3GPP TSG-RAN WG4 Meeting #107 R4-23xxxxx

Incheon, KR, May 22 – May 26, 2023

**Agenda item:** 8.9.4

**Source:** Moderator (Apple)

**Title:** AHoc summary for [107][209] NR\_RRM\_enh3\_part1 and [107][210] NR\_RRM\_enh3\_part2

**Document for:** Information

# Topic #0: General and work plan (8.9.1)

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions..*

### Sub-topic 0-1

*Sub-topic description:*

*Open issues and candidate options before f2f meeting:*

**Issue 0-1: Whether FR2 SCell activation enhancement in topic #1/2/3 is appliable for direct SCell activation and PUCCH SCell activation**

* Proposals (Huawei): The enhancement under discussion can also apply to other single Cell activation including direct SCell activation and PUCCH SCell activation.
* Recommended WF
  + To conclude on the proposal in this meeting
* **Discussion in AdHoc (May 23rd):**

Nokia: we agree to discuss to apply the same enhancement to other case, but need more discussion before decision.

QC: L3 reporting after activation is common part for direct SCell activation and PUCCH SCell activation for single activation.

Ericsson: we can apply same enhancement for PUCCH SCell activation, but direct SCell activation solution will be different.

Huawei: agree with QC and Ericsson.

MTK: agree with QC.

Vivo: can apply for both cases, but up to Ran2 discussion.

* **Agreement:**
  + Descope the L3 reporting based FR2 unknown SCell activation enhancement for direct SCell activation in R18.
  + The enhancement under discussion except the L3 reporting based enhancement can also apply to direct SCell activation.
  + The enhancement under discussion can also apply to other single PUCCH SCell activation

**Issue 0-2: Enhancement for multiple FR2 unknown SCells’ activation**

* Proposals (Huawei, vivo): RAN4 to discuss whether to define requirements for multiple SCell activation involving unknown FR2 to-be-activated SCell without active serving cell or known to-be-activated SCell in the same band.
  + If RAN4 decide to define requirements, it should be discussed after the requirements for single SCell activation is completed. (Huawei)
  + RAN4 inform RAN2 about RAN4’s decision regarding multiple SCell activation, especially on the issues that may have RAN2 signalling impact. (vivo)
* Recommended WF
  + To conclude on the proposal in this meeting, and if RAN4 made conclusion, it’s necessary to inform RAN2 ASAP.

* **Discussion in AdHoc (May 23rd):**
* **Tentative Agreement:**

Descope the FR2 unknown SCell activation enhancement for multiple SCell activation case in R18.

**Issue 0-3: whether to consider SCell activation requirements for FR2-2**

* Proposals (Huawei): RAN4 to clarify whether SCell activation requirements for FR2-2 are included or not.
* Recommended WF
  + To conclude on the proposal in this meeting
  + [Moderator]: the discussion so far is only for FR2-1. FR2-2 can be discussed in future release if needed (FR2-2 even has LBT and larger Rx beam sweeping factor), and please companies double confirm.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

Descope the SCell activation enhancement in FR2-2 in R18.

# Topic #1: L3 part enhancement for FR2 SCell activation (8.9.2.1)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 L3 reporting during SCell activation

*Sub-topic description:*

*Open issues and candidate options before f2f meeting:*

**Issue 1-1-1: Additional solutions of report L3 measurement results for unknown FR2 SCell activation enhancement (previous issue 1-1-1 in R4-2306315)**

|  |
| --- |
| *Last meeting agreement in R4-2306315:*   * *Agreements (GTW, Monday Apr 17, 2023)*   + *UE needs to report the L3 measurement result after SCell activation command*   + *FFS if additional solutions should be considered. Decision on additional solutions need to be made no later that in RAN4 #107.* |

* Option 1 (Apple):
  + RAN4 to not consider additional solution for report L3 measurement results for unknown FR2 SCell activation enhancement in R18.
  + Whether and how to extend the solution from R18 further mobility enhancement WI to SCell activation can be discussed in future release.
* Option 2 (vivo):
  + RAN4 may further discuss and clarify whether to re-use any newly introduced measurement and reporting mechanism, if agreed in other WIs based on RAN1/2 discussion, for unknown FR2 SCell activation delay reduction.
* Recommended WF
  + [Moderator]: due to the limited time for this WI, could we consider the following compromise:
    - Option 3 for compromise:
      * RAN4 to not consider additional solution for report L3 measurement results for unknown FR2 SCell activation enhancement in R18.
      * In future release, RAN4 can further discuss and clarify whether to re-use any newly introduced measurement and reporting mechanism, if agreed in other WIs based on RAN1/2 discussion, for unknown FR2 SCell activation delay reduction.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

