**3GPP TSG RAN WG1 #114** **R1-230xxxx**

**Toulouse, France, August 21st – 25th, 2023**

**Agenda item:** 9.17

**Source:** Samsung

**Title:** Summary of email discussions [114-R18-38.213-NR\_Netw\_Energy\_NR]

**Document for:** Discussion and decision

# Introduction

The purpose of this document is to collect inputs/comments on the draft CR for TS 38.213 [draftCR\_38213 NES](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114/Inbox/drafts/9.17%28Other%29/%5B38.213%20draft%20CRs%5D/NR_Netw_Energy_NR/R1-230xxxx%20draftCR_38213%20NES.docx) on the introduction of network energy savings for NR. If a comment on a particular aspect has been made by another company, please do not repeat it until, if needed, after a response.

The first checkpoint is on September 5, UTC 13:00.

# First Round Discussion

Please provide your comments on the draft CR for TS 38.213 [draftCR\_38213 NES](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_114/Inbox/drafts/9.17%28Other%29/%5B38.213%20draft%20CRs%5D/NR_Netw_Energy_NR/R1-230xxxx%20draftCR_38213%20NES.docx).

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| Company | Comments |
| ZTE, Sanechips | Thanks for the draft CR. Our comments are as below

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| Comment#1Based on the agreements, the serving cell that UE monitors DCI format 2\_x is not limited to PCell, it can be SCell.**Agreement**From RAN1 point of view, DCI format 2\_X supports activation/deactivation of cell DTX/DRX configuration of multiple serving cells and support activation/deactivation per cell* UE monitor DCI format 2\_X in one serving cell
 |
| Original text #1“a Type3-PDCCH CSS set configured by - *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, or CI-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), or NES-RNTI, or PS-RNTI, or ” |
| Suggested text #1“a Type3-PDCCH CSS set configured by - *SearchSpace* in *PDCCH-Config* with *searchSpaceType* = *common* for DCI formats with CRC scrambled by INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, or CI-RNTI or NES-RNTI and, only for the primary cell, C-RNTI, MCS-C-RNTI, CS-RNTI(s), ~~or NES-RNTI,~~ or PS-RNTI, or ”UE expects to monitoring DCI format 2\_9 in one serving cell.[Aris]: Agree for the placement of “NES-RNTI”.Regarding the monitoring of DCI format 2\_9, I expect that would be reflected in the search space set configuration in 38.331. |
| Comment#2Based on the following agreements, the function of DCI format 2\_X is to activation or de-activation of cell DTX/DRX. Furthermore, based on RAN2 agreements, the cell DTX/DRX is determined by the configuration of periodicity, start slot/offset, on duration, and the design in RAN2 focuses on one single configuration.Therefore, the activation/de-activation function carried by DCI format 2-9 only indicate the following 1. Operate the cell DTX/DRX according to the RRC configured parameters via activation indication or
2. switch to normal cell state (no cell DTX/DRX operation, the cell is always active) via de-activation indication.

However, with the wording of “indicates a start of DTX Active Time or of DRX Active Time”, it seems that the start position of cell DTX/DRX active time is dynamically changed. Meanwhile, with the wording of “indicates an end of DTX Active Time or of DRX Active Time” , it seems the active time of cell DTX/DRX will be terminated. Basically, we think the current wording needs to be update to be consistent with previous agreements.**Agreement in RAN1#114*** An information block field of DCI format 2\_X is variable size either 1 or 2 bits.
	+ Higher layer signaling configures whether the activation/deactivation of cell DTX and/or cell DRX is indicated in DCI format 2\_X for a serving cell.
		- If both cell DTX and cell DRX are configured for a serving cell,
			* 1st bit corresponds to activation/deactivation of cell DTX configuration, and
			* 2nd bit corresponds to activation/deactivation of cell DRX configuration,
		- otherwise, the 1 bit corresponds to the configured cell DTX or cell DRX configuration.

