**3GPP TSG-RAN WG2 Meeting #110e R2-20xxxx**

**Online, 1st – 12th June 2020**

**Agenda item: X.X**

**Source: MediaTek Inc,**

**Title: [Post109bis-e][939][PowSav] RRC open issues (Mediatek)**

**Document for: Discussion and decision**

# 1 Introduction

This document is to capture open issues and identify solutions as part of the following email discussion:

* [Post109bis-e][939][PowSav] RRC open issues (Mediatek)

Address stage-3 remaining open issues. Capture identified NEW, if any, stage-3 corrections/issues from ASN.1 review.  Issues that have already been discussed and not pursued should not be brought up again.

      Intended outcome: Agreable proposals and CR for 38.331 addressing open issues

      Deadline: Next Meeting, ASN.1 review schedule

Companies are encouraged to raise new or open issues with the NR and LTE RRC CRs for power savings [1] [2] in this document. Please also note the ASN.1 review plan as outlined in [3]. Specifically, note that each new open issue must be associated with a RIL ID:

* *For any remaining WI specific issues that don’t have an associated RIL#, add a RIL comment to the ASN.1 file*

Issues are to be classified as below:

1. ***Trivial*** *e.g. editorials, commas, colon, misspelling, missing/ double spaces, italics etc.   
   See procedure for Class 0 and Class 1 issues below.*
2. ***Minor*** *e.g. quite straightforward changes e.g. correction/ addition of specification references or sub-clauses.  
   See procedure for Class 0 and Class 1 issues below.*
3. ***ASN.1 session******issue*** *e.g. ASN.1 issue e.g. related to need codes, extensibility, alternative encoding, ASN.1/ guidelines, general protocol (consistency) issue or issue affecting more than one WI*
4. ***WI session issue i****.e. an issue that is not purely ASN.1 but has some impact on functionality but only affecting a single WI.*

*Minor editorial issues (spelling error, italics, missing commas, spaces, etc.) are sent to the ASN.1 Review Rapporteur via email and need no RIL.*