**Issue 1-1-2: waiting RAN2 conclusions for when/how/what to report L3 measurement results for unknown FR2 SCell activation enhancement (previous issue 1-1-1, 1-1-2, 1-1-3, 1-1-4, 1-1-5 in R4-2306315), except the FFS for additional solution in issue 1-1-1**

* Option 1 (Huawei, OPPO):
  + RAN4 to wait for RAN2 conclusion on triggering/configuration/reporting, and there is no need to have further discussion in RAN4.
* Option 2 (MediaTek):
  + Regarding when to report L3 measurement results in previous issue 1-1-1 in R4-2306315:
    - UE should send L3-RSRP report with SSB index after THARQ + MAC CE processing time and within a margin [M] ms.
    - If NW cannot grant the UE with an UL resource within [M] margin, NW should not trigger the UE to send the report.
  + Regarding how to trigger L3 report in previous issue 1-1-2 in R4-2306315:
    - The L3 measurement report for unknown FR2 Scell activation is triggered when
      * Scell activation command is received, and
      * When the existing conditions in 38.133 for considering target FR2 SCell as unknown are met.
* Recommended WF
  + [Moderator]: companies to check if option 1 is acceptable. For when to report in option 2, it could be further discussed in issue 1-1-5. For how to trigger L3 report in option 2, this enhancement is for unknown SCell activation already, not sure if we still need proposed clarification, and please companies share your views on it.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

**Issue 1-1-3: If measurement results are available, the UE will report them to the NW. How to determine the measurement result is available?**

* Proposals:
  + Option 1 (Apple, CMCC, Xiaomi, CTC, Huawei, OPPO, ZTE, Qualcomm, Ericsson):
    - No need to define criteria to determine the L3 measurement result is available or not for FR2 unknown SCell activation enhancement.
    - Option 1a (Apple, CMCC, Xiaomi)
      * The reported results must meet the existing measurement accuracy requirement.
    - Option 1b (CTC, Qualcomm, ZTE):
      * The valid reporting must meet the existing measurement delay/accuracy requirement.
  + Option 2 (LGE, vivo, MediaTek):
    - A time window could be considered as a condition to determine if the result to be reported is fresh.
    - Option 2a (LGE):
      * The valid measurement reporting after the SCell activation command needs to meet the existing measurement accuracy requirements, and additionally time window [W] could be considered as an additional condition.
    - Option 2b (vivo):
      * To check the freshness of the to-be-reported measurement results of the SCell, the same time windows as those in current known SCell condition can be reused, i.e. 4s for PC1/PC5, and 3s for PC2/PC3/PC4.
      * The measurement results are considered as available only if it fulfils the measurement requirement for a deactivated Scell as specified in TS38.133 Table 9.2.5.2-3 (for FR1) and Table 9.2.5.2-4 (for FR2), which implies that the reported SS-RSRP, SS-RSRQ, and SS-SINR measurements need to meet the accuracy requirements specified in Clause 10.
    - Option 2c (MediaTek):
      * For L3 measurements validity: measurement should satisfy the requirement for a deactivated Scell as specified in TS38.133.
      * For L3 measurements availability: a time duration [W]s is required to determine whether a valid L3 measurement is fresh or old.
  + Option 3 (Nokia, NTT DCM, Ericsson):
    - The report of L3 measurement result after SCell activation command needs to be valid.
    - The report of L3 measurement result is considered as valid only if it fulfils the measurement requirement for a deactivated SCell as specified in TS38.133 Table 9.2.5.2-3 (for FR1) and Table 9.2.5.2-4 (for FR2).
* Recommended WF
  + [Moderator]: The discrepancy among different sub-options are highlighted in RED. Please companies discuss:
    - In requirement design, whether or not need a time window to determine freshness of L3 measurement result? If yes, what’s the window?
    - In requirement design, which requirement shall the L3 measurement results reporting meet?
      * Accuracy requirement? Measurement delay requirement? Or both?
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

**Issue 1-1-4: FFS on necessity of L3 measurement reporting if UE has no valid measurement results?**

* Proposals:
  + Option 1 (Apple, Xiaomi, CTC, Huawei, OPPO, ZTE): No need to report L3 measurement reporting after receiving SCell activation command if UE has no valid measurement results.
    - Option 1a (Xiaomi): If the UE has no valid L3 measurement result to be reported, no need to report L3 measurement reporting after receiving SCell activation command, and the UE needs to perform L3 measurement and L1 measurement with/without enhanced requirement according to UE capability.
  + Option 2 (Nokia, NTT DCM): The UE is allowed to continue the measurement and report a valid L3 measurement result when it is ready, if there is no valid L3 measurement result at the time of SCell activation.
  + Option 3 (LGE, MediaTek): If NW triggers the UE to send L3 report, and if UE does not have valid L3 measurement results, UE still need to indicate something to the NW.
    - Option 3a (LGE): If a UE has no valid measurement results, UE needs to report even the lowest RSRP reported value to notice whether a UE has valid measurement results to the network.
    - Option 3b (MediaTek): If NW does not receive anything, NW may assume there was a failure in the report transmission and could request the UE to do re-transmission.
  + Option 4 (vivo): RAN4 inform RAN2 about a potential scenario that the reporting is triggered by SCell activation, but there is no available result at the UE side. Whether and how to send the corresponding reporting conveying the information of un-detected SCell can be decided by RAN2.
  + Option 5 (Ericsson): UE to send measurement report if UE obtain the measurement report before certain threshold. UE do not report L3 measurement report if UE do not have valid measurement report before certain threshold.
* Recommended WF
  + [Moderator]: please companies to discuss:
    - Whether or not UE needs to report anything immediately after decoding the SCell activation command if UE has no valid measurement results at that time point?
      * If yes, what to report? E.g., option 3?
      * If no, shall UE continue measurement and report a valid L3 measurement result when it is ready? E.g., option 1 or option 2?
      * Or send LS to RAN2 for their decision? Option 4?
      * Or other solution, like option 5?
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

**Issue 1-1-5: delay requirement for “L3 measurement reporting after SCell activation command”?**

* Proposals:
  + Option 1 (Qualcomm):
    - RAN4 shall define reporting delay requirements from receiving/decoding MAC-CE for SCell activation command to L3 measurement reporting.
      * UE shall report L3 measurement report within [X] ms from receiving [L3 report triggering command] if measurement result is available.
      * UE does not report L3 measurement report after exceeding reporting delay requirements.
    - Note: L3 report trigger command can be included at Scell activation command per RAN4 #106bis-e agreement.
  + Option 2 (MediaTek):
    - UE should send L3-RSRP report with SSB index after THARQ + MAC CE processing time and within a margin [M] ms.
    - If NW cannot grant the UE with an UL resource within [M] margin, NW should not trigger the UE to send the report.
  + Option 3 (CTC):
    - UE needs to report valid L3 measurement result within a time threshold after SCell activation command.
* Recommended WF
  + [Moderator]: the option 1/2/3 are quite similar, during the discussion please proponents confirm if they can be merged.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

**Issue 1-1-6: FFS: When the valid L3 measurement result with SSB index is reported after SCell activation command, L3 and L1 parts can be skipped, i.e., network can perform TCI activation after valid L3 measurement results are reported.**