**Agreements in RAN2**The Cell DTX/DRX configuration contains at least: periodicity, start slot/offset, on duration.**Agreements in RAN2**Confirm study item agreement that we can have separate DTX and DRX configuration. We will focus on designing DTX/DRX for at least single configuration. FFS whether multiple configuration of cell DTX or DRX will be supported.  |
| Original text #2- a '0' value for a bit of the cell operation state indicator field indicates a start of DTX Active Time or of DRX Active Time- a '1' value for a bit of the cell operation state indicator field indicates an end of DTX Active Time or of DRX Active Time- if the serving cell is configured with a SUL carrier, the cell operation state indicator field indication for start/end of DRX Active Time applies to both the UL carrier and the SUL carrierWhen a UE receives in slot $m$ on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in a current start/end state of DTX Active Time or DRX Active Time for a second serving cell, the UE operates on the second serving cell according to the indicated state of DTX Active Time or of DRX Active Time starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1. |
| Suggested text #2- a '0' value for a bit of the cell operation state indicator field indicates the de-activation of cell DTX or cell DRX ~~a start of DTX Active Time or of DRX Active Time~~- a '1' value for a bit of the cell operation state indicator field indicates the activation of cell DTX or cell DRX ~~an end of DTX Active Time or of DRX Active Time~~- if the serving cell is configured with a SUL carrier, the cell operation state indicator field indication for the activation or de-activation of cell DRX ~~start/end of DRX Active Time~~ applies to both the UL carrier and the SUL carrierWhen a UE receives in slot $m$ on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in a current ~~start/end~~ state of cell DTX or cell DRX ~~DTX Active Time or DRX Active Time~~ for a second serving cell, the UE operates on the second serving cell according to the indicated state of cell DTX or cell DRX ~~DTX Active Time or of DRX Active Time~~ starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.[Aris]: The terminology was intended to be temporary and eventually be aligned with RAN2 but OK to use the suggested text.  |
| Comment #3The DCI format 2-9 can be monitored in a serving cell, and also indicates the activation/de-activation information for the same serving cell.If we use the term “first serving cell”, and “second serving cell”, it may be interpreted that the DCI format 2-9 can not carry information for the serving cell that transmits DCI 2-9.Therefore, a slight change is suggested. |
| Original text #3When a UE receives in slot $m$ on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in a current start/end state of DTX Active Time or DRX Active Time for a second serving cell, the UE operates on the second serving cell according to the indicated state of DTX Active Time or of DRX Active Time starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1. |
| Suggested text #3When a UE receives in slot $m$ on the active DL BWP of a ~~first~~ serving cell a PDCCH providing DCI format 2\_9 that indicates a change in a current start/end state of DTX Active Time or DRX Active Time for a target ~~second~~ serving cell, the UE operates on the target ~~second~~  serving cell according to the indicated state of DTX Active Time or of DRX Active Time starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.[Aris]: The current text is OK – there is no requirement that the cells are different and no need to introduce unnecessary terminology such as “target” cell. Also, allowing the serving cell with the PDCCH transmission providing DCI format 2\_9 to be one of the indicated cells (i.e. no restriction) will be visible in 38.331 (if not, using “target” or any other terminology here would not fix that). |
| Comment #4Based on the following agreement, UE can drop SP/P CSI reporting outside cell DRX active time, instead of SP/P PUCCH, or PUSCH.Agreement in RAN1#112bisFrom RAN1 point of view, Rel-18 UE supporting cell DRX is not expected to transmit the following signals/channels to the gNB during non-active periods of cell DRX. The list of signals/channels may be updated based on RAN2/RAN4 input and other signals/channels are not precluded from further discussions.Periodic/Semi-persistent CSI reportPeriodic/Semi-persistent SRS FFS: SRS for positioningFFS:HARQ feedback for SPS PDSCHFFS whether there will be exception case(s) for UE transmitting listed signals/channels during non-active periods of DRXFFS Whether the listed signals/channels can be configurable by gNBFFS: Whether the same or different UE behavior is applicable with or without C-DRXFFS: RAN1 to consider impact on system if the channels/signals are not transmitted during non-active period |
| Original text #4Outside DRX Active Time of a serving cell, the UE does not transmit on the serving cell- periodic or semi-persistent PUCCH or PUSCH - periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet* |
| Suggested text #4Outside DRX Active Time of a serving cell, the UE does not transmit on the serving cell- periodic or semi-persistent ~~PUCCH or PUSCH~~ CSI report- periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet*[Aris]: The current text is OK – as captured in comment 6, RAN2 included periodic PUCCH/PUSCH. However, please see response to comment 6. |
| Comment #5In legacy spec, “DRX” refers to UE C-DRX. When cell DTX or cell DRX is introduced for NES, it would be better to use the term “cell DTX or cell DRX” (instead of “DTX or DRX”)to distinguish from UE C-DRX.[Aris]: OK. |
| Comment #6Based on RAN2’s previous agreements, other channel such as SPS PDSCH, CG PUSCH, PDCCH with DL assignment/UL grant will also be dropped during cell DTX/DRX non-active time period. For these impacted signal/channels, will we leave it to be captured in RAN2 spec, or we can also capture it in RAN1?[Aris]: The descriptions can be in only one TS. If RAN2 does not have a problem capturing everything in 38.321, as for UE C-DRX, then 38.321 is the appropriate TS. Otherwise, if there is any specific aspect that is difficult to capture in 38.321, it can be captured in 38.213. Overall, the list channels/signals that can be transmitted/not transmitted was intended to be placeholder text in 38.213. It is probably better to remove that text for now as (a) the list is substantially incomplete (both for remaining RAN1 decisions and current RAN2 decisions) and does not offer much to include few cases and (b) likely belongs to 38.321 and may not be a good use of time to continue discussion on details now. RAN1 should consider sending an LS to RAN2 with the agreements for Tx/Rx and non-Tx/Rs channels/signals as RAN2 may be assuming they will be captured in 38.321 (since RAN2 did not send a relevant LS to RAN1 to my knowledge). |
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| Qualcomm1 | We support suggested texts 2 & 3 & 4 from ZTE.* We suggest adding one sentence that “A UE is not expected to monitor PDCCH providing DCI format 2\_9 in more than one serving cell”, which is the intention for that part of the agreement from our understandings.