# 2 Open issues/RIL for NR Power Saving RRC CR

| **ID** | **Class** | **Section** | **Description** | **Proposed Change** | **Comments** |
| --- | --- | --- | --- | --- | --- |
| O802 | 3 | 5.7.4.2 | Accoding to RAN2#109e-bis agreement, the configuration of UAI for power saving and the reporting of UAI for power saving is CG-specific. In other word, UE reports UAI for power saving for a cell group only when the UE is configured to report the UAI for power saving for the cell group. In addition, the UAI reporting procedure for MCG and SCG are inpendently.  Take the UAI of UE’s preference on DRX parameters for power saving as an example., the following wording highlight yellow should be more clear that UE is configured to provide its preference on DRX parameters for power saving for the cell group.  1> if configured to provide its preference on DRX parameters of a cell group for power saving:  2> if the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters for power saving; or  2> if the current preference on DRX parameters of the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a is not running:  3> start timer T346a with the timer value set to the *drx-PreferenceProhibitTimer*;  3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide its preference on DRX parameters of the cell group for power saving; | 1. For UE’s preference on DRX parameters for power saving, change the following wording as below.   1> if configured to provide its preference on DRX parameters of a cell group for power saving:  2> if the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters of the cell group for power saving; or  2> if the current preference on DRX parameters of the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a is not running:  3> start timer T346a with the timer value set to the *drx-PreferenceProhibitTimer*;  3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide its preference on DRX parameters of the cell group for power saving;  2. For UE’s preference on the maximum aggregated bandwidth for power saving, the same change as above.  3. For UE’s preference on the maximum number of secondary component carriers for power saving, the same change as above.  4. For UE’s preference on the maximum number of MIMO layers for power saving, the same change as above.  5. For UE’s preference on the minimum scheduling offset for cross-slot scheduling for power saving, the same change as above. |  |
| O803 | 3 | 5.7.4.3 | For the overheating UAI, the reported maximum number of MIMO layer is for each serving cell. We have not discussed this is for each DL BWP. | For UAI for overheating, remove “ and each DL BWP” as below.  3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR1:  4> include reducedMaxMIMO-LayersFR1 in the OverheatingAssistance IE;  4> set reducedMIMO-LayersFR1-DL to the number of maximum MIMO layers of each serving cell ~~and each DL BWP~~ operating on FR1 the UE prefers to be temporarily configured in downlink;  4> set reducedMIMO-LayersFR1-UL to the number of maximum MIMO layers of each serving cell ~~and each DL BWP~~ operating on FR1 the UE prefers to be temporarily configured in uplink;  3> if the UE prefers to temporarily reduce the number of maximum MIMO layers of each serving cell operating on FR2:  4> include reducedMaxMIMO-LayersFR2 in the OverheatingAssistance IE;  4> set reducedMIMO-LayersFR2-DL to the number of maximum MIMO layers of each serving cell ~~and each DL BWP~~ operating on FR2 the UE prefers to be temporarily configured in downlink;  4> set reducedMIMO-LayersFR2-UL to the number of maximum MIMO layers of each serving cell ~~and each DL BWP~~ operating on FR2 the UE prefers to be temporarily configured in uplink; |  |
| O804 | 2 | 6.2.2 | Accoding to RAN2#109e-bis agreement, reporting a ‘feature’, the all parameters that the UE has a preference for are included. Parameters that are not included are interpreted as the UE having no preference for those parameters. So we think the following parameters should be defined as “optional” since UE may not have preference on a parameter for both DL and UL simultaneously.   * reducedBW-FR1-DL-r16 * reducedBW-FR1-UL-r16 * reducedBW-FR2-DL-r16 * reducedBW-FR2-UL-r16 * reducedMIMO-LayersFR1-DL-r16 * reducedMIMO-LayersFR1-UL-r16 * reducedMIMO-LayersFR2-DL-r16 * reducedMIMO-LayersFR2-UL-r16 | Define the following parameters as “optional”.  MaxBW-Preference-r16 ::= SEQUENCE {  reducedMaxBW-FR1-r16 SEQUENCE {  reducedBW-FR1-DL-r16 ReducedAggregatedBandwidth  OPTIONAL,  reducedBW-FR1-UL-r16 ReducedAggregatedBandwidth  OPTIONAL.  } OPTIONAL,  reducedMaxBW-FR2-r16 SEQUENCE {  reducedBW-FR2-DL-r16 ReducedAggregatedBandwidth  OPTIONAL,  reducedBW-FR2-UL-r16 ReducedAggregatedBandwidth  OPTIONAL,  } OPTIONAL  }  MaxMIMO-LayerPreference-r16 ::= SEQUENCE {  reducedMaxMIMO-LayersFR1-r16 SEQUENCE {  reducedMIMO-LayersFR1-DL-r16 INTEGER (1..8) OPTIONAL,  reducedMIMO-LayersFR1-UL-r16 INTEGER (1..4) OPTIONAL  } OPTIONAL,  reducedMaxMIMO-LayersFR2-r16 SEQUENCE {  reducedMIMO-LayersFR2-DL-r16 INTEGER (1..8) OPTIONAL,  reducedMIMO-LayersFR2-UL-r16 INTEGER (1..4) OPTIONAL  } OPTIONAL  } |  |
| O805 | 3 | 6.2.2 | In the field description for the following fields, it states that the reported value can only range up to the current active configuration when indicated to address power savings.   * reducedBW-FR1-UL * reducedBW-FR1-DL * reducedBW-FR2-UL * reducedBW-FR2-DL * reducedCCsDL * reducedCCsUL * reducedMIMO-LayersFR1-DL * reducedMIMO-LayersFR1-UL * reducedMIMO-LayersFR2-DL * reducedMIMO-LayersFR2-UL   we have discussed the issue on whether UE can indicate any preferred value within its capability for maximum aggregated bandwidth, number of carriers, MIMO layers and minimum scheduling offset, but has not reach conclusion. | Remove the following field description.  The aggregated bandwidth can only range up to the current active configuration when indicated to address power savings.  The maximum number of downlink SCells can only range up to the current active configuration when indicated to address power savings.  The maximum number of uplink SCells can only range up to the current active configuration when indicated to address power savings.  The maximum number of downlink MIMO layers can only range up to the current active configuration when indicated to address power savings.  The maximum number of uplink MIMO layers can only range up to the current active configuration when indicated to address power savings. |  |
