[102-e][239] LS_reply_NR_UE_pow_sav_R2-2108877_NWM - Version 0.0.4
RAN4

3GPP TSG-RAN WG4 Meeting # 102-e R4-2206782

Electronic Meeting, February 21 – March 3, 2022

Agenda item: 13.2.6

Source: Moderator (CATT)

Title: Email discussion summary for [102-e][239] LS_reply_NR_UE_pow_sav_R2-2108877_NWM

Document for: Information

1 Introducation

This e-mail thread treats:

1. LS response for RAN2 (R2-2108877) on "Reply LS on RRM relaxation in power saving"
2. CRs related to question in R2-2108877

(In addition to AI 13.2.6, R4-2205642, R4-2205643, R4-2205659 from AI 10.14 are also included.)

List of candidate target of email discussion for 1st round and 2nd round:

- 1st round: Discuss the open issues and conclude.
- 2nd round: According to the 1st round discussion, strive to agree on CRs and reply LS.

2 Topic #1: LS response to RAN2 (R2-2108877)

2.1 Companies' contributions summary

Table 1:

T-doc number	Company	Proposals / Observations

R4-2203909	CATT	Proposal 1: Support option 1b : regardless of *highPriorityMeas-Relax* When Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, UE shall search higher priority layers at least every 60 * (60 * N_{layers}) seconds When Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$, UE shall search for, measure and evaluate inter-frequency/inter-RAT layers of higher, equal or lower priority at least every 1 hour
R4-2203910	CATT	Draft reply LS to RAN2 on RRM relaxation in power saving
R4-2204801	vivo	Draft CR (Cat-F)
R4-2204805	vivo	Observation 1: The 1 hour time interval is used as an absolute value and not scaled at section 4.2.2.10.4 and 4.2.2.11.4 at TS38.133. The 1 hour time interval is scaled by the number of frequency layers at 4.2.2.10.2 and 4.2.2.11.2 at TS38.133. Proposal 1: Use option 2 with update for issue 1-2-1, i.e., change "1 hour" to "$N_{carrier_Relax}$* 1 hour" in clause 4.2.2.10.4 & 4.2.2.11.4

R4-2204914	Huawei, Hisilicon	Reply LS on RRM relaxation in power saving When UE is configured with both lowMobilityEvaluation criterion and cellEdgeEvaluation criterion, and has also fulfilled both criteria, When Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$, the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 1 hour the UE shall search for, measure and evaluate inter-RAT E-UTRAN layers of higher or lower priority at least every 1 hour When Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every $K2*T_{higher_priority_search}$ where $T_{higher_priority_search} = (60 * N_{layers})$ in clause 4.2.2.7 of 38.133, N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information, K2 = 60.
R4-2205207	Huawei, Hisilicon	Draft CR (Cat-F)
R4-2205208	Huawei, Hisilicon	Draft CR (Cat A)
R4-2205436	ZTE	Adopt RAN2 observation and correct the text, without sending any LS back to RAN2.
R4-2205642	Ericsson	**Proposal #1:** RAN4 shall maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 in TS 38.133. **Proposal #2:** RAN4 to clarify that the relaxation of higher priority carriers in scenario when UE fulfills both *lowMobilityEvalutation* and *not-at-cell edge* criterion is allowed only when *highPriorityMeasRelax* is configured.

R4-2205643	Ericsson	Draft CR (Cat-F)
R4-2205659	Ericsson	Draft CR (Cat-A)

2.2 Open issues summary

2.2.1 Sub-topic 1-1 Both low mobility and not-at-cell edge criteria

Issue 1-1-1: When UE fulfils both low mobility and not-at-cell edge criteria, how to consider the inconsistency issue raised by RAN2?

- Proposals
  - Option 1: Modify requirements in 4.2.2.10.4 & 4.2.2.11.4 as below (CATT, Huawei)
    - When Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$,
      - the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 1 hour
      - the UE shall search for, measure and evaluate inter-RAT E-UTRAN layers of higher or lower priority at least every 1 hour
    - When Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every $K2*T_{higher_priority_search}$ where
      - $T_{higher_priority_search}$ = (60 * N_{layers}) in clause 4.2.2.7 of 38.133,
      - N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information,
      - K2 = 60.
  - Option 2 (Vivo, ZTE): Change "1 hour" to "N_{layers} * 1 hour" in clause 4.2.2.10.4 & 4.2.2.11.4
  - Option 3 (Ericsson): Maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 and add clarification which the relaxation of higher priority carriers in scenario when UE fulfills both *lowMobilityEvalutation* and *not-at-cell edge* criterion is allowed only when *highPriorityMeasRelax* is configured.

- Recommended WF
  - TBA

Feedback Form 1: 1st round comment collection for Issue 1-1-1

1 – ZTE Corporation

Support Option 2. From RAN2 discussions it seems that RAN4 made a small mistake in the spec and it seems reasonable to add the missing factor back in.

