3GPP TSG RAN WG1 #109-e R1-21xxxxx

**e-Meeting, E-meeting, May 9 – 20, 2022**

Agenda Item: 7.1

Source: Moderator (vivo)

Title: Summary for [109-e-NR-CRs-05] Discussion on timeline requirement for MSG1 and MSGA retransmission

Document for: Discussion and Decision

# Introduction

This document is to kick-off the following email discussion:

* [109-e-NR-CRs-05] Timeline requirement for re-transmission of MSG1 and MSGA by May 13 – Lihui (vivo)

**Note that the deadline for the email and the potential TP is set on May 13**, **please provide your first-round feedback by UTC 23:59 pm, May 10.**

# Phase-1: Discussions

In TS 38.213 V17.1.0, following is specified for the retransmission of MSG1 and MSGA:

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| **TS 38.213 V17.1.0**8.2 Random access response - Type-1 random access procedure[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included and applicable, are not same as corresponding LSBs of the SFN where the UE transmitted PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE **is expected to** transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 assuming $μ$ corresponds to the smallest SCS configuration among the SCS configurations for the PDCCH carrying the DCI format 1\_0, the corresponding PDSCH when additional PDSCH DM-RS is configured, and the corresponding PRACH. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214]. For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines $N\_{1}$ assuming SCS configuration $μ=0$.[omit irrelevant text]8.2A Random access response - Type-2 random access procedure[omit irrelevant text]The UE does not expect to be indicated to transmit the PUCCH with the HARQ-ACK information at a time that is prior to a time when the UE applies a TA command that is provided by the transport block. If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if applicable, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure [11, TS 38.321]. If requested by higher layers, the UE **is expected to** transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 when additional PDSCH DM-RS is configured. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214]. [omit irrelevant text] |

In RAN1#108-e meeting Rel-17 RedCap discussion, for the above highlighted text, companies have different understandings on the timeline requirement for MSG1 and MSGA retransmission for Rel-15/16 UEs [1]. Depending on the exact interpretation for the Rel-15/16 specification, it may or may not have impact for the RedCap UE in idle/inactive mode to support a separate initial BWP associated with no SSB (CD or NCD) for RACH. Therefore, it is necessary to first have a common understanding on the Rel-15/16 specification.

In addition, during the RAN1#109-e email discussion preparation phase, companies commented that the TS38.213 V15.3.0 changed "the UE shall be ready to transmit" in TS38.213 V15.2.0 to "The UE is expected to transmit" after RAN1#94, although no agreement that produced this text change can be found.

**TS 38.213 V15.2.0**

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| 8.2 Random access response[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with the CRC scrambled by the corresponding RA-RNTI within the window, or if the UE does not correctly receive the DL-SCH transport block in the PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE **shall be ready to** transmit a PRACH no later than  msec after the last symbol of the window, or the last symbol of the PDSCH reception, where  is a time duration of  symbols corresponding to a PDSCH reception time for PDSCH processing capability 1 when additional PDSCH DM-RS is configured.[omit irrelevant text] |

**TS 38.213 V15.3.0**

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| 8.2 Random access response[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with the CRC scrambled by the corresponding RA-RNTI within the window, or if the UE does not correctly receive the DL-SCH transport block in the PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE **is expected to** transmit a PRACH no later than  msec after the last symbol of the window, or the last symbol of the PDSCH reception, where  is a time duration of  symbols corresponding to a PDSCH reception time for PDSCH processing capability 1 when additional PDSCH DM-RS is configured.[omit irrelevant text] |

The text should correctly reflect the following agreement made in RAN1#92bis meeting [2]:

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| Agreements: Update the previous agreement on Msg1 retransmission as follows:* If a received Msg2 does not contain a response to the transmitted preamble sequence, or no RAR is received by the end of the RAR window, the UE shall, if requested by higher layers, be ready to transmit a new preamble sequence ~~after~~ no later than the duration of N1 + Δnew + L2.
	+ N1 refers to the UE processing time value determined in the HARQ/scheduling session with front loaded plus additional DMRS and UE capability #1
	+ Δnew = 250 us
	+ L2=500 usec refers to the MAC layer processing time
	+ Note: UE is not mandated to measure each SSB prior to every Msg1 retransmission
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Based on above, [3] clarifies that above timeline requirement should be interpret as the earliest possible timing for UE to re-transmit the MSG1 and MSGA if requested by higher layers.

**Q1. Do you agree that the timeline requirement i.e.,** **“NT,1 + 0.75 msec” is the earliest possible timing for a UE to be ready to re-transmit the MSG1 and MSGA if requested by higher layers?**

***Please provide your views in the table below.***

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| Company | Views and Comments |
| Qualcomm | Yes |
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**Q2. Do you agree to correct the wording “the UE is expected to transmit” back to "the UE shall be ready to transmit" for MSG1(that was originally captured in the TS38.213 V15.3.0) and also for MSGA?**

* ***Corresponding TP is also provided in the appendix for reference, please provide your comments about the TP if any also in the table below***

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| --- | --- | --- | --- |
| Company | Agree or Disagree | The TP is for * Rel-15 or Rel-16/Rel-17
* Rel-16 and Rel-17
 | Comments |
| Qualcomm | We don’t think the TP is necessary. With the use of the qualifier “*if requested by higher layers*,” the wording in Rel-15 and Rel-16 specs are clear enough to capture the RAN1 agreements of RAN1#92bis. |  | Considering a R17 RedCap UE can be configured for RA procedure in an initial DL BWP without SSB, RAN1 can clarify the msg1/msgA retransmission timelines for R17 RedCap UE by drawing a conclusion (or adding a note) without changing the 213 spec. |
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# Phase-1: Summary