| CATT | 3 | 5.7.4.2 | According to the current UAI for power saving, the UE always initiate UAI for power saving upon being configured to provide its preference for power saving. And the UE may report an empty UAI for the first preference reporting for power saving. For example: the UE will report UAI with DRX-Preference IE without any parameter, if the UE receives the configuration to provide its preference on DRX parameters for power saving of a cell group but it has no preference on DRX parameters of the cell group.  The current UAI for power saving follows the same principle for delay budget report. However, the UE always reports a value for delay budget report. For overheating reporting, the UE initiates UAI upon detecting internal overheating after it is configured. Our understanding of the Power Saving UAI is that it is mainly UE-triggered, not network triggered, similar to overheating. In that sense, the first transmission will most likely be useless. Hence we suggest the UAI for power saving follows the same principle for overheating. | Take DRX preference of a cell group for power saving as an example as follows. The similar change need also to be applied to preference on the maximum aggregated bandwidth for power saving, preference on the maximum number of secondary component carriers for power saving, preference on the maximum number of MIMO layers for power saving, and preference on the minimum scheduling offset for cross-slot scheduling for power saving.  A UE capable of providing its preference on DRX parameters of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases if it was configured to do so, including upon ~~being configured to provide its~~ having a preference on DRX parameters for power saving and upon change of its preference on DRX parameters.  1> if configured to provide its preference on DRX parameters of a cell group for power saving:  2> if the UE has a preference on DRX parameters of the cell group and the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters for power saving; or  2> if the current preference on DRX parameters of the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a is not running:  3> start timer T346a with the timer value set to the *drx-PreferenceProhibitTimer*;  3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide its preference on DRX parameters of the cell group for power saving; |  |
| CATT | 3 | 6.2.2 | To align with text descriptions, add ‘of a cell group’ to the field descriptions of preference on *minimumSchedulingOffset* of cross-slot scheduling, preference on DRX parameters, preference on K0/K2, and preference on the maximum number of MIMO layers | Take filed descriptions of *minSchedulingOffsetPreference*, *preferredDRX-InactivityTimer*, *preferredK0*, *reducedMIMO-LayersFR1-DL* as examples:  ***minSchedulingOffsetPreference***  Indicates the UE's preferences on *minimumSchedulingOffset* of cross-slot scheduling for power saving of a cell group.  ***preferredDRX-InactivityTimer***  Indicates the UE's preferred DRX inactivity timer length for power saving of a cell group. Value in ms (milliSecond). *ms0* corresponds to 0, *ms1* corresponds to 1 ms, *ms2* corresponds to 2 ms, and so on.  ***preferredK0***  Indicates the UE's preferred value of *k0* (slot offset between DCI and its scheduled PDSCH - see TS 38.214 [19], clause 5.1.2.1) for cross-slot scheduling for power saving of a cell group. Value is defined for each subcarrier spacing (numerology) in units of slots. *sl1* corresponds to 1 slot, *sl2* corresponds to 2 slots, *sl4* corresponds to 4 slots, and so on.  ***reducedMIMO-LayersFR1-DL***  Indicates the UE's preference on reduced configuration corresponding to the maximum number of downlink MIMO layers of each serving cell operating on FR1 indicated by the field, to address overheating or power saving of a cell group. This field is allowed to be reported only when UE is configured with serving cells operating on FR1. The maximum number of downlink MIMO layers can only range up to the current active configuration when indicated to address power savings. |  |
| E265 | 3 | 6.2.2.2 | 1. The UE typically does not have the opportynity to cancel a release request, because it is typically released immediately, which is the whole point of this feature 2. The UE sending a cancellation after prohibit timer expiry creates unnessary signalling, i.e. the UE can assume that UE will be released based on NW inactivity timer in such case. 3. The UE waiting for the prohibit timer to expire to send a cancellation may be released by the NW because the NW inactivity timer expires 4. It is unclear what cancellation means and how the NW should act on it | Remove “connected”:  preferredRRC-State-r16 ENUMERATED {idle, inactive, ~~connected,~~ outOfConnected} |  |
| H390 | 3 | 6.3.2 | In RAN1#96bis meeting, there was an agreement:  Agreements:   * For PDCCH-based power saving signal/channel,   + The set of AL(s) is configured   + The number of PDCCH candidate(s) for each AL is configured   But in current signalling design, the aggregation level and the number of PDCCH candidate(s) are not configurable for DCP (dci-Format2-6).  },  dci-Format2-6-r16 SEQUENCE {  ...  } OPTIONAL, -- Need R  ... | The aggregation level and the number of PDCCH candidate(s) should be configurable for DCP (dci-Format2-6).  SearchSpace-v16xy ::= SEQUENCE {  searchSpaceId SearchSpaceId,  controlResourceSetId-r16 ControlResourceSetId-r16 OPTIONAL, -- Cond SetupOnly  searchSpaceType-r16 CHOICE {  common-r16 SEQUENCE {  dci-Format2-4-r16 SEQUENCE {  nrofCandidates-CI-r16 SEQUENCE {  aggregationLevel1 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel2 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel4 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel8 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel16 ENUMERATED {n1, n2} OPTIONAL -- Need R  },  ...  },  dci-Format2-5-v16xy SEQUENCE {  nrofCandidates-IAB-r16 SEQUENCE {  aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R  },  ...  },  dci-Format2-6-r16 SEQUENCE {  nrofCandidates-DCP-r16 SEQUENCE {  aggregationLevel1-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel2-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel4-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel8-r16 ENUMERATED {n1, n2} OPTIONAL, -- Need R  aggregationLevel16-r16 ENUMERATED {n1, n2} OPTIONAL -- Need R  },  ...  } OPTIONAL, -- Need R  ...  }, |  |