2 – Apple Hungary Kft.

Agree with option 2.

3 – MediaTek Inc.

Either Option 1 or 2 is fine to us.

Option 2 is simpler, while Option 3 seems to provide a more comprehensive solution for different cases.

4 – Ericsson Hungary Ltd

We propose a compromise proposal as follows:

- ”RAN4 to maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 and RAN2 is informed about the RAN4 decision. RAN4 does not define any additional clarification by adding configuration of

highPriorityMeasRelax”.

The motivation for the above proposal is that there is an important difference between the scenarios.

When the UE has fulfilled both low mobility and not-at-cell edge criteria, then the UE is allowed to completely skip all types of measurements for 1 hour i.e. including the neighbour cell measurements of normal, low and higher priority carriers. This is not the case in other scenario where only lowMobilityEvalutation criterion is fulfilled, in this scenario the UE is still measuring on the the normal other layers with certain measurement interval.

Therefore more relaxation can be accepted on the higher priority carriers in this scenario.

5 – Qualcomm Technologies Int

We are ok to go with either Option 1(preferred) or Option 2 to resolve this issue and if we cannot find an agreement, we think that the current version of the spec is also acceptable, even if has a minor inconsistency.

However, Option 3 contains two separate proposals and we cannot agree to it because it is our understanding that Ericsson is proposing to extend application of *highPriorityMeasRelax* to scenario 3 (Not at Cell Edge and Low Mobility) but both based on previous discussions and the outcome of the same discussion we had in RAN4#101-e, the consensus was that this flag applies only in low Mobility only (scenario 1) and we should not further discuss here the application of *highPriorityMeasRelax*.

A better way to include the option to keep the current requirement would be:

Option 4: Maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4;

6 – Huawei Technologies France

Support option 1. The main difference between option 1 and option2 is whether to distinguish the case (when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ) and the case (when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ).

The mismatch RAN2 identified is on the case when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ for frequency layers of higher priority. We don't think RAN4 shall overturn our prevous conclusion in the case when Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ..

RAN4 had the following agreementin in [R4-2005331]:

When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ:

• The relaxed requirement for the frequency layer of higher priority uses the same relaxed measurement requirement as those for the frequency layer of equal/lower priority.

And 1 hour is agreed for this case (which has discussed for a long time.).

Moreover technically we think when serving cell quality is not good (Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ), too relaxed requirements would have risk for mobility performance. Therefore we propose not to change the agreement we made for Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ and only address the case for (Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ).

Regarding option 3, we had the same view as QC, highPriorityMeasRelax seems extend to

both lowMobilityEvalutation and not-at-cell edge criterion. We don't think we shall do this at such a late phase.

7 – MediaTek Inc.

<**A Correction** to our previous comment>

Either Option 1 or 2 is fine to us.

Option 2 is simpler, while Option **1** seems to provide a more comprehensive solution for different cases.

8 – CATT

We support opion 1 as the compromed solution in last meeting. For option 2, our understanding it changed all cases to 1 hours * Nlayers but it is not the intention when the previous agreements have been agreed. When discuss this issue, the origin is reusing similar LTE MTC/NB-IoT RRM measurement relaxation for neighbour cell monitoring but with modification.

In 36.304,

"- Less than 24 hours have passed since measurements for cell reselection were last performed, and
"

We don't think it means 24 hours * Nlayers for all cases. option 2 changed a lot for all cases compared to current spec.

We can accept option 1 as the modification in current spec at a minumum.

9 – vivo Mobile Communication Co.

vivo: we support option 2 and can compromise to option 1. However in the corresponding CR of option 1 we think Nlayers_relax should be used as we indicated at CR comments.

We disagree with option 3 since it contradicts with RAN4's conclusion on Rel-16 UE power saving.

2.2.2 CRs comments collection

Feedback Form 2: 1st round comment collection fro R4-2204801 (vivo)

1 – ZTE Corporation

Can support this one.

2 – Ericsson Hungary Ltd

We don't support this CR. Our view is that RAN4 shall maintain the current requirements. This depends on the discussions in issue 1-1-1.

Feedback Form 3: 1st round comment collection fro R4-2205207 (Huawei)

1 – Ericsson Hungary Ltd

We don't support this CR. Our view is that RAN4 shall maintain the current requirements. This depends on the discussions in issue 1-1-1.

Feedback Form 4: 1st round comment collection fro R4-2205643 (Ericsson)

1 – MediaTek Inc.

It is not very obvious about what 'Otherwise' means in the CR. It could be

- "Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ" is not fulfilled, or
- UE is not configured with *highPriorityMeasRelax*

Needs some clarifications

2 – vivo Mobile Communication Co.

The CR contradicts with previous RAN4 conclusions on Rel-16 UE power saving.

