3GPP TSG-RAN WG2 Meeting #116 Electronic draftR2-2111324

Elbonia, 1 – 12 of November 2021

**Agenda item: 8.2.3.1**

**Source: Nokia, Nokia Shanghai Bell**

**Title: [AT116-e][223][R17 DCCA] Optional step in SN-initiated inter-SN CPC procedure (Nokia)**

**WID/SID: LTE\_NR\_DC\_enh2-Core - Rel-17**

**Document for: Discussion and Decision**

# 1 Introduction

The scope of this paper is as follows:

* [AT116-e][223][R17 DCCA] Optional step in SN-initiated inter-SN CPC procedure (Nokia)

Scope:

* + - Discuss the FFS left for the optional step in SN-initiated inter-SN CPC procedure: Is it up to 1) MN or 2) S-SN to determine whether to skip the second step, e.g. in case all suggested PSCell candidates have been accepted?

Intended outcome:

* + - Discussion summary in [R2-2111324](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116-e/Docs/R2-2111324.zip) (by email rapporteur).

Deadline for providing comments, for rapporteur inputs, conclusions and CR finalization:

* + - Initial deadline (for company feedback): 2nd week Thu, UTC 1200
    - Initial deadline (for rapporteur summary): 2nd week Thu, UTC 1700

This aspect is discussed below.

# 2 Discussion

During the online discussion at RAN2#116 the following has been captured in Chairman notes:

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| * FFS: 3: The second part of the SN initiated inter-SN CPC procedure is optional (i.e. Proposal 2 is not agreed), and it's up to the MN to determine whether to skip the second step, e.g. in case all suggested PSCell candidates have been accepted. Request RAN3 to work on details (e.g. how does MN tell this to S-SN, etc.) * Offline [223] (Nokia) to discuss above FFS, with main question being whether it's MN pr S-SN who decides whether to skip the second step. |

The online agreement quoted above was based on [1]. According to [1], it is the MN that should decide if the second part of the procedure in Solution 2 for SN-initiated CPC is triggered or not. During the online discussion it was commented that such additional message exchange with S-SN upon T-SN acknowledges candidate PSCells may not be needed for example when all PSCells suggested by S-SN are acknowledged by T-SN. In such scenario there is likely no need to perform the configuration update for the S-SN’s part. However, in our understanding that is still not ‘’up to the MN to determine’’. If any node shall have a decisive role here, it should be the S-SN and not the MN. It is ultimately the SN initiated CPC, not MN-initiated CPC. And it is about updating the S-SN configuration, not MN configuration. Thus, it seems to be obvious to leave the decision up to S-SN.

