**3GPP TSG-RAN WG2 Meeting #112e R2-20xxxxx**

**Electronic, 2 – 13 November 2020**

**Agenda item: 6.3.1**

**Source: Qualcomm Incorporated**

**Title: [AT112-e][507][NR-U] Large RAR window capability update**

**Document for: Discussion and decision**

# Introduction

During the first online session of RAN2#112e for NR-U, the response LS from RAN1 on extended RAR window capability was discussed. The LS asked RAN2 to make the support for extended RAR window monitoring optional since such capability was not needed for the CA/LAA type deployments. The following offline discussion was agreed to further discuss the issue:

* [AT112-e][507][NR-U] large RAR window capability update (Qualcomm)

Scope:

* + - CR to clarify that large RAR window capability is option for non-standalone NR-U

Intended outcome:

* + - Agreeable CR

Deadline for providing comments:

* + - Companies input: Nov. 11th
    - Updated CR ready for approval: Nov. 12th

This document will capture feedback from companies and suggest way-forward on this capability.

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| --- | --- |
| Company | Contact Name, Email |
|  |  |
| Samsung | Jaehyuk JANG (jack.jang@samsung.com) |

# Discussion

For NR-U, an extended RAR window length up to 40ms is supported where the maximum was 10ms for Rel-15 NR. In Rel-16 2-step RACH, it was also agreed to support a monitoring window length of up to 40ms for msgB.

The UE feature set list received from RAN1 after February meeting included the following for NR-U:

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| --- | --- | --- | --- |
| 10. NR-unlicensed | 10-2f | Support monitoring of extended RAR window | 1. Support of RAR extension from 10ms to 40ms by decoding of the 2-bit SFN indication in DCI 1\_0 |

Thus, 10-2f makes the large window size monitoring optional for NR-U UEs. RAN2#109bis-e has discussed the need for optionality, agreed that “it is mandatory to support monitoring the last two bits of SFN for RACH operation in shared spectrum”, and informed RAN1 in an LS (R2-2005865).

However, despite the RAN2 agreement, 10-2f was still introduced as capability in September 2020 specifications. *SharedSpectrumChAccessParamsPerBand* in 38.306 16.2.0 includes the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***extendedRAR-Window-r16***  Indicates whether the UE supports RAR extension from 10ms to 40ms by decoding of the 2-bit SFN indication in DCI 1\_0. | Band | No | N/A | N/A |

**Observation 1: Despite RAN2 agreement on making the extended RAR window monitoring mandatory, the latest 38.306 specification (16.2.0) has it as optional per band capability.**

The RAN1 LS in R1-2007137 gives an update on the UE features based on the agreement of RAN1#102e (August 2020 meeting) and states the following for NR-U:

*RAN1 discussed the RAN2 decision conveyed in LS R1-2005204(R2-2005865) not to define a capability bit for FG10-2f. It is RAN1’s understanding that FG10-2f should be optional because some UEs may not require this capability, e.g. UEs supporting only CA/LAA scenario (scenario A in the NR-U WID). Therefore, RAN1 would like to ask RAN2 to introduce a capability bit for FG10-2f.*

The argument by RAN1 is that the UE does not need to monitor the last two bits of SFN when it is signaled on a licensed PCell and if the UE only supports shared spectrum as an SCell.

The observation that these bits do not need to be signaled on a licensed PCell is correct and it is already reflected in RRC specification in the field description of *ra-ResponseWindow* that “…Msg2 is transmitted in licensed spectrum and a value lower than or equal to 40 ms when Msg2 is transmitted with shared spectrum channel access”.

**Observation 2: The rationale for RAN1 agreement to keep the optionality was that this is not necessary for CA/LAA deployments where RAR is sent on licensed PCell with legacy window duration.**

Even though there is no single capability for LAA/CA operation, not all the capabilities in 10-2x are necessary for every NR-U deployment scenario. On this front, RAN1 is having an email discussion on the “basic feature groups for NR-U deployment scenarios”. RAN1#103 may agree to introduce a table in the specifications showing which UE feature group(s) are required as basic FG for the corresponding NR-U deployment scenarios.

**Observation 3: RAN1 is capturing the correspondence between required UE feature groups and NR-U deployments.**

The scope of this RAN2 email discussion is to “clarify that large RAR window capability is option for non-standalone NR-U”. However, since there is no UE capability “non-standalone NR-U” in RAN1/RAN2 specifications. The only place this is captured is Annex B.3 in 38.300 for NR-U deployment scenarios. Therefore, it is not feasible to capture in 38.306 what a “non-standalone NR-U only capable UE” would mean.

**Observation 4: It is not possible to differentiate a “non-standalone NR-U only capable UE” in current 38.306/33.331 for now.**

It should also be noted that the capability corresponding to 1020f is only for NR-U and extended window monitoring is still mandatory for 2-step RACH.

**Observation 5: Monitoring of extended window for msgB is mandatory for 2-step RACH capable UE.**

If RAN1 introduces a table for a mapping between non-standalone NR-U and the UE features, then it may become possible to refer to that in the capability *extendedRAR-Window-r16.*

Based on these observations, the following are proposed:

**Proposal 1: Keep the existing capability of *extendedRAR-Window-r16* in 38.331/38.306 as is.**

**Proposal 2: Based on RAN1 progress on capturing the correspondence between NR-U deployments and UE features, RAN2 can re-visit the text for this capability to make it optional for only NR-U non-standalone capable UEs.**

**Do you agree with the above observations and proposals as a way-forward?**

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| --- | --- | --- |
| **Company** | **Response** | **Comments** |
| **Samsung** | **Yes in principle** | **We would like to further clarify the case (i.e. non-standalone NR-U) that 2-step RACH is not supported in which UE anyway has to support the extended RAR. Then, the following phrase can be added to the P2 at the end "with no support of 2-step RACH".** |
| ZTE | RAN1 rationale is unclear to us and we don’t think such capability is needed! | With regards to observation 2, RAN1 rationale for making this optional seems confusing. Firstly, the extended RAR window for NR-U was agreed to mitigate the LBT failures in DL. In the scenario of observation 2 (PCell in licensed), it was never the intention to actually extend the RAR window (since DL is on licensed spectrum). For this there is no real need for capability (since it was never intended to use the extended window in the first place).  Even if UE is allowed to indicate support for \*only LAA\* style operation as explained by the rapporteur, there is still no need for an explicit capability because in this case PCell will be in licensed spectrum anyway and hence extended RAR window will not be used for these UEs per the above explanation.  If companies agree with this, then, we propose to stick with RAN2 decision (that there is no need for such capability) and inform RAN1 of this and correct the 38.306 accordingly.  We agree with observation 5 and we can clarify this by adding that any capability only refers to DCI 1\_0 with CRC scrambled with RA-RNTI (if such capability is added). |
| Intel | Yes | Our understanding is that RAN1 has agreed to use the Annex B.3 of TS38.300 for the deployment scenario. Hence I think the field description can be updated to include the following sentence: “This capability is mandatory to all scenarios in Annex B.3 of TS38.300 except for Scenario A”. See RAN1 LS R1-2009586. |

**Summary:**

**Conclusion:**

# Conclusion

This report captures the feedback on the extended RAR window monitoring for NR-U and suggests the following: