3GPP TSG-RAN WG2 #119bis-e Tdoc R2-21xxxxx

Electronic meeting, 10th - 19th Oct. 2022

Agenda Item: 8.13.4

Source: Ericsson (Rapporteur of the offline)

Title: [AT119bis-e][802][R18 SON/MDT] SHR and SPR (Ericsson)

Document for: Discussion, Decision

# Introduction

This document is for the following offline discussion

* [AT119bis-e][802][R18 SON/MDT] SHR and SPR (Ericsson)

Discussion on the proposals 1-7 in R2-2210798.

Intended outcome: Report

Deadline: 04:44 UTC, Friday October 14th

Deadline for comments: 18:00 UTC Thursday October 13th

Contact person for each participating company:

|  |  |  |
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# Scenarios

|  |  |
| --- | --- |
| Company | Proposal |
| VIVO [1] | **Proposal 1:** RAN2 to confirm the scenarios for SPCR for NR-DC, including: •SN- and MN-initiated classic PSCell change / CPC •intra-SN classic PSCell change / CPC •classic Addition / CPA •HO with SN change (possibly addressed once the basic solution for SPCR is known) change shall be considered. |
| Samsung [3] | **Proposal 4:** SPCR can be applicable for both CPA/CPC and legacy PSCell addition/PSCell change. |
| Huawei [4] | Proposal 6a: RAN2 to focus on the following cases of SPCR:  •Scenario 1(classic PSCell change): 1a. SN/ MN-initiated classic PSCell change; 1b. Intra-SN classic PSCell change;  •Scenario 2(conditional PSCell change): 2a. SN/ MN-intimated CPC; 2b. Intra-SN CPC;  Proposal 6b: RAN2 for further discuss whether the following scenarios should be considered under the SPCR:  •Scenario 3: 3a. Classic addition; 3b. CPA;  Proposal 6c: RAN2 to deprioritize the following scenario under the SPCR:  •Scenario 4: HO with SN change; |
| ZTE [11] | Proposal 3: RAN2 focus on below scenarios for SPCR in NR-DC:  SN- and MN-initiated classic PSCell change / CPC  intra-SN classic PSCell change / CPC  classic Addition / CPA |
| Qualcomm [12] | Proposal 3: As indicated by RAN3 in LS R2-2209104, RAN2 should initially focus on basic solutions for SPCR without handover. |

Among the contributions, 4 companies proposed to first discuss and agree on the scenarios. Companies [1][3][11] focus on the scenarios agreed by RAN3 in the sent LS (R2-2209104), while Huawei in [4] proposed to discuss the classic PSCell addition and CPA scenarios. Given the LS provided by RAN3 and the provided proposals, rapporteur proposes the following:

**Proposal 1: RAN2 confirms the scenarios for SPR for NR-DC, including:**

* **SN- and MN-initiated classic PSCell change / CPC**
* **Intra-SN classic PSCell change / CPC**
* **Classic Addition / CPA**
* **HO with SN change (possibly addressed when the basic solution for SPR is known)**
* **Q1: Do you agree to the scenarios captured in proposal 1?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes, but | Our comments:   * + - 1. For **bullet 1 and 2,** we think the proper numbering may differ the classic and condition PSCell change cases. This would help RAN2 discussions. However, we do not have strong opinions, as it is not technical comment.       2. For **the bullet 3**, in the WID, the SPCR is explicitly mentioned, and SPAR has not been mentioned. We understand that RAN3 confirm the Classic Addition / CPA scenarios, but we think RAN2 can firstly discuss solutions for SPCR, and then check the delta enhancement for SPAR.   - Support of SON/MDT enhancements for [RAN3, RAN2]:   * MR-DC CPAC * Successful Pscell change report   + - 1. We suggest to remove “**HO with SN change**”, and we can have P1a like:   **P1a：RAN2 will discuss HO with SN change later, after the basic solution for SPR is known** |
| Lenovo |  | Same view as HW. |
| ZTE | Yes with modification | Our interpretation on this proposal is that he last bullet is de-prioritized, thus we are fine with Huawei’s modification. |
| Samsung | Yes |  |
| Ericsson | Yes | And agree to deprioritize the last bullet (HO with SN change) |
| Xiaomi | Yes |  |
| NEC | Yes |  |
| CATT | Yes with modification | Agree with Huawei. |
| Sharp | Yes |  |
| Nokia | Yes | HO with SN change to be deprioritized |
| APPLE | Yes |  |

Rapporteur´s summary: To be added later

### Abbreviation used for successful PSCell change/addition(?) report

If the above scenarios (including the PSCell Addition and CPA scenarios) are agreeable, rapporteur believes SPCR (that stands for successful PSCell Change Report) is not a correct abbreviation for this feature as it is to cover the classic PSCell Addition and CPA scenarios as well. Hence a successful PSCell Report (SPR) that does not limit the report to the successful PSCell change may be a more appropriate abbreviation for this report. Hence Rapporteur proposes the following:

**Proposal 2: RAN2 agree to the abbreviation of SPR instead of SPCR for the successful PSCell report to cover both “Change” and “Addition” scenarios.**

* **Q2: Do you agree with the above proposal to use SPR as abbreviation for successful PSCell Change/Addition Report (for the sake of having common language and correct naming)?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | No | We can follow the similar mechanism for abbreviation as CPAC – conditional PSCell addition or change. If we follow a similar mechanism, we can have SPACR – successful PSCell addition or change report. SPR does not provide much context about the report. |
| Huawei, HiSilicon | No strong opinion | We understand that SPR is to cover all scenarios mentioned in P1. |
| Lenovo | Maybe yes |  |
| ZTE | No | Same view as Qualcomm. Anyway this is no urgent to decide at this stage. |
| Samsung | See comments | Agree that SPCR may be improved, but even SPR doesn’t convey complete meaning.  We think SPCAR : (Successful PSCell ChangeorAddition Report) or even SPACR could be better. |
| Ericsson | Yes | Given that companies agree to consider PSCell Addition and CPA, a change in the abbreviation seems required to avoid later confusion. Either to use SPCAR or SPR, we are ok with both, however for the sake of simplicity and alignment with SHR, we slightly prefer SPR. |
| Xiaomi | No | Prefer SPACR to align with CPAC |
| NEC | No strong view | Either SPR or SPACR is fine. |
| CATT | No strong view | We understand that it depends on the scenarios discussed in P1. If only PSCell change/CPC is covered, it seems SPCR is enough, if PSCell addition/CPA is also agreed to discuss, we have similar view as Qualcomm that SPACR seems to be more suitable. |
| Sharp |  | SPCR is fine to us, or we can use SPACR to cover the “addition” case. |
| Nokia | Yes |  |
| Apple | Whatever the majority prefers |  |

Rapporteur´s summary: To be added later

### **Priorities DC types for SPR**

|  |  |
| --- | --- |
| Xiaomi [8] | Proposal 3 For successful Pscell change report, NR-DC is prioritized. |

Regarding the priority of different DC scenarios (e.g., EN-DC, NE-DC, NR-DC, etc.) to be considered for SPR, it has been proposed in [8] that for the SPR, NR-DC scenario can be prioritized. Although it has been discussed only in one contribution, the agreement on the different RAT types involved in the DC scenario seems to be essential for RAN2. RAN3 LS already points the NR-DC scenario but for the sake of clarity and to have a common understanding rapporteur proposes the following.

**Proposal 3: RAN2 confirm to prioritise NR-DC scenario for SPR.**

* **Q3: Do you confirm to prioritise NR-DC scenario for SPR?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes | This has been agreed in RAN3 and indicated in the incoming LS. |
| Lenovo | yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| NEC | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
| Nokia | Yes |  |
| Apple | Yes |  |

Rapporteur´s summary: To be added later

### **SHR as baseline for SPR solution**

|  |  |
| --- | --- |
| CATT [2] | Proposal 1:RAN2 to take the solution of R17 Pcell SHR as the baseline to start the R18 successful PSCell change report discussion. |
| Ericsson [9] | Proposal 1: Successful Handover Report (SHR) is the baseline for the successful PSCell report (SPR) in terms of configuration and reporting. |

The solution architecture/direction in terms of the configuration and reporting has been discussed in various papers and two companies mentioned to take Rel 17 SHR as baseline for the configuration and reporting solution for SPR.

**Proposal 4: SHR solution is taken as baseline for the SPR in terms of configuration and reporting.**

* **Q4: Do you agree with the above proposal to take SHR as baseline for SPR in terms of configuration and reporting?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | May be | For a few aspects, like trigger conditions, etc., we can consider SHR as the baseline. |
| Huawei, HiSilicon | Yes |  |
| Lenovo | yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| NEC | May be | Agree with QC. For example, in case of MN-initiated PSCell change, which node (MN or S-SN) configures SPR and to which node the UE report SPR needs further discussion. |
| CATT | Yes |  |
| Sharp | Yes |  |
| Nokia | Yes |  |
| Apple | Yes |  |