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| **Question 1: Do you agree with the reasoning explained above, i.e. t****hat for SN-initiated CPC it is not the MN that should decide whether to skip the second part (i.e. informing the S-SN about the acknowledged PSCells and awaiting the new configuration)?** | | |
| **Company** | **Answer** | **Comments** |
| Nokia | Yes | Let us consider the following examples:  Example 1:   * Source SN suggests the preparation of Cell A, B and C and does not configure any related measurement gap. * Target SN accepts the preparation of Cell A and B. * If the decision is left for MN as stated in [1], MN would contact again the source SN as PSCells suggested by source SN are not all acknowledged by target SN, i.e., Cell C is not prepared by target SN. However, considering that no measurement gap has been configured by the source SN, MN does not need to wait for a new measurement configuration from source SN before sending RRC Reconfiguration containing the CPC configurations.   This case is expected to be very common. By leaving the decision for MN, the issue would not be solved and the signaling overhead and the latency for providing CPC configuration would be high.  Example 2:   * Source SN suggests the preparation of Cell A, B and C and configures measurement gaps which are needed to evaluate the CPC execution condition of cell B, i.e., no measurement gap is needed for cell A and C. * Target accepts the preparation of cell A and B. In this case, the source SN does not need to update the measurement configuration as the measurement gap is still needed for cell B. * If the decision is left for MN as stated in [1], MN would contact again the source SN as PSCells suggested by source SN are not all acknowledged by target SN, i.e., Cell C is not prepared by target SN. However, considering that the measurement gap configuration is still needed for target cell B, source SN will not perform any update and as such the additional signaling is in vain/unnecessary.   These examples clearly show that MN cannot make the right decision on whether it needs to wait for an updated measurement configuration from source SN after it receives the response from target SN.  In addition, the SN measurement configuration may be transparent for MN and MN in general is not expected to decode it to figure out what has been configured by source SN. |
| Huawei, HiSilicon | No | The "source configuration update" must delete conditional measurements for which there is no candidate target PSCell as RAN2 agreed.  So in the above examples, an update is necessary anyway unless there are other candidate target PSCell prepared on the same carrier. As the MN is involved and is aware of the carriers of the prepared PSCells, **the MN has perfectly accurate information to know whether to wait for the SN or not.**  With respect to updating the gap configuration after conditional configurations are prepared: - if a cell is included as candidate by the S-SN, most likely there are measurement results from an already configured non-conditional measurement so the UE continues measuring the corresponding carrier unless the S-SN deletes the non-conditional event from measConfig. **This is only feasible if the T-SN has prepared a full configuration for all accepted PSCell candidates** (otherwise there will be a mismatch after CPC execution) - if the SN does so in the "source configuration update", **except for EN-DC in FR2 with per-FR gaps, the S-SN can only indicate a modified list of frequencies to be measured to the MN and it is up to the MN to modify the gaps and inform the SN**.  In existing procedures for gaps, such updated list is to be provided in SN-initiated SN modification and if the MN wants to update the gaps, it initiates a nested SN modification procedure in which it provides the updated gaps and the SN provides an updated configuration. So here, it would require two more steps, and we have never discussed this before. |
| NEC | See comments | We would like to clarify what we were thinking at online session.  From our view, skipping the second step would mean that the MN does not need to wait for a reply from the S-SN after sending the accepted PSCell information (provided by T-SN) to the S-SN. In other words, the skipping is not whole part of the second step but the second/latter part of the second step (S-SN->MN).  In order to ensure MN and SN coordination, the MN should be allowed to skip, only if all the candidate PSCells are accepted by the T-SN. Otherwise, the MN should wait a possible reply from S-SN.  To achieve the way above, we need to ask RAN3 about its feasibility, e.g. first part of second step (MN->S-SN) is the Class 2 message which does not need a specific response message. (up to RAN3)  If our thinking above is not agreeable for other companies, then the answer to the original question should be “Yes”. But we would like to propose the way as explained above.  # second input: In response to clarification from Nokia (thanks), we tend to think as follows:  It seems companies can agree that if all the suggested PSCell candidates are accepted by the T-SN, the MN is allowed to send the CPC configuration to the UE after sending the information of accepted PSCell candidates to the S-SN and without waiting for a response/message from the S-SN.  In our view, for this case above, there is no need for the MN to receive (pre-)confirmation from the S-SN, i.e. specification can capture this exceptional MN behaviour, e.g. in Stage-2. Also, we think this case can be independent from any other cases (even if any). In other words, regardless whether to support other cases where the S-SN may or may not give (pre-)confirmation for similar MN behaviour (i.e. allowed to send CPC configuration to UE without waiting a response/message from S-SN), the MN can simply decide based on the information of accepted PSCell candidates. |
| Futurewei | No | We support the text that the MN determines whether to skip the second step. The decision has to be made by MN.  MN is located at the centre among S-SN, T-SN and the UE. MN receives the complete information from S-SN and T-SN directly and quicker than that S-SN and T-SN receives information from each other. MN receives T-SN conformation earlier and has complete information to decide whether forward T-SN decision to S-SN is needed. It is MN to decide whether to send T-SN confirmation to S-SN and wait for S-SN to respond. If we let S-SN to make the final decision, MN have to always waiting S-SN to make the decision after it receives complete information including the case T-SN accepted all the S-SN suggested candidate. S-SN don’t know it until the MN forwarded the information to it. |
| ZTE | No | For skipping the second part, we share the same view with NEC that it just means that the MN does not need to wait for the response/message from the source SN before sending the CPC configuration to the UE.  We think it’s simpler to have the same step on informing the accepted candidate PSCells to the source SN in both cases, i.e. with/without the second part. Anyway the MN needs to inform the source SN before sending the CPC configuration to the UE. However, the MN can directly decide whether to wait for the response from the source SN for SN configuration update, e.g. in case all suggested PSCell candidates have been accepted. If we let the source SN make the final decision, then an additional message from the source SN to the MN is required after knowing the accepted candidate PSCells, even in case that no SN update is required. Or some assistant information is needed in SN change required message, as proposed by Nokia. Both solutions will introduce additional complexity.  Besides, the source SN configuration update may also include the removing of useless measId(s) related with CPC, not only the measurement gap reconfiguration. So the source SN configuration update may be required in most cases except that all suggested PSCell candidates have been accepted. |
| intel | No | We also think the MN does not need to wait for the response/message from the source SN before sending the CPC configuration to the UE. And we are also ok with NEC’s suggestion that “ask RAN3 about its feasibility, e.g. first part of second step (MN->S-SN) is the Class 2 message which does not need a specific response message”. |
| Lenovo, Motorola Mobility | No | We have a feeling that we are now in the middle ground between solution 1 and solution 2.  First, in our understanding, **even if the second part (whatever that means) of solution 2 is skipped, MN shall still send a SN change confirm message to source SN, which basically becomes solution 1**. Then, if source SN wants to modify any CPC related configuration after receiving SN change confirm and knowing the prepared PSCells, source SN can do so by triggering another procedure to update the relevant configuration. It is arguable in this case the 100% correct configuration is provided to UE with a bit delay. But it does not seem a big problem to us assuming the configurations to make CPC work has been provided. It is a trade-off between let CPC evaluation start ASAP and provide a 100% correct configuration. Maybe there is no need to mandate in spec when should MN to use solution 2.  In short, by saying MN decides to skip the second part of solution 2 means MN can decide whether to adopt solution 1 or solution 2. In general, we share the view that MN shall not be mandated to wait for source SN’s “possible” update before generating and sending the RRC configuration to UE. |
| Ericsson | No | We think that the MN decides what to trigger based on the response from the T-SN e.g. either second procedure or not. Thus, the MN decides whether to configure the UE with CPC or not, upon receiving the SN Add Req Ack from TC-SN, before sending the SN Change Confirm (or equivalent) to the S-SN. If all candidate cells were accepted, the MN knows that and there is no reason to wait with the UE configuration. |
| Qualcomm | No | We think it should be MN which should decide whether to skip the second part. Once MN receives the accepted PSCells information from a target SN and based on the candidate PSCells information from the source SN, MN can make the decision whether to skip the second part, e.g., when all candidate PSCells are accepted. It saves some delay and signaling in configuring the UE with CPC. |
| LG | No | In our understanding, the second part includes i) SN change confirm (MN🡪S-SN) and ii) SN modification required (S-SN🡪MN). If S-SN decides whether to skip the second part, the signalling i) always happens because S-SN needs information to make a decision, which implies S-SN based decision incurs undesirable signalling from MN to S-SN when the second part is not needed, i.e., all suggested PSCell candidates have been accepted. We do not think that all decisions should be made by SN in the SN-initiated scenario. Since the second part is initiated by MN and MN has all the information to decide whether to skip the second part or not, it is desirable for MN to make a decision. |
| ITRI | No | We think MN should be the node that decides whether to skip the second part and the skip means that MN does not need to wait for S-SN’s response before CPC configuration. The decision should be based on which candidate cells are accepted by T-SN. MN, in the current procedure, plays the role of gathering suggested candidate cells from S-SN and accepted candidate cells from T-SN and thus has sufficient information to make the decision. |
| Ericsson |  | The configuration with all target cells accepted must be fine by the S-SN, as it was the S-SN that prepared it. |
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If companies agree with the understanding above and have responded positively to Q1, then it shall be decided how this can be resolved in a different manner. In [2] it is proposed S-SN decides when the MN can skip the second part of the procedure in Solution 2. Alternatively, as was commented during the online session at RAN2#116 [3], it can be defined explicitly in the specification the MN skips that part when all candidate PSCells are acknowledged by T-SN. Companies are kindly asked to express their preference.

