3GPP TSG-RAN WG2 #115-e R2-21xxxxx

Online, 16-27 August 2021

Agenda Item: xx

Source: MediaTek Inc.

**Title: Report of email discussion [Post114-e][071][NR16] CandidateBeamRSList set to release (MediaTek)**

Document for: Discussion, decision

# 1 Introduction

This document is a report on the following email discussion, initiated after RAN2#114-e:

* [Post114-e][071][NR16] CandidateBeamRSList set to release (MediaTek)

Scope: how UE shall handle the extension field of candidateBeamRSList. The intention is to agree a 38.331 clarification CR in next meeting. Could consider option 2 and option 3 proposed in R2-2106115 as a starting point. This was also discussed in [AT114-e][022].

Intended outcome: Report, agreeable CR.

Deadline: Long

The discussion will proceed in two phases, first to determine an agreeable mechanism for handling the extension field and second to converge on an agreeable CR. The deadlines are as follows:

Phase 1: Friday 2 July 1700 UTC

Phase 2: Friday 6 August 0900 UTC

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

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| Company | Name | Email Address |
| MediaTek (rapporteur) | Nathan Tenny | nathan.tenny@mediatek.com |
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# 3 Background

## 3.1 Original options

The discussion from [1] considered three options drawn from the discussion in [2]:

* **Option 1:** The UE releases the entire concatenated list, both the entries configured with *candidateBeamRSList* and the entries configured with *candidateBeamRSListExt-v1610*.
* **Option 2:** The UE releases only the extended entries that were configured with *candidateBeamRSListExt-v1610*.
* **Option 3:** The *release* branch is not used, and the UE treats *candidateBeamRSList* and *candidateBeamRSListExt-v1610* as a single concatenated field with Need M. The extended list *candidateBeamRSListExt-v1610* is only included when *candidateBeamRSList* is included and fully populated.

## 3.2 Updated options for this discussion

In the discussion, option 1 had less support compared to options 2 and 3. Rapporteur also understands that in continued offline discussion (separate from the official email discussion), a network-based restriction was proposed, in which the network is required to signal the extension (*candidateBeamRSListExt-v1610*) whenever it wants the extension entries to remain unchanged in the UE, and the “release” option on the extension list is used only when the network intends to reconfigure the UE to a number of entries fitting within the original list. This option (option C below) disambiguates the UE behaviour by having the network always indicate explicitly the fate of the extension entries.

Accordingly, this discussion considers three options:

* **Option A:** When *candidateBeamRSListExt-v1610* is set to *release*, the UE releases only the extended entries that were configured with *candidateBeamRSListExt-v1610*.
* **Option B:** The *release* branch is not used, and the UE treats *candidateBeamRSList* and *candidateBeamRSListExt-v1610* as a single concatenated field with Need M. The extended list *candidateBeamRSListExt-v1610* is only included when *candidateBeamRSList* is included and fully populated.
* **Option C:** The network is required to signal the extension (*candidateBeamRSListExt-v1610*) whenever it wants the extension entries to remain unchanged in the UE, and the *release* option on the extension list is used only when the network intends to reconfigure the UE to a number of entries fitting within the original list.

The details of the options may require some clarification (e.g. how to define the “extended entries” in option A), so the following discussion subsections include space for discussion of the details of each option.

## 3.3 Examples

For clarity, this section illustrates how options A/B/C would operate in two example scenarios.

**Example 1:** The network reduces the list size while extension entries are configured, and the resulting list is still larger than the legacy list size:

1. Network sends a *BeamFailureRecoveryConfig* containing a fully populated *candidateBeamRSList* (16 entries) and a partly populated *candidateBeamRSListExt-v1610* (2 entries).



1. UE concatenates the fields into a single list of 18 entries.



1. Network sends a *BeamFailureRecoveryConfig* containing a partly populated *candidateBeamRSList* (15 entries) and omitting the *candidateBeamRSListExt-v1610*.
   1. With option A, the UE populates a list of 17 entries, and the handling of a future *release* indication depends on the interpretation of the option (see section 4.1 below).



* 1. With option B, the UE populates a list of 15 entries; the 2 entries from *candidateBeamRSListExt-v1610* are released.



* 1. With option C, this step is not allowed; if the network intends to reconfigure the UE to a list of 15 entries, it needs to include the 15 entries explicitly along with the *candidateBeamRSListExt-v1610* set to *release*, and if it intends to reconfigure the UE to a list of 17 entries, it needs to include the 17 entries explicitly.

