**3GPP TSG RAN2 #120 R2-22xxxxxx**

**Toulouse, France, 14th – 18th November, 2022**

**Agenda Item:**  **8.13.4 SHR and SPCR**

**Source: Huawei (email rapporteur)**

**Title:** **Report of [Pre120][801][R18 SON/MDT] SHR and SPR (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This is the email report of [Pre120][801]:

**#801 SHR and SPR discussion, summarize the papers in 8.13.4. Focus on incoming LS-related issues. (Huawei)**

According to Skeleton v1, the relevant Tdocs are listed below:

[0] R2-2211160 LS on inter-RAT SHR and SPCR (R3-226003; contact: Qualcomm) RAN3 LS in To:RAN2

[1] R2-2211613 Discussion on Inter-RAT SHR and SPR CATT discussion

[2] R2-2211884 Discussion on successful PSCell change report NEC discussion

[3] R2-2211992 Discussion on SPR NTT DOCOMO, INC. discussion

[4] R2-2212032 SON enhancements for SPR Lenovo discussion

[5] R2-2212033 Successful Handover Report for inter-RAT HO Lenovo discussion

[6] R2-2212090 SPR and SHR enhancements Ericsson discussion

[7] R2-2212220 Discussion on SHR and SPR Huawei, HiSilicon discussion

[8] R2-2212283 Consideration on SHR and SPCR ZTE Corporation, Sanechips discussion

[9] R2-2212290 SON/MDT enhancements for SHR and SPCR Samsung R&D Institute India discussion

[10] R2-2212642 Remaining issues on SON enhancement for SPR vivo discussion

[11] R2-2212665 Discussion on SHR for inter-RAT handover and successful PSCell change reporting Qualcomm Incorporated discussion

[12] R2-2212728 SON enhancements on SPR Sharp discussion

[13] R2-2212807 Discussion on SHR and SPCR Xiaomi discussion

**Section 2.1 is to address the questions listed in the RAN3 LS [0], and section 2.2/2.3 are to address others.**

# 2 Discussion

## 2.1 Discussions related to LS-related issues

### 2.1.1 Questions for inter-RAT SHR

#### 2.1.1.1 Q1

RAN3 agreed to support T310 and T312 related triggers for inter-RAT SHR from NR to LTE. But there was no consensus on whether to also support T304 trigger for inter-RAT SHR from NR to LTE. Considering this might impact RAN2 specifications (including LTE specifications), RAN3 has the following questions: (Q1, Q2, and Q3)

**Q1. Is RAN2 planning to impact LTE specifications to support inter-RAT SHR?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 9: RAN2 discuss to avoid LTE spec impact. |
| [3], NTT DOCOMO | Proposal1: RAN2 plans to modify LTE spec to support inter-RAT SHR. |
| [6], Ericsson | Observation 6 The WID supporting inter-RAT SHR specifically mentions NR but not LTE. |
| [7], Huawei | The answer to Q1: RAN2 agrees to reduce/avoid the impact on LTE specification to support inter-RAT SHR. |
| [11], Qualcomm | Proposal 1: RAN2 should avoid LTE specification impacts to support inter-RAT SHR. |

**Summary:**

4/5 companies prefer to avoid LTE impacts. The rapporteur thinks that Q1 is related to Q4 and Q5.

**To-be-discussed Proposal 1: Whether there are LTE impacts depends on RAN2 progress on Q3, Q4 and Q5.**

#### 2.1.1.2 Q2

**Q2. Whether T304 trigger for inter-RAT SHR from NR to LTE is to be supported?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 10: T304 trigger condition is not supported for HO from NR to LTE. |
| [3], NTT DOCOMO | Proposal2: RAN2 to support T304 trigger for inter-RAT SHR from NR to LTE. |
| [5], Lenovo | Proposal 3: Configuration of triggering inter-RAT SHR from NR to LTE may be transmitted to the UE via the MobilityFromNRCommand message. |
| [6], Ericsson | Observation 7 The WID does not support using timer T304 for inter-RAT SHR from NR to LTE. |
| [7], Huawei | The answer to Q2: T304 trigger for inter-RAT SHR from NR to LTE is NOT supported. |
| [8], ZTE | Proposal 1: RAN2 discuss whether to allow configuring T304 SHR trigger for HO from NR to EUTRA. |
| [9], Samsung | Proposal 2: For NR to LTE handover’s SHR, RAN2 can consider all the triggers as in Intra-NR SHR. |
| [11], Qualcomm | Proposal 2: Consider only RLM/BFD timers (i.e., only T310 and T312) threshold for generating SHR for intra-system inter-RAT, HO from NR to LTE, i.e., no need to support T304 threshold. |

**Summary:**

No: CATT, Ericsson, Huawei, Qualcomm

Yes: NTT DOCOMO, Lenovo, Samsung

Discuss: ZTE

4/8 companies do not support T304 trigger. This Q2 is related to Q3 and Q4, so the summary proposal will be made after Q4.

#### 2.1.1.3 Q3

**Q3. If yes to Q2, whether the inter-RAT SHR is always encoded in source RAT format or can be encoded based on the RAT format which generates the inter-RAT SHR trigger condition (e.g., inter-RAT SHR encoded in NR format for T310/T312 triggers and in LTE format for T304 triggers for inter-RAT HO from NR to LTE)?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 11: The inter-RAT SHR is always encoded in source RAT format, i.e. NR format, and is reported to NR cell when the UE is back to NR in case of HO from NR to LTE. |
| [3], NTT DOCOMO | Proposal3: inter-RAT SHR is encoded based on the RAT format which generates the inter-RAT SHR trigger condition (e.g., inter-RAT SHR encoded in NR format for T310/T312 triggers and in LTE format for T304 triggers for inter-RAT HO from NR to LTE). |
| [5], Lenovo | Proposal 5: Inter-RAT SHR can be encoded based on the RAT format of the node which generates the inter-RAT SHR trigger condition (e.g., inter-RAT SHR can be encoded in NR format if T310/T312 triggers inter-RAT SHR from NR to LTE, or in LTE format if T304 triggers inter-RAT SHR from NR to LTE). |
| [6], Ericsson | Observation 8 If T304 trigger for NR is supported for inter-RAN SHR from NR to LTE, a SHR needs to be sent to the LTE node using LTE format. |
| [7], Huawei | The answer to Q3: The inter-RAT SHR is encoded in NR format for T310/T312 triggers. |
| [8], ZTE | Proposal 2: If only T310/312 triggers are supported for mobility from NR to LTE, UE stores the SHR in NR format with the same amount information agreed for intra-NR SHR and report to NR (i.e., no inter-RAT report).  Proposal 3: If T310/312/T304 triggers are supported for mobility from NR to LTE, UE stores the SHR in LTE format and report to LTE node with below enhancements:   * OtherConfig in *RRCConnectionReconfiguration* is enhance*d* to allow T304 SHR trigger configuration * UEInformationRequest/Response is used for SHR reporting * The same amount of information as for intra-NR SHR is included |

**Summary:**

Encoded in NR format: CATT

Encoded based on the RAT format which generates the trigger condition:

NTT DOCOMO, Lenovo, Ericsson

Encoded in NR format (for T310/T312): Huawei, ZTE

Encoded in LTE format (for T310/T312/T304): ZTE

If yes to Q2, slightly more companies prefer the following option:

*The inter-RAT SHR is always encoded based on the RAT format which generates the inter-RAT SHR trigger condition (e.g., inter-RAT SHR encoded in NR format for T310/T312 triggers and in LTE format for T304 triggers for inter-RAT HO from NR to LTE)*

#### 2.1.1.4 Q4

Further RAN3 is not sure on the retrieval and reporting of inter-RAT SHR and would like to ask RAN2 the following question:

Q4. If yes to Q2, and if inter-RAT SHR is collected due to T304 triggers (configured by target LTE node), what is RAN2’s preference on the following two options?

* Option 1: It is sufficient for UE to report the inter-RAT SHR once UE is back to NR
* **Option 2: The LTE node should have the capability to retrieve the inter-RAT SHR**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [3], NTT DOCOMO | Proposal4: It is sufficient for UE to report the inter-RAT SHR once UE is back to NR. |
| [5], Lenovo | Proposal 6: When T310/T312 triggers inter-RAT SHR from NR to LTE, inter-RAT SHR encoded in NR format can be transmitted to a NR node, or, to the target LTE node or a second LTE node together with source cell ID outside of the inter-RAT SHR. |
| [5], Lenovo | Proposal 7: When T304 triggers inter-RAT SHR from NR to LTE, inter-RAT SHR encoded in LTE format can be transmitted to the target LTE node or a second LTE node, or, to a NR node optionally with target cell ID outside of the inter-RAT SHR. |
| [6], Ericsson | Observation 9 Sending a LTE SHR to the NR node is possible in theory, but requires the LTE SHR to be sent to the target node using Xn, NG or S1, making for a clumsy solution. Furthermore, LTE specifications need to be augmented with SHR.  Observation 10 Sending the LTE SHR to the LTE nodes requires LTE specifications to be augmented with a complete SHR concept. |
| [7], Huawei | The answer to Q4: It is sufficient for UE to report the inter-RAT SHR once UE is back to NR. |
| [9], Samsung | Proposal 4: Inter-RAT SHR retrieval follows same principle as RLF retrieval. |

**Summary:**

Option 1: NTT DOCOMO, Huawei, Samsung

Option 2: no companies

The Inter-RAT SHR to be transmitted to NR when T310/T312 triggers, or to other node (depends on source cell ID): Lenovo

No to both option 1 and 2: Ericsson

Related to Q2, Q3 and Q4:

For Q4, option 1 has some supports, but one company pointed out that the option is a clumsy solution and would need LTE specification updates. There are no supports on option 2. And one company provided another option (as below).

For Q3, 3 companies preferred that the SHR report is encoded based on the RAT format which generates the trigger condition, but there are also other views.

For Q2, 3 companies support to have T304 trigger, but 4 companies do not support.

Considering the above discussions, the rapporteur thinks that T304 trigger has lots of work/impacts in RAN2, so it is not agreeable for now. So it is proposed:

**To-be-discussed Proposal 2: T304 trigger for inter-RAT SHR from NR to LTE is not supported.**

#### 2.1.1.5 Q5

RAN3 further discussed on the potential contents for inter-RAT successful handover and agreed on the following:

1. Source NR cell information
2. Target LTE cell information
3. Measurement results for source, target and neighbours
4. Cause to indicate which inter-RAT SHR triggering condition was met
5. UE location Information

Considering there might be parallel discussion in RAN2, RAN3 would like to check the following:

Q5: Can RAN2 confirm the support for above parameters for inter-RAT SHR from NR to LTE? Whether the existing IEs defined in Rel-17 for intra-NR SHR can be reused is up to RAN2 decision.

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 12: Introduce LTE target cell identity and measurement results in SHR to support inter-RAT SHR. |
| [5], Lenovo | Proposal 4: The following information can be included in the inter-RAT SHR from NR to LTE:   * source NR cell information * target LTE cell information * measurement results of source NR cell, target LTE cell and neighbour cell(s) * cause to indicate which inter-RAT SHR triggering condition was met * UE location Information   target C-RNTI |
| [6], Ericsson | Observation 11 RAN2 can confirm the support for the parameters listed in Q5.  Proposal 10 For Inter-RAT handover from NR to LTE, augment the SHR with a counter for the number of RA attempts made for the successful handover.  Proposal 11 For Inter-RAT handover from NR to LTE, augment the SHR with a flag on whether contention was observed for the successful handover.  Proposal 12 RAN2 agree to enhance the inter-RAT SHR configuration with a triggering condition associated to the number of random access attempts toward the LTE cell. |
| [7], Huawei | Proposal 4: For the SHR from NR to LTE, RAN2 includes the following information:  a. Source NR cell information  b. Target LTE cell information  c. Measurement results for source, target and neighbours  d. Cause to indicate which inter-RAT SHR triggering condition was met  e. UE location Information  f. source C-RNTI  Proposal 5a: Introduce the new target LTE cell information in the existing SHR.  Proposal 5b: If the new target LTE cell information is set, the target NR cell information is set to a special value, e.g., 0.  The answer to Q5: for bullets a, c, d and e, the existing IEs defined in R17 SHR can be reused, while for bullet b RAN2 introduces the new LTE target cell information. |
| [9], Samsung | Proposal 3: Include the below in Inter-RAT SHR report   1. Source NR cell information 2. Target LTE cell information 3. Measurement results for source, target and neighbours 4. Cause to indicate which inter-RAT SHR triggering condition was met 5. UE location Information |

**Summary:**

|  |  |  |
| --- | --- | --- |
| **Information** | **Supports** | **Re-use R17 IE** |
| **a. Source NR cell information** | CATT, Huawei, Lenovo, Samsung | Huawei |
| **b. Target LTE cell information** | Ericsson, Lenovo, Samsung |  |
| **c. Measurement results for source, target and neighbours** | Ericsson, Huawei, Lenovo, Samsung | Huawei |
| **d. Cause to indicate which inter-RAT SHR triggering condition was met** | Ericsson, Huawei, Lenovo, Samsung | Huawei |
| **e. UE location Information** | Ericsson, Huawei, Lenovo, Samsung | Huawei |

**Others:**

* Target C-RNTI: Lenovo
* A counter for the number of RA attempts for the successful handover: Ericsson
* A flag on whether contention was observed for the successful handover: Ericsson
* A triggering condition associated to the number of random access attempts toward the LTE cell: Ericsson
* If the new target LTE cell information is set, the target NR cell information is set to a special value, e.g., 0: Huawei

For Q5, most of companies confirm the support for above parameters. Regarding whether the existing IEs defined in Rel-17 for intra-NR SHR can be reused, one company think IE b should be a new one, while other IEs can reuse Rel-17 definitions.

**Agreeable Proposal 1: For Q5, RAN2 confirms the support for the parameters for inter-RAT SHR from NR to LTE.**

**To-be-discussed Proposal 3: For Q5, RAN2 to discuss whether it is agreeable: the IE b. Target LTE cell information is a new IE, and others (i.e. IE a/c/d/e) can reuse the existing IEs defined in Rel-17 for intra-NR SHR).**

#### 2.1.1.6 Suggestions on the reply LS

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [6], Ericsson | Proposal 9 RAN2 to reply to the LS from RAN3 asking RAN3 to note that RAN2 is not planning to impact LTE specifications to support inter-RAT SHR and T304 based threshold is not to be used as SHR triggering condition for Inter-RA HO. |
|  |  |

**Summary:**

Once RAN2 has concluded on the listed questions in the RAN3 LS [0], the reply LS can be discussed.

### 2.1.2 Questions for SPR

#### 2.1.2.1 Q6

RAN3 also discussed different aspects related to SPCR and have the following questions to RAN2: (Q6, Q7, and Q8)

**Q6. Whether the SPCR can be stored at the UE and sent later to the gNB or is sent immediately after the successful PSCell change or addition?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 1: UE can store SPR at most 48 hours after the last successful PSCell addition/PSCell change report is stored at UE. |
| [3], NTT DOCOMO | Proposal5: SPR can be stored at the UE and sent later to the gNB. |
| [4], Lenovo | Proposal 5: SPR is logged in a new IE and stored in a new UE variable. |
| [7], Huawei | The answer to Q6: The SPR can be stored at the UE and sent later. |
| [10], vivo | Proposal 1: The following should be included in the reply LS on SPR:   * UE can store and later send the SPR to gNB via UEInformationRequest/Response; |

**Summary:**

Almost all companies agree that SPR can be stored at the UE and sent later to the gNB, and it follows the same way as Rel-17 SHR, i.e. the UE stores the SHR, and then it can indicate the field successHO-InfoAvailable-r17 to the network, later the network can use UEInformation procedure to request the SHR.

**Agreeable Proposal 2: SPR can be stored at the UE and sent later to the gNB.**

The following proposals are not related to Q6, and they are for details for UE behaviours. It is suggested to discuss them in section 2.2.2.

* UE can store SPR at most 48 hours after the last successful PSCell addition/PSCell change report is stored at UE CATT
* SPR is logged in a new IE and stored in a new UE variable Lenovo
* UE can store and later send the SPR to gNB via UEInformationRequest/Response vivo

#### 2.1.2.2 Q7

**Q7. Which node (MN or SN) retrieves the SPCR from the UE?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 2: It is MN to retrieves the SPR from UE. |
| [3], NTT DOCOMO | Proposal6: For CPA and MN initiated classis PSCell change or CPC, MN should be responsible for SPR retrieval, for SN initiated classis PSCell change or CPC, SN should be responsible for SPR retrieval. UE can first send SPR to MN, and MN forward SPR to SN if it is SN initiated classis PSCell change or CPC. |
| [7], Huawei | The answer to Q7: MN retrieves the SPR from the UE. |
| [9], Samsung | Proposal 7: Both MN and SN can retrieve SPR reports. |
| [6], Ericsson | Proposal 2 MN collects the SPR from the UE. |
| [8], ZTE | Proposal 4: It is up to NW’s implementation to request UE to report SPR.  Proposal 8: SPR is only reported to MN. |
| [10], vivo | Proposal 1: The following should be included in the reply LS on SPR:   * Only MN retrieves the SPR from the UE; |
| [4], Lenovo | Proposal 7: The UE sends an indication for availability of SPR to MN, MN may request and receive the SPR from the UE via legacy UE Information Request/Response procedure. |

**Summary:**

Only MN can retrieve the SPR from the UE: CATT, Huawei, Ericsson, vivo, Lenovo

MN or SN can retrieve the SPR from the UE: NTT DOCOMO, Samsung, ZTE

5/8 companies support that only MN can retrieve the SPR from the UE.

