, Option 4 and Option 6)
* Case 2: 2 NES-CHO events (this excludes Option 1)

We share the same understanding as Rapporteur that Case 2 (2 NES-CHO events) are against the intention of NES CHO enhancement (Since the intention is to HO the UE as soon as possible after reception of DCI 2-9, why the NW choose to configure UE to satisfy two events simultaneously instead of only one with relaxed threshold?). We intend to simplify NW and UE operation. That is why we drafted previous CR with assumption that only case 1) is allowed. We planned to discuss this issue in RAN2, but since we have only one meeting left, we can compromise that Case 2 is also allowed if majority prefer.2) As Rapporteur clarified, there are below two understandings on UE behavior if “1 NES-CHO event + 1 normal event” are configured:* 1): UE triggers CHO execution as long as one of the events is satisfied
* 2): UE triggers CHO execution only when both events are satisfied

We share the same understanding as Rapporteur that understanding 1) is the correct understanding. Understanding 2) will make NES CHO useless to configure a normal CHO event to the UE (as it will never be triggered before receiving NES triggering). Thus, we only accept understanding 1). 3) On ASN.1 “a separate list of MeasIds” vs “a flag to existing CHO events”, we actually think they are equal but just difference of ASN.1 details. So, either way is fine to us. In previous CR, we used former one (i.e., an index of MeasID) because we want to restrict only one NES-CHO event can be configured, in order to simplify NW and UE operation, as clarified in 1). If it is majority view that 2 NES-CHO events are allowed (although the benefit of this flexibility is not clear), we can accept, considering WI progress.  |
| CATT | We prefer the solution proposed by Samsung (i.e. 4). Considering Conditions A3 to A5 are already configurable with different threshold values, we can have separate *CondReconfigId*s for legacy CHO and NES CHO for the same candidate cell. The drawback of the extension is that it reduces the maximum number of candidate cells for CHO and the same RRC configuration message of the candidate cell needs to be sent to the UE twice if separate CondReconfigIds for legacy CHO and NES CHO are configured together. But with the extension, the principle that the conditional reconfiguration execution is initiated only when both events within one *condReconfigId* (if configured) are fulfilled, is kept. And the modification of 5.3.5.13.4 is less as we don’t need to cover the cases that UE triggers CHO execution as long as one of the events is satisfied if “1 NES-CHO event + 1 normal event” are configured for one *condReconfigId*.And our understanding regarding “1 NES-CHO event + 1 normal event”, is that the intended behaviour is that UE triggers CHO execution as long as one of the events is satisfied. |
| Google | We also share the same view with CATT that the solution proposed by Samsung (i.e., 4) makes 5.3.5.13.4 much simpler (UE design also simpler). Therefore, we prefer the previous CR with Samsung’s modification.This also means that we cannot configure a legacy CHO event together with a NES-CHO event in the same *CondReconfigId* anymore. |
| vivo | We are ok with the current version, but have some questions. 1) From our understanding, the network may configure 2 normal CHO conditions for legacy case and 1 or 2 NES CHO condition at the same time. So, 3~4 MeasID should be supported. And if the companies have concern on the number of MeasID the UE would use, we think the normal CHO conditions can be disabled and NES CHO conditions are enabled when receiving the L1 signalling. 2) In case ‘1 normal CHO condition + 1 NES CHO condition’ is configured, it seems the UE will not perform CHO execution when only NES CHO condition is fulfilled. Or can this be covered by the bullet: 2> if event(s) associated to all *measId*(s) within *condTriggerConfig* for a target candidate cell within the stored *condRRCReconfig* are configured with *nesEvent* and fulfilled:3> consider the target candidate cell within the stored *condRRCReconfig*, associated to that *condReconfigId*, as a triggered cell;3> initiate the conditional reconfiguration execution, as specified in 5.3.5.13.5; |
|  |  |

**Rapporteur’s summary:**

Since we have no agreement on whether 1 NES CHO event + 1 normal event is precluded or not, we cannot exclude such case in the CR. The solution captured in v02/v03 has the flexibility that some companies asked for with the cost of a more complex design. The rapporteur suggests to keep the CHO solution from v02/v03 in the running CR. Companies that prefer option 4, as proposed by Samsung (add an “ENMUERATED {true}” to the existing MeasId list), can bring a complete TP to RAN2#124 and the group can decide which solution to choose. Issue 4-2 remains open; the rapporteur proposes to downselect from the following two solutions:

**Issue 4-2: Configuration details for the NES specific CHO execution condition, downselect from:**

* **Add a flag to event configuration (as in the current running CR).**
* **Add an “ENMUERATED {true}” to the existing MeasId list.**

## 3.2 SSB-less SCell for inter-band CA implementation in RRC

In [3] the rapporteur identified a following open issue:

**Issue 2-1: SSB-less SCell operation impact on the RRC specification.**

Currently only impact identified for inter-band SSB-less is in the *absoluteFrequencySSB* field (“same frequency band” is currently mentioned). For further 331 spec impacts more discussion is needed. The rapporteur did not identify any RAN4 agreement related to RAN2 specs.

Companies are invited to comment or provide TPs for this issue to the table below and by contribution to RAN2#124.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | RAN4 sent LS to RAN2 in R4-2317307, which asks RAN2 to design signalling to support indication of which cell is the reference cell. Although RAN2 has not discussed this issue, we assume the signaling should be RRC signaling with spec change in TS 38.331. Because RAN2 has not discussed the LS, we think it is expected to be difficulty to discuss it in post-meeting email discussion. Thus, we suggest Rapporteur to list it as one open issue of RRC.  |
| Nokia | Likely we need to signal timing reference – RAN4 did not indicate how that is done. Maybe something to be discussed in future meeting. But you could add a editor’s note about open issue? |
| Xiaomi  | Agree with Apple and we can discuss it in next meeting online.  |
| Qualcomm | Agree with Nokia and Apple. Some RAN2 work is needed and probably best at this point to highlight as an open issue and leave it to individual contributions to come up with signalling designs.  |
| Fujitsu | Agree with above companies, at least linking of reference cell will be discussed in the next meeting. |
| OPPO | Agree with Apple and Nokia. |
| ZTE | Agree with above companies’ view. |
| Sharp | Agree with above companies’ view. |
|  |  |

**Rapporteur’s summary:**

We agree that the RAN4 LS (R4-2317307) was received late and it cannot be part of this email discussion. This will be left as an open issue to be discussed during RAN2#124. Therefore, the rapporteur identifies the following open issues for SSB-less SCell:

**Issue 2-1: SSB-less SCell operation impact on the RRC specification.**

**Issue 2-2: Implementation of indication from NW to UE to indicate which cell (e.g., PCI, SSB frequency, etc.) is the reference cell.**

## 3.3 RAN1 parameter list implementation in RRC

In [3] the rapporteur identified a following open issue:

**Issue 5-1: Implementation of the RAN1 parameter list.**

The parameter list will be implemented by the RRC rapporteur and reviewed after RAN2 receives the LS. The most recent RAN1 parameter list (R1-2310692) is provided in the discussion folder for reference.

No input to this table is foreseen until the rapporteur provides the TP. Companies can also provide TPs for this issue by contribution to RAN2#124.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Will come back later on details of these |
| Qualcomm | Agree with rapporteur plan  |
|  |  |

**Rapporteur’s summary:**

The rapporteur plans a separate RRC CR with RAN1 parameters, not to interfere with the progress of the CR based on RAN2 agreements. Thus, the discussion on RAN1 parameter list impact on RRC will be separated and take place during RAN2#124. Issue 5-1 remains open.

# 4 Conclusion

Based on the discussion and companies’ inputs in the previous sections the following RRC open issues need to be resolved:

**Issue 1-13: Should cell DRX be added to the agreement: “We focus on the case where DTX in RRC can only be configured when C-DRX is configured”.**

**Issue 1-14: For cell barring resolve FFS “if other NES features need to be included only if legacy impact is found”.**

Rapporteur recommendation: Confirm no other features have legacy impact.

**Issue 1-15: For cell barring resolve FFS “how we capture it in the CR in terms of wording”.**

Rapporteur recommendation: Refer to UE capability of cell DTX/DRX.

**Issue 4-2: Configuration details for the NES specific CHO execution condition, downselect from:**

* **Add a flag to event configuration (as in the current running CR).**
* **Add an “ENMUERATED {true}” to the existing MeasId list.**

**Issue 2-1: SSB-less SCell operation impact on the RRC specification.**

**Issue 2-2: Implementation of indication from NW to UE to indicate which cell (e.g., PCI, SSB frequency, etc.) is the reference cell.**

**Issue 5-1: Implementation of the RAN1 parameter list.**

# 5 References

1. RP-223540, “New WID: Network energy savings for NR”, Huawei
2. 3GPP TR 38.864 V1.0.0, “Study on network energy savings for NR (Release 18)”
3. R2-2310003, “Discussion on remaining issues of the RRC CR for NES”, Huawei, HiSilicon
4. R2-2310293, “Remaining issues of NES specific CHO enhancement”, Apple