TBU

# Email discussion outcome

TBU

# Appendix: TP

## TP for Rel-15 TS38.213 V15.14.0

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| ***Reason for change:*** | Current timeline requirement specified in Clause 8.2 and 8.2A of TS 38.213 for MSG1 and MSGA retransmission for Rel-15/16 UEs does not correctly reflect the following agreement made in RAN1#92bis.Agreements: Update the previous agreement on Msg1 retransmission as follows:* If a received Msg2 does not contain a response to the transmitted preamble sequence, or no RAR is received by the end of the RAR window, the UE shall, if requested by higher layers, be ready to transmit a new preamble sequence ~~after~~ no later than the duration of N1 + Δnew + L2.
	+ N1 refers to the UE processing time value determined in the HARQ/scheduling session with front loaded plus additional DMRS and UE capability #1
	+ Δnew = 250 us
	+ L2=500 usec refers to the MAC layer processing time
	+ Note: UE is not mandated to measure each SSB prior to every Msg1 retransmission
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| ***Summary of change:*** | Change the wording “is expected” to “shall be ready” to make it clear that the UE is ready to transmit, not mandated to transmit the MSG1 no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception. |
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| ***Consequences if not approved:*** | There is mismatch between the specification and agreement. |

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| 8.2 Random access response[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE ~~is expected~~ shall be ready to transmit a PRACH no later than  msec after the last symbol of the window, or the last symbol of the PDSCH reception, where  is a time duration of  symbols corresponding to a PDSCH processing time for UE processing capability 1 assuming  corresponds to the smallest SCS configuration among the SCS configurations for the PDCCH carrying the DCI format 1\_0, the corresponding PDSCH when additional PDSCH DM-RS is configured, and the corresponding PRACH. For , the UE assumes  [6, TS 38.214]. For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines  assuming SCS configuration .[omit irrelevant text] |

## TP for Rel-16 TS 38.213 V16.9.0

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| 8.2 Random access response - Type-1 random access procedure[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included and applicable, are not same as corresponding LSBs of the SFN where the UE transmitted PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE ~~is expected~~ shall be ready to transmit a PRACH no later than  msec after the last symbol of the window, or the last symbol of the PDSCH reception, where  is a time duration of  symbols corresponding to a PDSCH processing time for UE processing capability 1 assuming  corresponds to the smallest SCS configuration among the SCS configurations for the PDCCH carrying the DCI format 1\_0, the corresponding PDSCH when additional PDSCH DM-RS is configured, and the corresponding PRACH. For , the UE assumes  [6, TS 38.214]. For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines  assuming SCS configuration .[omit irrelevant text]8.2A Random access response - Type-2 random access procedure[omit irrelevant text]The UE does not expect to be indicated to transmit the PUCCH with the HARQ-ACK information at a time that is prior to a time when the UE applies a TA command that is provided by the transport block. If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if applicable, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure [11, TS 38.321]. If requested by higher layers, the UE ~~is expected~~ shall be ready to transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 when additional PDSCH DM-RS is configured. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214].[omit irrelevant text] |

## Mirror TP for Rel-17 TS 38.213 V17.1.0

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| 8.2 Random access response - Type-1 random access procedure[omit irrelevant text]If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if included and applicable, are not same as corresponding LSBs of the SFN where the UE transmitted PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit a PRACH. If requested by higher layers, the UE ~~is expected~~ shall be ready to transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 assuming $μ$ corresponds to the smallest SCS configuration among the SCS configurations for the PDCCH carrying the DCI format 1\_0, the corresponding PDSCH when additional PDSCH DM-RS is configured, and the corresponding PRACH. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214]. For a PRACH transmission using 1.25 kHz or 5 kHz SCS, the UE determines $N\_{1}$ assuming SCS configuration $μ=0$.[omit irrelevant text]8.2A Random access response - Type-2 random access procedure[omit irrelevant text]The UE does not expect to be indicated to transmit the PUCCH with the HARQ-ACK information at a time that is prior to a time when the UE applies a TA command that is provided by the transport block. If the UE does not detect the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window, or if the UE detects the DCI format 1\_0 with CRC scrambled by the corresponding MsgB-RNTI within the window and LSBs of a SFN field in the DCI format 1\_0, if applicable, are not same as corresponding LSBs of the SFN where the UE transmitted the PRACH, or if the UE does not correctly receive the transport block in the corresponding PDSCH within the window, or if the higher layers do not identify the RAPID associated with the PRACH transmission from the UE, the higher layers can indicate to the physical layer to transmit only PRACH according to Type-1 random access procedure or to transmit both PRACH and PUSCH according to Type-2 random access procedure [11, TS 38.321]. If requested by higher layers, the UE ~~is expected~~ shall be ready to transmit a PRACH no later than $N\_{T,1}+0.75$ msec after the last symbol of the window, or the last symbol of the PDSCH reception, where $N\_{T,1}$ is a time duration of $N\_{1}$ symbols corresponding to a PDSCH processing time for UE processing capability 1 when additional PDSCH DM-RS is configured. For $μ=0$, the UE assumes $N\_{1,0}=14$ [6, TS 38.214].[omit irrelevant text] |

# Reference

1. R1-2202532, FL summary #5 on reduced maximum UE bandwidth for RedCap, Moderator (Ericsson)
2. 3GPP RAN1#92bis meeting, Chairman’s notes.
3. R1-2203498, Timeline requirement for re-transmission of MSG1 and MSGA, vivo