**To-be-discussed Proposal 4: Only MN can retrieve the SPR from the UE.**

#### 2.1.2.3 Q8

**Q8. Which node (MN or SN) sends the Successful PSCell Change/Addition configuration to the UE?**

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 3: The SPR configuration is configured only by SN, i.e. source SN configures T310 and T312 thresholds, target SN configures T304 threshold.  Proposal 4: It is source SN to send the T310 and T312 thresholds of SPR configuration to UE, and MN (for inter-SN PSCell change and PSCell addition) or source/target SN (for intra-SN PSCell change) to send T304 threshold of SPR configuration to UE. |
| [2], NEC | Proposal 1. For MN-initiated PSCell change/addition, triggering conditions (e.g. T310 threshold, T312 threshold) of SPR are configured by MN.  Proposal 2. For SN-initiated PSCell change, triggering conditions (e.g. T310 threshold, T312 threshold) of SPR are configured by S-SN/S-PSCell  Proposal 3. For both MN-initiated PSCell change/addition and SN-initiated PSCell change, the triggering condition T304 threshold is configured by T-SN/T-PSCell. |
| [3], NTT DOCOMO | Proposal7: In case there is no SRB3 configured, MN sends SuccessPScellChange config (T310/T312 config) to the UE.  Proposal8: In case there is SRB3 configured, SN sends SucessPScellChange Config (T310/T312 config) to the UE.  Proposal9: MN always sends SuccessPScellChange/Addition config (T304 config) to the UE. |
| [4], Lenovo | Proposal 2: The node which initiates PSCell change or CPC decides T310/T312 trigger threshold for SPR, i.e.   * For MN initiated PSCell change or CPC, MN decides T310/T312 trigger threshold for SPR; * For SN initiated PSCell change or CPC, source SN decides T310/T312 trigger threshold for SPR.   Proposal 3: Target SN decides T3104 trigger threshold for SPR.  Proposal 4: Configuration of T310/T312/T304 trigger threshold for SPR can be sent to the UE by the MN. |
| [6], Ericsson | Proposal 1 T304 related triggering condition is set by the target PSCell. The triggering condition is a threshold percentage;  Proposal 2  UE logs SPR when ratio of T304 timer value and the maximum T304 value is above the configured T304 threshold.  Proposal 3 T310 and T312 timer related triggering conditions are set by node initiating the PSCell change procedure. i.e., for MN initiated SN change, MN configures the T310 and T312 related triggering conditions; for SN initiated SN change, source SN configures the T310 and T312 related triggering conditions.  Proposal 4 RAN2 define binary flags for T310 and T312 timer based thresholds to trigger SPR if the timer T310 or T312 were running before execution of the PSCell change.  Proposal 5 SPR is triggered based on the following additional triggering thresholds: - time between CPAC events threshold - time between receiving CPAC configuration to the execution of the CPAC - Experiencing LBT issues during CPAC execution |
| [7], Huawei | The answer to Q8: depending on different cases, RAN2 confirms that:   * MN sends the Successful PSCell Change/Addition configuration for the MN-initiated PSCell Change/Addition; * For the SN-initiated PSCell Change, the source-SN sends the Successful PSCell Change configuration within the container through MN via SRB1 or directly via SRB; |
| [8], ZTE | Proposal 5: For SPR, target SN provides T304 configuration through otherConfig embedded in HO command message.  Proposal 6: Except for CPA and SN addition, source SN provides T312/T310 trigger configuration through otherConfig in RRCReconfiguration message, while MN provides T312/T310 trigger for CPA and SN addition.  Proposal 7: UE receives configuration of SPR through RRCReconfiguration message following the SN addition/modification/change/PSCell change procedure defined in TS 37.340 for NR-DC. |
| [9], Samsung | Proposal 5: Both MN and SN can provide SPR configuration.  Proposal 6: SPR is logged in a new Information Element and is stored in a new UE variable. |
| [10], vivo | Proposal 1: The following should be included in the reply LS on SPR:   * MN sends the Successful PSCell Change/Addition configuration to the UE. |
| [11], Qualcomm | Proposal 4: When (re-)configuration does not require MN involvement, SPR thresholds can be sent By SN over SRB3.  Proposal 5: RAN2 should wait for RAN3 to conclude discussions on the optimization objective associated with SPR and which node configures the triggering conditions in different scenarios. |
| [12], Sharp | Proposal 3: RAN2 discusses which node configures SPR configuration to UE. |

**Summary:**

For Q8, there are at least the following options:

* Option 1: Only MN can send the SPR config to the UE
* Option 2: depends on the presence of SRB3, i.e.
  + in case there is no SRB3 configured, MN sends SuccessPScellChange config (T310/T312 config) to the UE.
  + In case there is SRB3 configured, SN sends SucessPScellChange Config (T310/T312 config) to the UE.
  + MN always sends SuccessPScellChange/Addition config (T304 config) to the UE.
* Option 3: depends on which of nodes initiates SPR, i.e.
  + For the MN-initiated PSCell Change/Addition, MN sends the SPR config to the UE
  + For the SN-initiated PSCell Change, the source-SN sends the Successful PSCell Change configuration within the container through MN via SRB1 or directly via SRB;

**To-be-discussed Proposal 5: For Q8, RAN2 to discuss the following options:**

* **Option 1: Only MN can send the SPR config to the UE**
* **Option 2: depends on the presence of SRB3, i.e.:**
  + **In case there is no SRB3 configured, MN sends SuccessPScellChange config (T310/T312 config) to the UE**
  + **In case there is SRB3 configured, SN sends SucessPScellChange Config (T310/T312 config) to the UE**
  + **MN always sends SuccessPScellChange/Addition config (T304 config) to the UE**
* **Option 3: depends on which of nodes initiates SPR, i.e.:**
  + **For the MN-initiated PSCell Change/Addition, MN sends the SPR config to the UE**
  + **For the SN-initiated PSCell Change, the source-SN sends the Successful PSCell Change configuration within the container through MN via SRB1 or directly via SRB**

The rapporteur notes that some proposals are related to which of nodes can set the parameters, which can be left to RAN3 discussions.

