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.

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| --- | --- | --- |
| **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." |  |
| 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. |  |
| 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? |  |
| 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; |  |
| 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; or  3> 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. |  |
| 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-duration  We 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. |  |
| 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.” |  |
| 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. |  |
| 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:  |  | | --- | | ***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. |  |

# 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.

|  |  |
| --- | --- |
| **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; or  3> 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.     |  | | --- | | ***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. |

## 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.

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| --- | --- |
| **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. |

## 3.3 RAN1 parameter list implementation in RRC

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

**Issue 5-1: Implementation of 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.

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| **Company** | **Comments** |
| Nokia | Will come back later on details of these |
| Qualcomm | Agree with rapporteur plan |
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*[Rapporteur’s summary and proposals]*

# 4 Conclusion

Based on the discussion in the previous sections we propose the following:

**Proposal 1** abc

**Proposal 2** def

# 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