* Proposals: When the valid L3 measurement result with SSB index is reported after SCell activation command,
  + Option 1 (Apple, Nokia, CMCC, Xiaomi, CTC, OPPO, ZTE, MediaTek):
    - L3 and L1 parts can be skipped in the activation delay requirement design, i.e., network can perform TCI activation after valid L3 measurement results are reported.
    - Option 1a (Apple):
      * the uncertainty for TCI can be defined as the time period between TCI configuration/activation relative to the first valid L1-RSRP reporting and the new triggered L3 measurement report which occurs earlier.
    - Proposal 1b (Nokia):
      * The TCI and SP/P-CSI-RS activation commands are based on the valid L3 measurement report after SCell activation command, if the report is sent after SCell activation command.
      * A-TRS for fast SCell activation can be triggered based on the valid L3 measurement report after SCell activation command.
  + Option 2 (vivo, Huawei):
    - If the new triggered measurement reporting is reported after SCell activation, the SCell activation can be considered as unknown case where the uncertainty for TCI can be defined as the time period between TCI configuration/activation relative to the first valid L1-RSRP reporting and the new triggered L3 measurement report which occurs earlier.
    - Option 2a (Huawei):
      * RAN4 to discuss applicability conditions for requirements based on L3 reporting after SCell activation that the measurement period of the SCell being activated is equal to or smaller than X ms.
      * It is up to NW implementation to choose whether to configure TCI based on L3 report after SCell activation command or based on L1-RSRP as legacy cases.
  + Option 3 (Qualcomm):
    - UE expect to receive TCI activation command after reporting L3 measurement report with SSB index.
      * If UE does not receive TCI activation command within certain time period after reporting L3 measurement, UE can perform either legacy SCell activation process or enhanced Scell activation.
  + Option 4 (Ericsson):
    - RAN4 to agree that L3 part can be skipped and whether L1 part can be skipped or not depends on whether NW sends TCI command or not.
* Recommended WF
  + [Moderator]: based on the majority views, please companies consider if we can combine option 1 and 2 as compromise? And also please check the additional conditions proposed in option 3 and 4.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

### Sub-topic 1-2 Beam related enhancement for L3 part

*Sub-topic description*

***Agreement in last meeting R4-2306315***

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| --- |
| Agreement:   * For unknown FR2 SCell activation enhancement, introduce the UE capability to support Rx beam sweeping factor less than 8 for cell detection part and SSB based L1-RSRP measurement.   + if UE has full set (N=8) of beam sweeping during AGC settling part during FR2 unknown SCell activation procedure.     - Introduce beam sweeping factor capability of X1 for cell detection part (X1\*Trs) and beam sweeping factor capability of X2 for SSB based L1-RSRP measurement     - Beam sweeping factor capability X1/X2 are two independent capabilities * Note: above enhancement only applies for FR2 unknown SCell activation enhancement * Note: How to capture in spec can be discussed in CR stage * The candidate values for X1/X2 are FFS |

*Open issues and candidate options before f2f meeting:*

**Issue 1-2-1: can X1(Beam sweeping factor enhancement in L3 part of FR2 unknown SCell activation) be zero? (not related with WI of FR2 multi-Rx chain DL reception)**

***Agreement in RAN4#106 meeting R4-2303228***

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| --- |
| Agreement:   * To keep “X1\*Trs” part of current FR2 unknown SCell activation delay in the delay requirement for FR2 SCell activation enhancment.   + X1 can be less than 8 in the beam sweeping factor reduction discussion for cell detection stage in L3 part based on UE capability. |

* Option 1 (Apple, Xiaomi, CTC, LGE, OPPO, MediaTek, Huawei): No.
* Option 2 (Nokia, CMCC, Ericsson): Yes
* Recommended WF
  + [Moderator]: Please companies double check the previous agreement in RAN4#106 meeting for reference.
* **Discussion in AdHoc (May 23rd):**

Nokia: X1 and X2 can be separated, it’s no harm for UE to indicate 0 if UE is capable of that.

CMCC: X1 is UE capability, wondering the technical reason to preclude 0.

MTK: if X1=0 it will break the previous agreement.

HW: Positioning related beam sweeping factor is decided by RAN1 but not RAN4. Don’t want to keep it 0.

QC: based on previous agreement, it mean at least UE needs one sample.

Xiaomi: support MTK and QC.

* Agreement:
  + X1=1 is one of the candidate values for beam sweeping factor in L3 part for FR2 unknown SCell activation enhancement.
  + X1 is greater than 0 and less than 8.

**Issue 1-2-2: Beam sweeping factor enhancement in L3 and L1 part of FR2 unknown SCell activation (not related with WI of FR2 multi-Rx chain DL reception)**