**To-be-discussed Proposal 6: Which of nodes can set the parameters can be left to RAN3 discussions.**

## 2.2 Proposals extracted for SPR enhancements

### 2.2.1 SPR configuration and triggering conditions

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [4], Lenovo | Proposal 1: A percentage value of T310/T312/T304 can be configured as the trigger condition of SPR. |
| [7], Huawei | Proposal 13: For MN-initiated PSCell change / CPC, when the MN configures the T310, T312 related triggering condition, it indicate UE to correlate the above triggers with the T310, T312 timers configured in source SN:   * Indicator to indicate UE to correlate the above triggers with the ones configured in source SN * Separate T310-scg, T312-scg related triggering conditions.   Proposal 17: MN sends the indicator to inform UE whether MN initiates the PSCell change. |
| [10], vivo | Proposal 2: The current agreed triggering conditions of SPR are sufficient, i.e., no other triggering condition is needed.  Proposal 3: Regarding values of the triggering conditions of SPR, RAN2 to agree the following:   * Define separate thresholds for T310/T312/T304; * The percentage values are 40%, 60%, 80%, and the percentage value also includes 20% for threshold for T312; * The percentage is to indicate the ratio of the threshold value (unit: ms) over the signalled T310/T312/T304 value (unit: ms). |
| [11], Qualcomm | Proposal 3: RAN2 can consider SHR as the reference for the values of the triggering conditions, i.e., values are configured as the percentage of actual timer values. |

**Summary:**

For values of the triggering conditions (FFS from RAN2#119b-e), most of companies think RAN2 can consider SHR as the reference for the values of the triggering conditions, i.e., values are configured as the percentage of actual timer values.

**Agreeable Proposal 3: Agree that the values of the triggering conditions are configured as the percentage of actual timer values. Rel-17 SHR can be considered as the reference.**

### 2.2.2 Logging and storing SPR

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [2], NEC | Proposal 4: RAN2 to define separated SPR availability indication and SPR report fetch mechanisms for different cases. |
| [7], Huawei | Proposal 8: The UE stores the SPR and discard the SPR if not fetched within 48 hours. |
| [8], ZTE | Proposal 9: UE stores both SPCR and SHR configuration (one for each type at most) if received from NW.  Proposal 10: Extend existing SHR with additional IE to store SPR.  Proposal 11: RAN2 inform RAN3 in the reply LS that SPR is agreed as the formal terminology for Successful PSCell change/addition report. |
| [6], Ericsson | Proposal 1 UE removes the last stored SPR upon - State transition (RRC\_CONNECTED to RRC\_INACTIVE/IDLE) - executing reconfiguration with sync on PCell or PSCell. |
| [1], CATT | Proposal 8: UE records/reports PCell SHR and PSCell SPR separately. |
| [11], Qualcomm | Proposal 6: Considering the limited memory at the UE, only the latest successful PSCell change is reported by the UE.  Proposal 7: UE can clear SPCR upon PCell change, i.e., UE generates the PSCell change report when configured trigger condition meets. Send the availability indicator in RRCReconfigurationComplete (containing RRCReconfigurationWithSYNC for SCG) messages. Clear after UE changes PCell. |
| [12], Sharp | Proposal 1: introduce a new UE variable for SPR information.  Proposal 2: only the latest PSCell change is recorded in SPR. |

**Summary:**

For Q6, some proposals are summarized and they can be discussed here.

|  |  |  |
| --- | --- | --- |
| **No** | **Proposal** | **Supports** |
| 1 | UE can store SPR at most 48 hours after the last successful PSCell addition/PSCell change report is stored at UE | CATT, Huawei |
| 2 | SPR is logged in a new IE and stored in a new UE variable | Lenovo, Sharp |
| 3 | UE can store and later send the SPR to gNB via UEInformationRequest/Response | vivo, NEC |
| 4 | Define separated SPR availability indication | NEC |
| 5 | UE stores both SPCR and SHR configuration (one for each type at most) if received from NW. | ZTE |
| 6 | Extend existing SHR with additional IE to store SPR. | ZTE |
| 7 | UE removes the last stored SPR upon - State transition (RRC\_CONNECTED to RRC\_INACTIVE/IDLE) - executing reconfiguration with sync on PCell or PSCell. | Ericsson |
| 8 | UE records/reports PCell SHR and PSCell SPR separately. | CATT |
| 9 | Considering the limited memory at the UE, only the latest successful PSCell change is reported by the UE. | Qualcomm, Sharp |
| 10 | UE can clear SPCR upon PCell change, i.e., UE generates the PSCell change report when configured trigger condition meets. Send the availability indicator in RRCReconfigurationComplete (containing RRCReconfigurationWithSYNC for SCG) messages. Clear after UE changes PCell. | Qualcomm |