**Example 2:** The network reduces the list size while extension entries are configured, and the resulting list fits inside the legacy list size:

1. Network sends a *BeamFailureRecoveryConfig* containing a fully populated *candidateBeamRSList* (16 entries) and a partly populated *candidateBeamRSListExt-v1610* (2 entries).



1. UE concatenates the fields into a single list of 18 entries.



1. Network sends a *BeamFailureRecoveryConfig* containing a partly populated *candidateBeamRSList* (10 entries) and omitting the *candidateBeamRSListExt-v1610*.
   1. With option A, the UE populates a list of 12 entries, and the handling of a future *release* indication depends on the interpretation of the option (see section 4.1 below).



* 1. With option B, the UE populates a list of 10 entries; the 2 entries from *candidateBeamRSListExt-v1610* are released.



* 1. With option C, this step is not allowed; if the network intends to reconfigure the UE to a list of either r10 or 12 entries, it needs to include the entries explicitly along with the *candidateBeamRSListExt-v1610* set to *release*.

# 4 Discussion (Phase 1)

## 4.1 Details of option A

During the previous discussion of option A, it became clear that there are two potential understandings of the definition of “only the extended entries”.

* Approach A.1: The UE remembers which list entries were *initially* configured by *candidateBeamRSListExt-v1610*, and subsequently treats these as being the extension entries. Thus, even if the list is later shortened to a length that fits within the original list size, some entries may be marked as “extended entries” and can be released with the extension field.
  + In Example 1 from section 3.3, sending a *release* would release the 2 entries that were initially configured by *candidateBeamRSListExt-v1610*, leaving the UE with a list of 15 entries.



* + In Example 2 from section 3.3, sending a *release* would release the 2 entries that were initially configured by *candidateBeamRSListExt-v1610*, leaving the UE with a list of 10 entries.



* Approach A.2: The UE treats the entries from the two list fields as a single undifferentiated list (as usual for lists without ToAddMod structure), and the extension field only addresses entries beyond the size of the original list. Thus, if the list is shortened to a length that fits within the original list size, the UE considers that it has no more extended entries, and setting *candidateBeamRSListExt-v1610* to *release* becomes vacuous.
  + In Example 1 from section 3.3, sending a *release* would release the 1 entry that exceeds the legacy list size, leaving the UE with a list of 16 entries.



* + In Example 2 from section 3.3, sending a *release* would have no effect.



**Question 1.1:** Which of the two approaches do companies prefer, within the scope of option A?

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| **Company** | **Preferred Approach** | **Comments** |
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**Question 1.2:** Any other comment on the details of option A?

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## 4.2 Details of option B

Rapporteur understands that option B is fairly straightforward and there may not be many details that need clarification. This section is provided for any comments on the details of option B.

**Question 2.1:** Any comment on the details of option B?

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## 4.3 Details of option C

Option C was introduced in informal discussion and may need some analysis to make sure that all the implications are understood. Rapporteur understanding is that this option is intended to have no UE impact (i.e., to be compatible with any UE handling of the *release* branch), since the *release* branch is only used when the original field is populated and the list fits within the original entries.

**Question 3.1:** Companies are invited to provide details of their understanding of option C**.**

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**Question 3.2:** Do companies understand that option C can be specified/implemented without UE impact?

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**Question 3.3:** Any other comment on the details of option C?

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## 4.4 Preferred option

Companies are invited to indicate their preferred option (A/B/C).

**Question 4.1:** Which option do companies prefer among options A/B/C?

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| **Company** | **Preferred Option** | **Comments** |
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## 4.5 Text for the general case

The difficulty of this example seems to suggest that we should have some general guidance in the spec for extending a list without ToAddMod, e.g. in a new section A.4.3.7 or by expanding on the existing example in section A.3.10. Any general text to be captured will depend on what approach we take to solving the specific example, but companies are invited to provide candidate text or general guidance for discussion.

**Question 5.1:** What guidance should we provide for the general case of extending lists without ToAddMod?

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# 5 Discussion (Phase 2)

[To be populated]

# 6 Conclusions

Based on the discussion in sections 4 and 5 above, we propose the following outcomes:

Phase 1

Phase 2

# 7 References

[1] R2-2106736: “Report of e-mail discussion [AT114-e][022][NR16] RRC II (MediaTek), MediaTek Inc., RAN2#114-e

[2] R2-2106115: “Extension of candidateBeamRSList set to ‘release’”, MediaTek Inc./Intel Corporation, RAN2#114-e