* Option 1 (Apple):
  + X1 = {2,4,6} and X2 = {2,4,6}.
  + If X1 is absent in capability indication, it means 8 for beam sweeping factor;
  + If X2 is absent in capability indication, it means 8 for beam sweeping factor;
* Option 2 (CMCC):
  + X1 to select from {0, 1, 2, 4, 6}; X2 to select from {1,2,4,6}
* Option 3 (LGE):
  + X1={2,4,6} and X2={0,2,4,6}
  + If X1 is absent in capability indication, it means X1=8 for beam sweeping factor;
  + If X2 is absent in capability indication, it means X2=8 for beam sweeping factor;
* Option 4 (Xiaomi):
  + X1 = {4,6} and X2 = {4,6}.
* Option 5 (CTC, MediaTek):
  + X1 = {1,2,4,6} and X2 = {1,2,4,6}.
* Option 6 (vivo):
  + X1 = {0,2,4,8} and X2 = {0,2,4,6}.
* Option 7 (Huawei):
  + X1 = {4,6} and X2 = {2,3,4,5,6,7}.
* Option 8 (Ericsson):
  + X1 = {0,1,4} and X2 = {2,4,6}.
* Option 9 (Qualcomm):
  + X2 can be either zero or non-zero when X1 =8. X2 cannot be zero when X1 is less than 8.
* Recommended WF
  + [Moderator]: summarize all the candidate values for discussion:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | X1 | X2 | If X1 is absent, beam sweeping factor for cell detection part is | If X2 is absent, beam sweeping factor for SSB-based L1 measurement is |
| Apple | 2,4,6 | 2,4,6 | 8 | 8 |
| CMCC | 0, 1, 2, 4, 6 | 1,2,4,6 |  |  |
| LGE | 2,4,6 | 0,2,4,6 | 8 | 8 |
| Xiaomi | 4,6 | 4,6 |  |  |
| CTC | 1,2,4,6 | 1,2,4,6 |  |  |
| MediaTek | 1,2,4,6 | 1,2,4,6 |  |  |
| vivo | 0,2,4,8 | 0,2,4,6 |  |  |
| Huawei | 4,6 | 2,3,4,5,6,7 |  |  |
| Ericsson | 0,1,4 | 2,4,6 |  |  |
| **Summary** | 4 (9 companies support);  6 (7 companies support);  2 (6 companies support)  1 (4 companies support) | 4 (9 companies support);  6 (8 companies support);  2 (8 companies support)  1 (3 companies support)  0 (2 companies support) |  |  |
| **Proposal for compromise (>50% supporting)** | **{2,4,6}** | **{2,4,6}; and 0 is up to the conclusion of issue 2-1-1** | **8** | **8** |

* **Discussion in AdHoc (May 23rd):**

HW: X2 for L1 shall have the finer granularity of beam sweeping factor, it can have more candidate values than X1.

Nokia: if X2 shall be smaller than X1.

Ericsson: remove 6 from X1

MTK: can we reuse the same value from positioning.

Ericsson: can network indicate such beam sweeping.

LGE: X2 can have the 0 value if the X1 is 8.

* **Agreement:**
  + X1= {1,2,4,6}
  + X2= {0,1,2,3,4,5,6,7}
  + If X1 is absent, beam sweeping factor for cell detection part is 8
  + If X2 is absent, beam sweeping factor for SSB-based L1 measurement is 8

### Sub-topic 1-3 others for L3 part

*Sub-topic description*

*Open issues and candidate options before f2f meeting:*

**Issue 1-3-1: whether to use SSB periodicity instead of SMTC periodicity for FR2 unknown SCell activation**

* Proposals
  + Option 1 (Apple, Nokia, ZTE):
    - RAN4 to use SSB periodicity instead of SMTC periodicity.
    - Option 1a (Apple):
      * The window of the cell detection can be same as SMTC duration from UE implementation perspective but it’s no need to be reflected in the requirement.
  + Option 2 (vivo):
    - Do not change the definition/usage of SMTC periodicity for FR2 unknown SCell activation requirements.
  + Option 3 (Huawei):
    - For enhanced unknown FR2 Scell activation requirement, RAN4 to use SSB periodicity instead of SMTC periodicity when the SMTC is only configured in MO.
  + Option 4 (Qualcomm):
    - min(SSB periodicity, SMTC periodicity) is used for enhanced FR2 SCell activation delay requirements.
  + Option 5 (Ericsson):
    - RAN4 to use the SSB periodicity instead of SMTC\_MAX for coarse and fine AGC measurement for unknown SCell activation.
* Recommended WF
  + [Moderator]:
    - It was agreed in previous WF R4-2120241 that: It is an error case if the SSB transmission periodicity is greater than the configured SMTC for the same carrier. Then option 4 shall be same as option 1.
    - Option 1 and option 3 are also same from technical perspective, based on Huawei’s excerpt of smtc definition from RAN2 TS38.331 that,
      * Smtc: The SSB periodicity/offset/duration configuration of target cell for NR SCell addition. The network sets the *periodicityAndOffset* to indicate the same periodicity as ssb-*periodicityServingCell* in *sCellConfigCommon*.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