The rapporteur thinks that the following proposals should be agreeable:

**Agreeable Proposal 4: UE stores both SPCR and SHR configuration (one for each type at most) if received from NW.**

**Agreeable Proposal 5: UE can store and later send the SPR to gNB via UEInformationRequest/Response.**

**Agreeable Proposal 6: Only the latest successful PSCell change is reported by the UE.**

The following proposals need more discussions:

**To-be-discussed Proposal 7: RAN2 to discuss the following options:**

* **Option 1: Extend existing SHR with additional IE to store SPR**
* **Option 2: UE records/reports PCell SHR and PSCell SPR separately.**

### 2.2.3 Information and measurements logged in the SPR

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [1], CATT | Proposal 5: CPAC candidate cell flag can reuse CHO candidate cell flag to indicate whether a neighbour cell is CPAC candidate cell or not.  Proposal 6: Random access related information is included in SPR only when the SPR is triggered due to T304 exceeds the configured threshold.  Proposal 7: Location information is included in SPR. |
| [4], Lenovo | Proposal 6: The following information can be included in the SPR:   * location information * random access related information when SPR is triggered due to T304 * a new flag to indicate CPAC candidate PSCell |
| [6], Ericsson | Proposal 8 UE logs the following additional information in the SPR report:   * Value of T310 and T312 timers at the time of execution of PSCell change if the timers were running before PSCell execution * Random access related information if SPR is triggered due to T304 related triggering conditions or consistent LBT failure if LBT recovery configuration was configured * Location information, if available. * Time elapsed between the initiation of the last CPAC execution towards the target PSCell and the reception of the latest CPC for this target PSCell. * LBT related information and measurements when operating in NRU |
| [9], Samsung | Proposal 8: A new flag is used to indicate CPAC candidate cell in SPR. |
| [9], Samsung | Proposal 9: RA information and location information are optionally included in SPR. |
| [10], vivo | Proposal 5: The CHO candidate cell flag can be reused for the CPAC candidate cells.  Proposal 6: When T304 triggering condition is fulfilled, random-access related information should be included in SPR.  Proposal 7: The location information can be included in SPR.  Proposal 8: The following information should be included in the SPR:   * An indication to indicate the type of PSCell addition/change, i.e., PSCell addition, MN-initiated PSCell change or SN-initiated PSCell change; * PCell ID during PSCell addition/change procedure. |
| [13], Xiaomi | Proposal 3 choCandidate flag in MeasResultNR of neighbor cell is reused for indicating CPAC candidate cells flag.  Proposal 4 For SPR, Random access related information is included only when SPR is triggered by T304.  Proposal 5 For SPR, available location information is included. |
| [12], Sharp | Proposal 4: reuse CHO candidate cell flag to indicate CPAC candidate cell in neighbor cell measurements. |
| [7], Huawei | Proposal 14: Define a new flag to indicate CPAC candidate cell.  Proposal 15: The random access related information is not introduced in SPR.  Proposal 16:The UE logs the PCell information in case of PSCell addition and MN-initiated PSCell change.  Proposal 18: The UE logs PCell information instead of PSCell if the indicator is received in case of MN-initiated PSCell change. |

**Summary:**

Among all information and measurements, the rapporteur suggest to discuss random access related information, and others may be discussed. The summary is as below:

|  |  |
| --- | --- |
| **Views** | **Supports** |
| Random access related information is included in SPR only when the SPR is triggered due to T304 exceeds the configured threshold. | CATT, Lenovo, Ericsson, Xiaomi |
| Random access related information if SPR is triggered due to consistent LBT failure if LBT recovery configuration was configured | Ericsson |
| RA information and location information are optionally included in SPR. | Samsung |
| The random access related information is not introduced in SPR. | Huawei |

Some companies prefer to optionally include RA information, and 4 companies prefer to include the information only when the SPR is triggered due to T304 exceeds the configured threshold.

**Agreeable Proposal 7: Random access related information is included in SPR only when the SPR is triggered due to T304 exceeds the configured threshold.**

## 2.3 Proposals extracted for Inter RAT SHR enhancements

### 2.3.1 Scenarios

The companies’ views are listed in the table below:

|  |  |
| --- | --- |
| **Company** | **Views** |
| [5], Lenovo | Proposal 1: Prioritize SHR for intra-system inter-RAT HO from NR to LTE in R18. |
| [9], Samsung | Proposal 1: RAN2 to prioritise inter-RAT HO from NR to LTE first. Inter-RAT HO from LTE to NR can be considered after that. |

**Summary:**

In the RAN3 LS, inter-RAT from NR to LTE was mentioned, but inter-RAT HO from LTE to NR was not. So the above companies’ views are reasonable.