Rapporteur´s summary: To be added later

### **SHR configuration and triggering conditions**

|  |  |
| --- | --- |
| VIVO [1] | Proposal 2:The triggering conditions for generating SPCR should at least include: T310 elapsed time for the source PSCell exceeds a threshold; T312 elapsed time for the source PSCell exceeds a threshold; T304 elapsed time for the target PSCell exceeds a threshold. |
| CATT [2] | Proposal 2:The following three trigger conditions can be considered for successful PSCell addition/change report and RAN2 to discuss which node i.e. MN or SN should configure these trigger conditions to the UE. T304 trigger condition T310 trigger condition T312 trigger condition |
| Samsung [3] | Proposal 5:SPCR may be reported based on configured conditions. |
| Huawei [4] | Proposal 7: Introduce T304, T310 and T312 related triggering conditions of SCG for SPCR. |
| Lenovo [6] | Proposal 1: Configuration for generating successful PSCell addition/change report is configured to the UE by the network. |
| NEC [7] | Proposal 2: same as SHR, network configures triggering conditions for SPCR, and UE only stores SPCR information when triggering condition is fulfilled.  Proposal 3: the following triggering conditions can be supported for SPCR:  the elapsed time of the timer T304 is greater than a threshold  the elapsed time of the timer T310 is greater than a threshold  the elapsed time of the timer T312 is greater than a threshold |
| Xiaomi [8] | Proposal 4: Network can configure the following trigger condition for successul Pscell change report through otherConfig: T304 threshold, T310 threshold, T312 threshold. |
| Ericsson [9] | Proposal 2: SPR is triggered based on the following triggering thresholds: - T304 timer threshold – T310 timer threshold – T312 timer threshold – time between CPAC events threshold – time between receiving CPAC configuration to the execution of the CPAC – Experiencing LBT issues during CPAC execution |
| ZTE [11] | Proposal 4: The triggering events and measurements of SHR in MN can be seen as baseline for SPCR except for DAPS related triggering event and measurements. |
| Qualcomm [12] | Proposal 4: Define SCG T310, T312, and T304 thresholds for generating the SPCR. |
| SHARP [13] | Proposal 3: SPCR configuration includes triggering conditions configuration that is used to SPCR determination. |

Taking SHR as baseline for the SPR, companies [1][2][3][4][6][7][8][9][11][12][13] provided their view on the SPR configuration and in particular triggering conditions for SPR. Among them most of the companies [1, 2, 4, 7, 8, 9, 12] proposed the required triggering thresholds to be defined at least based on the SHR triggering thresholds including T310, T312, and T304 timer thresholds. Therefore, based on the convergence of the proposals, rapporteur proposes the following:

**Proposal 5: Network configures SPR configuration IE for the UE, with at least the following SPR triggering thresholds (Other triggering thresholds are FFS)**

* **T310 timer threshold**
* **T312 timer threshold**
* **T304 timer threshold**
* **Q5: do you agree to consider at least T310 and T312 and T304 timers thresholds as SPR triggering configuration while other triggering thresholds are FFS?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | Yes |  |
| Huawei, HiSilicon | Yes |  |
| Lenovo | yes |  |
| ZTE | Yes |  |
| Samsung | Yes |  |
| Ericsson | Yes |  |
| Xiaomi | Yes |  |
| NEC | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
| Nokia | Yes | Discussion is needed to decide which node configures each threshold and appropriate signalling |
| Apple | Yes |  |

Rapporteur´s summary: To be added later

### **Logging and storing SPR**

Again, taking SHR as baseline for SPR, some companies discussed the SPR logging IE and storing at the UE and reporting to the network. Below is the list of relevant proposals.

|  |  |
| --- | --- |
| VIVO [1] | Proposal 5:SPCR should be transferred with a separate signaling procedure from that of SHR if the SPCR shall be reported upon the random access towards PSCell is completed. |
| CATT [2] | Proposal 3:RAN2 to discuss the report information and following two signaling designs for successful PSCell addition/change report: successful PSCell addition/change report embedded in Pcell SHR Pcell SHR and successful PSCell addition/change report is separate |
| Xiaomi [8] | Proposal 4: Network can configure the following trigger condition for successul Pscell change report through otherConfig:  Proposal 6: UE indicates the availability of a Successful Pscell change Report in complete message. gNB can fetch the successful Pscell change report via UE Information Request/Response mechanism. |
| Qualcomm [12] | Proposal 7: Introduce a new report for SPCR for reporting lower layer issues during the successful classical/conditional PSCell change or addition.  Proposal 9: Use UEInformationResponse for reporting of SPCR. |
| SHARP [13] | 1. Proposal 1: introduce a new UE variable for SPCR information. |
| NTT DOCOMO [14] | Proposal 4: Introduce a new UE variable for successful PSCell change report.  Proposal 5: RAN2 to discuss which message is used for successful PSCell change reporting |

Based on the above proposals, rapporteur proposes to discuss the following.