AgreementFrom RAN1 point of view, DCI format 2\_X supports activation/deactivation of cell DTX/DRX configuration of multiple serving cells and support activation/deactivation per cell* UE monitor DCI format 2\_X in one serving cell

[Aris]: Please see responses to ZTE. |
| vivo | **1st comment:**Similar comment with ZTE Comment#2, current wording “indicates a start/end of DTX Active Time or of DRX Active Time” is not correct. We suggest changes as follows:- a '0' value for a bit of the cell operation state indicator field indicates ~~a start of DTX Active Time or of DRX Active Time~~ deactivation of the DTX mode operation state by *cellDTXConfig* or the DRX mode operation state by *cellDRXConfig*- a '1' value for a bit of the cell operation state indicator field indicates ~~a end of DTX Active Time or of DRX Active Time~~ activation of the DTX mode operation state by *cellDTXConfig* or the DRX mode operation state by *cellDRXConfig*When a UE receives in slot $m$ on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in a current ~~start/end~~ activation/deactivation state of DTX ~~Active Time~~ mode operation or DRX ~~Active Time~~ mode operation for a second serving cell, the UE operates on the second serving cell according to the indicated state of DTX ~~Active Time~~ mode operation or DRX ~~Active Time~~ mode operation starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.[Aris]: Please see responses to ZTE.**2nd comment:** Agree with the editor, the following text may be left for 38.321. So, it will be put in bracket and not endorsed in RAN1. Is this the correct understanding?Outside DTX Active Time of a serving cell, the UE does not receive on the serving cell- PDCCH candidates for search space sets associated with detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4, and DCI format 2\_5- CSI-RS in resources provided by *CSI-ReportConfig* with *reportQuantity* that includes rank indicationOutside DRX Active Time of a serving cell, the UE does not transmit on the serving cell- periodic or semi-persistent PUCCH or PUSCH - periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet*Besides, agree with ZTE’s comment#4 that PUCCH or PUSCH should be replaced by CSI report to align the agreement.[Aris]: The current note and the discussion in this document for the review of the draft CR should serve as “[ ]” – the note is actually clearer that the descriptions can be moved to TS 38.321 (the [ ] may imply that the text is to be confirmed for TS 38.213). Please also see response to comment 6 from ZTE.**3rd comment:** We support Qualcomm’s suggested text to include the agreement not captured.[Aris]: Please see response to ZTE/Qualcomm. |
| Apple1 | We agree with ZTE and vivo’s comment on the interpretation of “0” and “1” value in DCI format 2\_9 and we support suggested modification by vivo.We also support ZTE’s suggested texts 1, 3 &4 and Qualcomm’s suggested text to include the agreement not captured.[Aris]: Please see previous responses. |
| LG Electronics | Thank you very much for providing the draft CR. We have one comment for spatial/power domain NES techniques.**Agreement**Down-select from the below for priority rule determination for CSI reporting of multiple sub-configurations* Option 1: The priority of the CSI report containing CSIs for multiple sub-configurations, is determined according to the clause 5.2.5 of TS 38.214.
	+ 1-b) A sub-configuration level priority is determined by the order of sub-configuration index. For Part 2 CSI corresponding to each sub-configuration, omission is at subConfig level. Follow legacy dropping rules for a CSI report containing multiple CSIs.
		- CSI mapping rule across sub-configurations follow legacy specification principle
		- Sub-configuration index with lower value has higher priority
		- Sub-configuration index is configured in CSI report config

According to the above agreement made in RAN1#114, the following yellow-highlighted part (captured from Clause 9.2.5.2) can be impacted, since the highlighted part implies CSI reporting level omission (different from sub-configuration level omission in the RAN1 agreement) if PUCCH resource is not sufficient.