# Topic #2: L1 part enhancement for FR2 SCell activation (8.9.2.2)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions..*

### Sub-topic 2-1 Enhancement for L1-RSRP

*Sub-topic description:*

*Open issues and candidate options before f2f meeting:*

**Issue 2-1-1: Whether and how to skip L1-RSRP measurement of FR2 unknown SCell activation (for the case when no valid L3 measurement result is reported after SCell activation command)?**

* Proposals
  + Option 1 (Apple, CMCC, Xiaomi, CTC, OPPO, ZTE, Ericsson):
    - if L3 measurement is performed without beam sweeping factor reduction and if L3 and L1 measurement are using same RS or QCLed type D RSs, skip L1-RSRP measurement and use measurement result from L3 stage for L1-RSRP reporting.
    - Option 1a (Apple):
      * if L3 measurement is performed without beam sweeping factor reduction and if L3 and L1 measurement are using same RS or QCLed type D RSs, the L1-RSRP measurement delay can be deducted from the total activation delay.
    - Option 1b (Ericsson):
      * If L3 and L1 measurement are using same RS or QCLed type D RSs, RAN4 to agree that UE can skip L1-RSRP measurement and use measurement result from L3 stage for L1-RSRP reporting (X1 need not be 8 to apply this principle).
  + Option 2 (Nokia):
    - The L1-RSRP measurement can be skipped at least for Case 1 and Case 2 if the reference signals configured for L1-RSRP report has been measured during L3 part, or is QCL-typeD with the SSB being measured during L3 part.
      * Case 1: the UE does not indicate reduced beam sweeping factors in UE capability
      * Case 2: the UE indicates the support of reduced beam sweeping factor X1/X2 and X2 is above zero.
    - The L1-RSRP measurement is always skipped if the UE indicates a zero-value X2.
  + Option 3 (NTT DCM):
    - Not to discuss the explicit UE behaviour on “skip L1-RSRP” or whether UE shall derive L1-RSRP based on L3 measurement, which can already be reflected by capability indication of X2 if X2 = 0 is introduced.
  + Option 4 (vivo):
    - If zero is one of the possible entry of UE capability for X2 in issue 1-2-1 and issue 1-2-2, the discussion of issue 2-1-1 of R4-2306315 can be merged into 1-2-1 and 1-2-2 of R4-2306315.
  + Option 5 (Huawei):
    - If L3 measurement is performed without L3 part enhancement, whether UE can report L1-RSRP based on L3 measurement is up to UE implementation, when the performance requirements as specified in TS38.133 clause 10.1.20.1 shall be fulfilled. And there is no specification impact.
  + Option 6 (Qualcomm):
    - X2 can be either zero or non-zero when X1 =8. X2 cannot be zero when X1 is less than 8.
  + Option 7 (MediaTek):
    - Close Issue 2-1-1 and discuss it under Issue 1-2-1 based on the UE capability X2.
* Recommended WF
  + [Moderator]: Based on previous agreement in R4-2306315, X2 is the capability to indicate beam sweeping factor **for SSB based L1-RSRP measurement**. To compromise (considering relation between X2 and L1 measurement skipping in option 1/2/3/4/6/7, and considering whether UE can report L1 based on L3 measurement is UE implementation in option 5), following option is proposed from moderator perspective, and wording can be further polished:
    - Option 8 (Moderator):
      * For unknown FR2 SCell activation enhancement when no valid L3 measurement result is reported after SCell activation command, if L3 measurement is performed without beam sweeping factor reduction (beam sweeping factor is 8):
        + When SSB based L1-RSRP measurement is configured, if X2 = 0, UE can skip SSB based L1-RSRP measurement, i.e., X2 can be indicated as 0 only if beam sweeping factor is 8 for L3 measurement.
        + When CSI-RS based L1-RSRP measurement is configured, if L3 and L1 measurement are using QCLed type D RSs, UE can skip CSI-RS based L1-RSRP measurement.
* **Discussion in AdHoc (May 23rd):**

QC: CSI-RS is not measured in the L3 part, so CSI-RS based L1 skipping is FFS

Ericsson: we can directly use X2 to indicate

Vivo: same as QC

ZTE: for L3 part we shall focus on X1=8

Nokia: why cannot use X2 to indicate CSI-RS beam sweeping

QC: CSI-RS QCLed to SSB, but not mean SSB based measurement can directly used for CSI-RS based L1 result.