**Proposal 6: RAN2 discuss and agree to the following:**

1. **SPR configuration is configured by network through otherConfig**
2. **SPR is logged in a new information element**
3. **SPR is stored in a new UE variable**
4. **SPR is fetched via UE Information Request/Response procedure**

* **Q6: Is the above proposal acceptable?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | Yes – A, D  FFS – B, C | In our understanding, for the SPR a few of the configuration parameters can be optimized by MN and a few of the configuration parameters can be optimized by SN. Therefore, we believe that UE may need to store the SPR until UE is connected to current Pcell. Upon Pcell change, SPR can discard the SPR. However, we also believe that there is no immediate requirement for reporting. Therefore, we believe that while we can reuse the UE Information Request/Response procedures for fetching the report. Whether UE need to allocate a UE variable for storing it still needs to be evaluated. |
| Huawei, HiSilicon | Yes | We take the SHR procedures as baseline and can derive these ones for SPR. |
| Lenovo | Yes |  |
| ZTE | Yes – A, D  Ffs – B, C | B/C depends on whether common or separate report is used, thus might need more investigation. |
| Samsung | Yes |  |
| Ericsson | Yes | Having a new information element (IE) for SPR seems required, as SPR and SHR may be configured independently by the MN and SN. Putting SPR and SHR together creates dependency between these two independent features that may eventually cause extra overhead and complexity for coordination between these two features |
| Xiaomi | Yes |  |
| NEC | Yes |  |
| CATT | Yes |  |
| Sharp | Yes |  |
| Nokia | Yes |  |
| Apple | Yes |  |

Rapporteur´s summary: To be added later

**Content of SPR**

In various papers it has been discussed to include the measurements and information in the SPR when at least one of the SPR triggering conditions is fulfilled. In the following, the information and measurements that are commonly proposed by the companies are provided as baseline in the SPR IE.

**Proposal 7: UE logs at least the following information and measurements in the SPR IE (other information and measurements are FFS).**

1. **Source PSCell info (cell ID, measurement result)**
2. **Target Pscell info (cell ID, measurement result)**
3. **Candidate PSCell info (cell ID, measurement result)**
4. **Neighbour Cells info (cell ID, measurement result)**
5. **Success PSCell change cause (e.g., t304, t310, t312 cause, etc.)**
6. **Random access related information**
7. **The time elapsed between the CPAC execution towards the target cell and the corresponding latest CPAC configuration received for the selected target cell**
8. **Location Information**

* **Q7: Are the above information and measurements acceptable to be included in the SPR? If not, please comment which one you disagree**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Qualcomm | Okay – E, G, H  No – C, F  Modified – A, B, D | Network should be aware of the candidate cell list. UE does not need to report. Furthermore, for candidate cell list optimization, network can use failure scenarios.  For measurements of source, target, and neighbouring cells, we can reuse existing Ies (measResultFreqList and measResultSCG-Failure) from SCGFailureInformation. |
| Huawei, HiSilicon | Yes,  but comments for c+d, f | We are ok with all the Ies a)~h). But we want to further clarify that:   * For c) and d): in SHR, there is no separate candidate cell measurement result list. The candidate cell info can be indicated by the *choCandidate-r17* in the *measResultNeighCells-r17*. We prefer to apply the similar principle and merge the two bullets like:   **c) Neighbour Cells info (cell ID, measurement result, including Candidate PSCell info)**   * For f): In SHR, considering the signaling overhead, we introduced conditions for UE to include the RACH info. We also have concern on the signaling overhead for the SPR. One option is not to report f). The other is prefer to consider some conditions. And the conditions can be FFS from the time being. Both options are OK for us. |
| Lenovo | Yes for all | Same view as HW on c) and d). |
| ZTE | Yes | Try to adopt the same amount of information for SHR, which is also beneficial for SPCR for the similar reasoning. As for c, agree with Huawei’s observations. We can say try to reusing Ies defined in SHR. |
| Samsung | See comments. | Ok for all except c)  As d) includes reporting neighbour cells info, Candidate PSCelInformation may not be explicitly needed. The neighboring cells info may include indicators to indicate if each neighboring cell is candidate PSCell similar to SHR. |
| Ericsson | Yes | For c and d we think further investigation is needed whether we can reuse the same flag (*choCandidate-r17*) or not. As of now, we think it may be necessary to differentiate the CHO candidate cell from CPAC candidate cell, as policies for CHO and CPAC may be different at RAN nodes and not differentiating them may cause confusion at the RAN node.  For f we agree to FFS conditions on inclusion of RA information in SPR. |
| Xiaomi | Yes,  but comments for c+d, f | Same view as HW |
| NEC | Yes | Agree with Huawei on c+d and f. |
| CATT | Yes with comment | Same view as Huawei. |
| Sharp | Yes | Similar to candidate CHO cell information in SHR，c）can be implemented as an candidate indicator which is set to true if the cell is a candidate target cell in the neighbor cell measurement in SPCR. |
| Nokia | Yes | e) should also cover addition (see proposal 2), h) is optional |
| Apple | Se comments | OK for a-e, not OK for f-h |

Rapporteur´s summary: To be added later

# Conclusion

To be added later.

# References

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