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| If a UE has HARQ-ACK, SR and sub-band CSI reports to transmit and the UE determines a PUCCH resource with PUCCH format 3 or PUCCH format 4, where - the UE determines the PUCCH resource using the PUCCH resource indicator field [5, TS 38.212] in a last of a number of DCI formats, excluding the SPS activation DCI, with a value of a PDSCH-to-HARQ\_feedback timing indicator field indicating a same slot for the PUCCH transmission, or by a value provided by *dl-DataToUL-ACK* or *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-DCI-1-2* or *dl-DataToUL-ACK-r17* or *dl-DataToUL-ACK-DCI-1-2-r17* if the PDSCH-to-HARQ\_feedback timing indicator field is not present in the last DCI format, from a PUCCH resource set provided to the UE for HARQ-ACK transmission, and - the UE determines the PUCCH resource set as described in clause 9.2.1 and clause 9.2.3 for  UCI bitsand- if , the UE transmits the HARQ-ACK, SR and the  CSI report bits by selecting the minimum number  of PRBs from the  PRBs satisfying  as described in clauses 9.2.3 and 9.2.5.1- else, - if for  Part 2 CSI report priority value(s), it is and , the UE selects the first  Part 2 CSI reports, according to respective priority value(s) [6, TS 38.214], for transmission together with the HARQ-ACK, SR and  Part 1 CSI reports , where  is the number of Part 1 CSI report bits for the  CSI report and  is the number of Part 2 CSI report bits for the  CSI report priority value,  is a number of CRC bits corresponding to , and  is a number of CRC bits corresponding to   |

[Aris]: Yes, I was aware of this. The reason why there was no update is because some coordination with 38.214 is likely needed (could not be done in real time). It may be possible to capture the sub-configuration level omission with a simple statement in 38.214. I suggest this is left for the update after RAN1#114bis. |
| Huawei, HiSilicon | **1st comment:*** The term “cell operation states” seems too generic and could be interpreted differently from what is agreed and it is not used in draft CRs of RAN2 (e.g., see 38.331 definition of cellDTXConfig) nor in the agreements of RAN1. Hence, we propose to use replace it with simply “cell DTX/DRX”
* The term “adaptation” could be more generic than activation/deactivation that is agreed in RAN1. Hence, we propose to simply (directly) use activation/deactivation.

an example of modification could be:***11.5 ~~Adaptation~~*** activation/deactivation ***of cell ~~operation states~~ DTX/DRX***A UE configured for operation on a serving cell according to one or both of a cell DTX ~~mode operation state~~ by cellDTXConfig and a cell DRX ~~mode operation state~~ by cellDRXConfig for the serving cell [11, TS 38.331], can be additionally provided by dci-Format2-9 a search space set to monitor PDCCH for detection of DCI format 2\_9 according to a common search space as described in clause 10.1, and a location in DCI format 2\_9 by position-inDCI-NES of a cell operation state indicator field for the serving cell[Aris]: As this is a topic with likely continuation in Rel-19, it is preferable for some terminology to be generic. For other updates, please see response to ZTE.**2nd comment:** We support Comment #1, #2, #3 and #4 from ZTE and their modifications proposed to the text, taking into consideration our **1st comment**.[Aris]: Please see response to ZTE.**3nd comment:** Similar to Vivo, we agree with the editor, the following text may be left for 38.321. and can be put in bracket and not endorsed in RAN1.Outside DTX Active Time of a serving cell, the UE does not receive on the serving cell- PDCCH candidates for search space sets associated with detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4, and DCI format 2\_5- CSI-RS in resources provided by *CSI-ReportConfig* with *reportQuantity* that includes rank indicationOutside DRX Active Time of a serving cell, the UE does not transmit on the serving cell- periodic or semi-persistent PUCCH or PUSCH - periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet*[Aris]: Please see previous responses. The text will be removed in the next update. |
| CATT | We support ZTE’s suggested text modification #2, #3 and #4. We also support Huawei’s text modification in 1st comment. Comment#1 The DTX/DRX mode is for UE. The “cell operation state” is to the terminology of gNB state machine but not for the specification of activation/deactivation. Specifications would describe the UE behavior when the cell DTX/DRX change between activation and deactivation. Comment#2DCI format 2\_9 is used to indicate the activation/deactivation of cell DTX/DRX not to indicate the transition between DTX/DRX ON (active time) and DTX/DRX OFF (outside active time)Comment#3The physical channel/signals not received by UE during cell DTX inactive time should have the UE behavior “not expect to receive”.