2.3 Summary for 1st round

2.3.1 Open issues

Issue 1-1-1: When UE fulfils both low mobility and not-at-cell edge criteria, how to handle the inconsistency issue raised by RAN2?

- Proposals
  - Option 1: Modify requirements in 4.2.2.10.4 & 4.2.2.11.4 as below (CATT, Huawei)
    - When Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$,
      - the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 1 hour
      - the UE shall search for, measure and evaluate inter-RAT E-UTRAN layers of higher or lower priority at least every 1 hour
    - When Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every K2*$T_{higher_priority_search}$ where
      - $T_{higher_priority_search}$ = (60 * N_{layers}) in clause 4.2.2.7 of 38.133,
      - N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information,
      - K2 = 60.
  - Option 2 (Vivo): Change "1 hour" to "N_{layers} * 1 hour" in clause 4.2.2.10.4 & 4.2.2.11.4
  - Option 3 (Ericsson): Maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 and add clarification which the relaxation of higher priority carriers in scenario when UE fulfills both *lowMobilityEvalutation* and *not-at-cell edge* criterion is allowed only when *highPriorityMeasRelax* is configured.

8 companies discussed Issue 1-1-1.

- Option 1:
  - Supported (5): Huawei, CATT, (MTK, Qualcomm(preferred)), [vivo can compromise to]
  - Disagree: Ericsson
- Option 2:
  - Supported (5): vivo, ZTE, Apple, (MTK, Qualcomm)
  - Disagree: Huawei, CATT, Ericsson

- Option 3:
    - Supported (1): Ericsson
    - Disagree: Qualcomm, Huawei, vivo

Tentative agreement:

Recommendations for 2nd round:

This issue has been discussed for a long time. It's hard to find another compromised option among three options. According to the vote of supporting and objection, to move forward, check could option 1 be agreeable?

2.3.2 CRs/TPs

R4-2204801 (vivo): Disagree by Ericsson

R4-2205207 (Huawei, Hisilicon): Disagree by Ericsson

R4-2205643 (Ericsson): Disagree by vivo, need further clarification commented by MTK

2.4 Discussion on 2nd round (if applicable)

Issue 1-1-1: When UE fulfils both low mobility and not-at-cell edge criteria, how to handle the inconsistency issue raised by RAN2?

- Option 1: Modify requirements in 4.2.2.10.4 & 4.2.2.11.4 as below (Huawei, CATT, MTK, Qualcomm, vivo)
    - When Srxlev ≤ $S_{nonIntraSearchP}$ or Squal ≤ $S_{nonIntraSearchQ}$,
        - the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 1 hour
        - the UE shall search for, measure and evaluate inter-RAT E-UTRAN layers of higher or lower priority at least every 1 hour
    - When Srxlev > $S_{nonIntraSearchP}$ and Squal > $S_{nonIntraSearchQ}$, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every $K2*T_{higher_priority_search}$ where
        - $T_{higher_priority_search}$ = (60 * N_{layers}) in clause 4.2.2.7 of 38.133,
        - N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information,
        - K2 = 60.
- Option 2 (vivo, ZTE, Apple, MTK, Qualcomm): Change "1 hour" to "N_{layers} * 1 hour" in clause 4.2.2.10.4 & 4.2.2.11.4

- Option 3 (Ericsson): Maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 and add clarification which the relaxation of higher priority carriers in scenario when UE fulfills both *lowMobilityEvalutation* and *not-at-cell edge* criterion is allowed only when *highPriorityMeasRelax* is configured.

According to the vote of supporting and objection, to move forward, could option 1 be agreeable?

3 Recommendations for Tdocs

3.1 1st round

New tdocs

Table 2:

Title	Source	Comments

Existing tdocs

Table 3:

Tdoc number	Title	Source	Recommendation	Comments
R4-2203910	Draft reply LS to RAN2 on RRM relaxation in power saving	CATT	To be revised to capture the final conclusion. change title to "Reply LS to RAN2 on RRM relaxation in power saving"	
R4-2204801	Draft CR for requirement alignment for UE power saving measurement requirements	vivo	Return to	
R4-2205207	Correction on measurement requirements in relaxed measurement	Huawei, Hisilicon	To be revised	Vivo's comments on this CR

R4-2205643	Correction to Rel-16 UE relaxed measurement requirements	Ericsson	To be revised	MTK's comments.
All other discussion papers: Noted.				

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   a) CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   b) Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

3.2 2nd round

Table 4:

Tdoc number	**Title**	**Source**	**Recommendation**	**Comments**

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   a) CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   b) Other documents: Agreeable, Revised, Noted

3. Do not include hyper-links in the documents

4 Annex

Please add your contact information in the feedback form below as following:

- **Company, Name, email address**

Feedback Form 5: Contact Information

1 – Qualcomm Technologies Int Qualcomm, Pierpaolo Vallese, pvallese@qti.qualcomm.com