**Agreeable Proposal 8: RAN2 to prioritise inter-RAT HO from NR to LTE first. Inter-RAT HO from LTE to NR can be considered after that.**

# 3 Conclusion

**For LS-related discussions, for inter-RAT SHR related questions, the following proposals are made:**

**Agreeable Proposal 1: For Q5, RAN2 confirms the support for the parameters for inter-RAT SHR from NR to LTE.**

**To-be-discussed Proposal 1: Whether there are LTE impacts depends on RAN2 progress on Q3, Q4 and Q5 (To-be-discussed Proposal 2).**

**To-be-discussed Proposal 2: T304 trigger for inter-RAT SHR from NR to LTE is not supported.**

**To-be-discussed Proposal 3: For Q5, RAN2 to discuss whether it is agreeable: the IE b. Target LTE cell information is a new IE, and others (i.e. IE a/c/d/e) can reuse the existing IEs defined in Rel-17 for intra-NR SHR).**

**For LS-related discussions, for SPR related questions, the following proposals are made:**

**Agreeable Proposal 2: SPR can be stored at the UE and sent later to the gNB.**

**To-be-discussed Proposal 4: Only MN can retrieve the SPR from the UE.**

**To-be-discussed Proposal 5: For Q8, RAN2 to discuss the following options:**

* **Option 1: Only MN can send the SPR config to the UE**
* **Option 2: depends on the presence of SRB3, i.e.:**
  + **In case there is no SRB3 configured, MN sends SuccessPScellChange config (T310/T312 config) to the UE**
  + **In case there is SRB3 configured, SN sends SucessPScellChange Config (T310/T312 config) to the UE**
  + **MN always sends SuccessPScellChange/Addition config (T304 config) to the UE**
* **Option 3: depends on which of nodes initiates SPR, i.e.:**
  + **For the MN-initiated PSCell Change/Addition, MN sends the SPR config to the UE**
  + **For the SN-initiated PSCell Change, the source-SN sends the Successful PSCell Change configuration within the container through MN via SRB1 or directly via SRB**

**To-be-discussed Proposal 6: Which of nodes can set the parameters can be left to RAN3 discussions.**

**For SPR enhancements (other than LS-related discussions):**

**Agreeable Proposal 3: Agree that the values of the triggering conditions are configured as the percentage of actual timer values. Rel-17 SHR can be considered as the reference.**

**Agreeable Proposal 4: UE stores both SPCR and SHR configuration (one for each type at most) if received from NW.**

**Agreeable Proposal 5: UE can store and later send the SPR to gNB via UEInformationRequest/Response.**

**Agreeable Proposal 6: Only the latest successful PSCell change is reported by the UE.**

**Agreeable Proposal 7: Random access related information is included in SPR only when the SPR is triggered due to T304 exceeds the configured threshold.**

**To-be-discussed Proposal 7: RAN2 to discuss the following options:**

* **Option 1: Extend existing SHR with additional IE to store SPR**
* **Option 2: UE records/reports PCell SHR and PSCell SPR separately.**

**For inter-RAT SHR enhancements (other than LS-related discussions):**

**Agreeable Proposal 8: RAN2 to prioritise inter-RAT HO from NR to LTE first. Inter-RAT HO from LTE to NR can be considered after that.**

# 4 RAN2#119b-e agreements

Agreements

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

1a RAN2 will discuss HO with SN change later, after the basic solution for SPR is known

2 Given that PSCell addition is proposed by all companies, SPR is used as the abbreviations to use for the feature.

3 RAN2 confirm to prioritize NR-DC scenario for SPR.

4 SHR solution is taken as baseline for the SPR in terms of configuration and reporting at high level. Details of the configuration and report need to be tailored/customized/new message per use case.

5 Network configures SPR configuration IE for the UE, with at least the following triggering conditions:

• T310 triggering condition

• T312 triggering condition

• T304 triggering condition

5a: Other triggering conditions are FFS

5b: Values of the triggering conditions are FFS

5c: Which node configures the triggering condition is FFS.

6 RAN2 agree to the following:

A. SPR configuration is configured by network through otherConfig

B. SPR is fetched via UE Information Request/Response procedure

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

a) Source PSCell info (cell ID, measurement result)

b) Target PScell info (cell ID, measurement result)

c) Neighbour Cells info (cell ID, measurement result, CPAC Candidate cells flag)

d) Success PSCell change/addition cause value (e.g., t304, t310, t312 cause, etc.)

f) The time elapsed between the CPAC execution towards the target cell and the corresponding latest CPAC configuration received for the selected target cell

7a: FFS on whether to reuse CHO candidate cell flag for the CPAC candidate cells or define a new flag to indicate CPAC candidate cell.

7b: FFS on whether to include or on conditional inclusion of random access related information.

7c: FFS on Location Information