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| **Question 2: Which of the following options do you prefer for defining the rules when MN can skip the second part of Solution 2 (i.e. informing the S-SN about the acknowledged PSCells and awaiting the new configuration) in SN-initiated CPC:**   1. **S-SN decides when the MN can skip the second part of the procedure in Solution 2** 2. **MN skips that part when all candidate PSCells are acknowledged by T-SN. This is a part of procedural text** 3. **MN skips that part when a candidate PSCell is rejected while there is no other candidate PSCell accepted on the same carrier. FFS whether that needs to be captured.** 4. **By implementation, MN decides whether to use solution 1 or solution 2 when informing SN about the prepared PSCells.** | | |
| **Company** | **a) or b) or c)** | **Comments** |
| Nokia | a) | As stated in the answer to Question 1, MN cannot make the right decision in SN-initiated CPC, so we think it should be S-SN that defines the rules when this part of Solution 2 can be skipped. |
| Huawei, HiSilicon | c) | See comments above. |
| NEC | b) | We assume b) means the specification clarifies this and it is not the SN to decide when to skip, either. |
| Futurewei | None | S-SN does not at a good position to make decision for MN. We also don’t think additional requirements on when to skip the step can be imposed to the network. Supporting the second step as an optional operation at the node interface(s) is what we could specify at the most. |
| Intel | b) | A Note in specification may be sufficient. |
| Lenovo, Motorola Mobility | d) | As explained in Q1 |
| Ericsson | b)-ish | We think it is sufficient to describe the behaviour in Stage 2. |
| Qualcomm | b) | This is simple and straightforward. It is better to not have more complex (maybe optimized) behavior. |
| LG | b) | We think it is desirable for MN to make a decision. See comment in Q1. |
| ITRI | b) | A Note in Stage 2 may be sufficient. |
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If you have selected option a) for Question 2, then please provide further details how this solution should be implemented.