* **Agreement:**
  + Up to the conclusion in issue 1-2-2

**Issue 2-1-2: if L1-RSRP measurement can be skipped in issue 2-1-1, whether to skip L1-RSRP reporting or TCI indication of FR2 unknown SCell activation (for the case when no valid L3 measurement result is reported after SCell activation command)?**

* Proposals
  + Option 1 (Apple, Nokia, CTC, Huawei, ZTE, MediaTek):
    - L1-RSRP reporting cannot be skipped. It is needed to inform network the beam information of the SCell.
    - Option 1a (Nokia):
      * The UE shall indicate the L1-RSRP reporting is derived by skipping L1-RSRP measurement.
  + Option 2 (Xiaomi, Ericsson): (Moderator: this option might not be in scope of this issue, since it’s based on L3 measurement report)
    - If L1-RSRP measurement is skipped, the configuration of TCI state activation is based on L3 measurement report and the L1-RSRP reporting can be skipped.
* Recommended WF
  + [Moderator]: this issue is for the case when no valid L3 measurement result is reported after SCell activation command, please companies check if option 1 is acceptable as well as the option 1a.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

### Sub-topic 2-3 Aperiodic RS related enhancement for L1 part

*Sub-topic description*

*Open issues and candidate options before f2f meeting:*

**Issue 2-3-1: Aperiodic RS for TFineTiming during FR2 unknown SCell activation (this AP-RS is not QCLed to a RS on inter-band serving cell)**

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| It was an agreement in RAN4 #104bis-e (R4-2217249):  Issue 3-3-1: Aperiodic RS for TFineTiming during FR2 unknown SCell activation  Agreement:   * A-TRS can be configured for fine timing tracking after TCI state activation, and the A-TRS is QCL-ed with the selected SSB index. |

* Proposal:
  + The A-TRS as specified for fast SCell activation can be used also for fine time tracking after TCI activation command. (Apple, Nokia, ZTE)
  + A-TRS based fine timing tracking after TCI activation command should be NW configurable. That means SSB based and A-TRS based fine timing acquisition should be supported. (Apple, Ericsson)
  + Send LS to RAN1 informing A-TRS as specified for fast SCell activation can be used also for fine time tracking after TCI activation command. (Nokia, vivo)
* Recommended WF
  + [Moderator]: Please company check if the above three proposals are agreeable or not.
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

# Topic #3: Other enhancements for FR2 SCell activation (8.9.2.3)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions..*

### Sub-topic 3-1

*Sub-topic description:*

*Open issues and candidate options before f2f meeting:*

**Issue 3-1-1: Scheduling enhancement for FR2 unknown SCell activation**

* Proposals
  + Option 1 (Apple, Huawei, OPPO, ZTE, Qualcomm, MediaTek, Ericsson):
    - The early scheduling is network implementation and it’s not precluded in existing SCell activation requirement. No enhancement is needed.
    - Option 1a (Apple): Whether UE shall be scheduled by the network immediately after L3 or L1-RSRP reporting is up to network implementation.
    - Option 2a (ZTE):
      * We are fine to discuss some clarification on the UE behavior after receiving such early scheduling from NW.
      * For FR2, the initial scheduling can be decided by the NW after receiving the beam info and signal quality info after L1-RSRP report. For FR1, once the signal quality info derived by NW, the initial scheduling is possible.
  + Option 2 (Nokia):
    - The potential to enable earlier data transmission within the activation period shall be studied.
    - The data transmission shall be allowed after the UE receives the TCI activation command.
    - Starting from receiving the TCI activation command, the UE shall report CSI, instead of OoR, if the UE has available uplink resources to report CQI for the SCell.
* Recommended WF
  + [Moderator]: Can Nokia compromise to option 1?
* **Discussion in AdHoc (May 23rd):**
* **Agreement:**

# Topic #4: SCG activation/deactivation requirements for FR1-FR1 NR-DC

**Issue 1-1-1: UE behaviour when UE detected either BFD or RLF on the deactivated PSCell for RACH-less SCG activation**

Proposals:

* Option 1(Apple, Xiaomi, OPPO): UE fall back to RACH based activation.
* Option 1a (Huawei):
  + When RLF happens during SCG activation procedure, UE shall indicate SCG failure to NW, and the SCG activation is stopped.
  + When BF happens during SCG activation procedure, UE will initiate RACH procedure.
* Option 2(Ericsson):
  + UE will follow the SCG failure procedure if BFD or RLF declared before SCG activation RRC reconfiguration message.
  + UE will follow RACH based activation if BF declared after SCG activation RRC reconfiguration message
  + UE will follow SCG failure procedure if RLF declared after SCG activation RRC reconfiguration message
* Option 3(Nokia): UE is allowed additional search/measurements at PSCell activation.

Recommended WF:

* Option 1 is recommended
* **Discussion in AdHoc (May 23rd):**

Nokia: this issue is from R17, don’t understand what does fall back to RACH based mean? Ran4 is doing something breaking Ran2 feature. RACH or RACH-less is used depends on the different conditions. UE reports failure to upper layer, and upper layer to decide. It’s RAN2 issue.

OPPO: for requirement, for additional search/measurement, we may need new requirement for RACH-less case.

Huawei: according to RAN2 spec, RACH or RACH-less is up to beam failure. RLF needs SCG failure indication. Agree with Nokia, in RAN4 we don’t need to define new thing beyond RAN2 spec.

Ericsson: similar as Huawei, RLF and BF shall be decoupled. When network send activation command, to RAN2 the UE status is changed to activated.

* **Agreement:**

No requirement shall be defined for this case when UE detected either BFD or RLF on the deactivated PSCell during RACH-less SCG activation.

FFS whether LS is needed to check with RAN2 on the UE behavior for above case.

**Issue 1-1-2：UE report on the beam failure if Beam failure has been declared or TCI become unknown during SCG activation procedure**

Proposals:

* Option 1(OPPO): UE can report beam failure of the PSCell during PSCell activation.
  + Option 1a (Huawei): It is a corner case when beam failure happens the PSCell during PSCell activation, and whether to report beam failure can be up to UE implementations. Whether the SCG failure for BF is transmitted or not is not essential.
* Option 2(Apple): UE shall indicate network the beam failure as same as the beam failure indication of the PSCell to the network while the SCG is deactivated; or send LS to RAN2 for clarification if RAN4 cannot decide.
* Option 4(Nokia, Ericsson): No need to indicate the beam failure during SCG activation procedure.

Recommended WF

* Option 1 is recommended
* **Discussion in AdHoc (May 23rd):**

Ericsson: For activated SCG, it’s no need to indicate such beam failure. For deactivated SCG, it’s needed.

* **Agreement:**
  + FFS
    - Option 1: RAN4 assumes whether to report beam failure to the network can be up to UE implementations if beam failure has been detected during SCG activation procedure.
    - Option 2: RAN4 assumes UE should not indicate beam failure to the network if beam failure has been detected during SCG activation procedure.
  + FFS whether LS is needed to check with RAN2 on the indication for above case.

**Issue 1-1-3: RRM requirements when UE detected either BFD or RLF on the deactivated PSCell for RACH-less SCG activation**

Proposals

* Option 1(xiaomi, Huawei, OPPO): No need to specify new requirements in the spec.
* Option 2(Ericsson, [Apple]): Clarify that the RACH based activation requirement will be followed.
* Option 3(Nokia): Additional measurement delay.

Recommended WF

* Option 1 is recommended

**Issue 1-1-4: LS to RAN2 about RACH-less SCG activation**

Proposals

* Option 1: Send LS to RAN2 for clarification on the case that BFD happens during SCG activation procedure
* Option 2: Send LS to RAN2 to confirm whether the followings are correct understanding of UE behaviour:
  + 1) UE can report beam failure of the PSCell during SCG activation procedure if TCI becomes unknown or beam failure happans
  + 2) UE should fall back to RACH based activation if UE detected either BFD or RLF on the deactivated PSCell.

Recommended WF:

* Discuss whether to send LS and the details of LS.