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| 11.5 ~~Adaptation~~ Activation/Deactivation of cell DTX/DRX ~~operation states~~A UE configured for operation on a serving cell according to one or both of a cell DTX ~~mode operation state~~ by *cellDTXConfig* and a cell DRX ~~mode operation state~~ by *cellDRXConfig* for the serving cell [11, TS 38.331], can be additionally provided by *dci-Format2-9* a search space set to monitor PDCCH for detection of DCI format 2\_9 according to a common search space as described in clause 10.1, and a starting bit position ~~location~~ in DCI format 2\_9 by *position-inDCI-NES* of an indication of cell DTX/DRX activation/deactivation ~~cell operation state indicator~~ field for the serving cell - if the UE is configured with both cell DTX ~~mode~~ and cell DRX ~~mode operation states~~ for the serving cell, the cell DTX/DRX ~~operation state~~ indicator field includes two bits where the first bit indicates the activation/deactivation of cell DTX ~~mode operation state~~ and the second bit indicates the activation/deactivation of cell DRX ~~mode operation state~~- if the UE is configured with only one of the cell DTX ~~mode and~~ or cell DRX ~~mode operation states~~ for the serving cell, the activation/deactivation of the cell DTX/DRX ~~operation state~~ indicator field includes one bit indicating the activation/deactivation of ~~one of the~~ cell DTX ~~mode and~~ or cell DRX ~~mode operation states, respectively,~~ for the serving cell- a '0' value for a bit of the cell operation state indicator field indicates the activation of the cell DTX or cell DRX ~~a start of DTX Active Time or of DRX Active Time~~- a '1' value for a bit of the cell operation state indicator field indicates the deactivation of the cell DTX or cell DRX ~~an end of DTX Active Time or of DRX Active Time~~- if the serving cell is configured with a SUL carrier, the activation/deactivation of cell DTX/DRX ~~operation state~~ indicator field indication for the activation/deactivation of cell DRX ~~start/end of DRX Active Time~~ applies to both the UL carrier and the SUL carrierWhen a UE receives in slot $m$ on the active DL BWP of a first serving cell a PDCCH providing DCI format 2\_9 that indicates a change in the activation/deactivation of cell DTX or cell DRX ~~a current start/end state of DTX Active Time or DRX Active Time~~ for a target ~~second~~ serving cell, the UE operates on the target ~~second~~ serving cell according to the indicated activation/deactivation of cell DTX or cell DRX ~~state of DTX Active Time or of DRX Active Time~~ starting from a slot on the active DL BWP or on the active UL BWP of the second serving cell, respectively, that is not before the beginning of the slot $m+d$ on the active DL BWP of the first serving cell where $d$ is a number of slots for the SCS of the active DL BWP of the first serving cell in Table 11.5-1.Table 11.5-1: Minimum number of slots for adaptation of an operation state on a serving cell

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| SCS (kHz) | Number of slots  |
| 15 | 3 |
| 30 | 6 |
| 60 | 12 |
| 120 | 24 |
| 480 | 96 |
| 960 | 192 |

Outside DTX Active Time of a serving cell, the UE does not expect to receive on the serving cell- PDCCH candidates for search space sets associated with detection of DCI format 2\_0, DCI format 2\_1, DCI format 2\_2, DCI format 2\_3, DCI format 2\_4, and DCI format 2\_5- CSI-RS in resources provided by *CSI-ReportConfig* with *reportQuantity* that includes rank indicationOutside DRX Active Time of a serving cell, the UE does not expect to transmit on the serving cell- periodic or semi-persistent PUCCH or PUSCH - periodic or semi-persistent SRS except for SRS in resources provided by *SRS-posResourceSet*\*\*\* Unchanged parts are omitted \*\*\* |

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