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| **Question 3: How the S-SN may inform the MN that second part of the procedure in Solution 2 can be skipped?** | |
| **Company** | **Answer** |
| Nokia | Source SN may indicate to MN (e.g. using SN Change Required message) whether MN needs to wait for the updated measurement/measurement gap configuration after informing the source SN about the list of prepared cell. For instance, in Example 1 described in our answer to Question 1, source SN can indicate to MN that it does not need to wait for an updated measurement configuration before sending the RRC Reconfiguration message containing the CPC configuration.  The indication can also include the list of suggested target cells for which MN shall wait for an updated measurement configuration if they are not all prepared by target SN. For instance, in the Example 2 that is raised in our answer to Question 1, the source SN can inform MN about the need to wait for an updated measurement configuration when target cell B (for which the measurement gap is configured) is not accepted by target SN:   * In case target cell B is prepared by target SN, MN does not need to wait for the updated measurement configuration from the source SN (skip the second part of solution 2). * Otherwise, if target cell B is not prepared by target SN, MN needs to wait for the updated measurement configuration from the source SN (does not skip the second part of the solution 2).   The specification changes impact only RAN3 and do not seem to be major. |
| Huawei, HiSilicon | Leaving it to the MN (see above) works and has no impact to RAN3. |
| Futurewei | This additional effort can be avoided by not following the option a). |
| Qualcomm | The proposal “Source SN may indicate to MN (e.g. using SN Change Required message) whether MN needs to wait for the updated measurement/measurement gap configuration after informing the source SN about the list of prepared cell” seems reasonable. Then, once MN receives the accepted PSCells, MN takes into consideration the above indication also before it decides whether to send the accepted PSCells and wait for the source SN’s response before sending CPC configuration to UE. |
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# 3 Conclusion

The following proposals have been made in this document:

# References

1. R2-2109869 Network procedures and signalling for CPAC Ericsson 3GPP TSG-RAN WG2 Meeting #116 Electronic Elbonia, 1 – 12 of November 2021
2. R2-2110615 Resolving open points of Rel-17 CPAC Nokia, Nokia Shanghai Bell 3GPP TSG-RAN WG2 Meeting #116 Electronic Elbonia, 1 – 12 of November 2021
3. R2-2111291 Report on LTE legacy, 71 GHz, DCCA, Multi-SIM and RAN slicing 3GPP TSG-RAN WG2 Meeting #116 Electronic Elbonia, 1 – 12 of November 2021