| I200 | 3 | 5.3.5.3 | The *UEAssistanceInformation* (UAI) msg is re-sent when it was sent during the last 1 second before receiving RRCReconfiguration msg  (with *reconfigurationWithSync* included in *masterCellGroup*). We wonder whether some clarification is needed now that UAI can go to MCG and/or SCG considering as UAI can also be configured in (NG)EN-DC and NR-DC. | A possible change could be the following in section 5.3.5.3 “Reception of RRCReconfiguration by the UE”:  2> if *reconfigurationWithSync* was included in *masterCellGroup* or *secondaryCellGroup*; and  2> if the UE transmitted a *UEAssistanceInformation* message during the last 1 second, and the UE is still configured to provide UE assistance information for the applicable cell group:  3> initiate transmission of a *UEAssistanceInformation* message to re-send the UE assistance information for the applicable cell group that UE is still configured to provide with the same contents; |  |
| I201 | 3 | 11.2.2 | The *ueAssistanceInformation* (included in HandoverPreparationInformation as part of the inter-node RRC message) does not include the information for other cell groups (as it refers to MCG). | A possible change could be the following in section 11.2.2. Message definitions for HandoverPreparationInformation:  AS-Context ::=                          SEQUENCE {      reestablishmentInfo                     ReestablishmentInfo                             OPTIONAL,      configRestrictInfo                      ConfigRestrictInfoSCG                           OPTIONAL,      ...,      [[  ran-NotificationAreaInfo            RAN-NotificationAreaInfo                        OPTIONAL      ]],      [[  ueAssistanceInformation             OCTET STRING (CONTAINING UEAssistanceInformation)  OPTIONAL   -- Cond HO2      ]],      [[      selectedBandCombinationSN               BandCombinationInfoSN                           OPTIONAL      ]],      [[      configRestrictInfoDAPS-r16              ConfigRestrictInfoDAPS-r16                      OPTIONAL,      sidelinkUEInformationNR-r16             OCTET STRING                                    OPTIONAL,      sidelinkUEInformationEUTRA-r16          OCTET STRING                                    OPTIONAL,      ueAssistanceInformationEUTRA-r16        OCTET STRING                                    OPTIONAL,     ueAssistanceInformationSCG-r16         OCTET STRING (CONTAINING UEAssistanceInformation)  OPTIONAL   -- Cond HO2      ]]  } |  |
| I202 | 3 | 5.3.7 | The release of the applicable UAI PowSav features and the stop of the timers do not indicate that this is applicable to all the instances for the different cell groups when initiating resume procedure | A possible change could be the following in the initiation of section 5.3.7 “RRC Connection Resume”:  1> release *drx-PreferenceConfig* for any configured cell group from the UE Inactive AS context, if stored;  1> stop all instances of the timer T346a, if running;  1> release *maxBW-PreferenceConfig* for any configured cell group from the UE Inactive AS context, if stored;  1> stop all instances of the timer T346b, if running;  1> release *maxCC-PreferenceConfig* for any configured cell group from the UE Inactive AS context, if stored;  1> stop all instances of the timer T346c, if running;  1> release *maxMIMO-LayerPreferenceConfig* for any configured cell group from the UE Inactive AS context, if stored;  1> stop all instances of the timer T346d, if running;  1> release *minSchedulingOffsetPreferenceConfig* for any configured cell group from the UE Inactive AS context, if stored;  1> stop all instances of the timer T346e, if running; |  |
| I203 | 3 | 5.3.5.4 | In section 5.3.5.4 “secondary cell group release”, there is a general statement indicating “release the SCG configuration”, and we wanted to check with companies whether there is a need or not to add explicit reference to the release of the applicable UAI PowSav features and the stop of the corresponding timers (this mechanism would be applicable e.g. during reestablishment or reconfiguration). | If the update were desirable, this would impact to the release of *drx-PreferenceConfig, maxBW-PreferenceConfig, maxCC-PreferenceConfig, maxMIMO-LayerPreferenceConfig* and *minSchedulingOffsetPreferenceConfig*, as well as, the stop of T346a/b/c/d/e |  |
| H391 | 3 | 5.7.4.2 | UE reports UAI for power saving for a cell group only when the UE is configured to report the UAI for power saving for the cell group or the preference for the cell group changes. To align with the other texts, the “for the cell group” should be added as the texts in red to make it clearer. | A possible change could be：  A UE capable of providing its preference on DRX parameters of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide its preference on DRX parameters for the cell group and upon change of its preference on DRX parameters for the cell group.  A UE capable of providing its preference on the maximum aggregated bandwidth of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide its maximum aggregated bandwidth preference for the cell group and upon change of its maximum aggregated bandwidth preference for the cell group.  A UE capable of providing its preference on the maximum number of secondary component carriers of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide its maximum number of secondary component carriers preference for the cell group and upon change of its maximum number of secondary component carriers preference for the cell group.  A UE capable of providing its preference on the maximum number of MIMO layers of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide its maximum number of MIMO layers preference for the cell group and upon change of its maximum number of MIMO layers preference for the cell group.  A UE capable of providing its preference on the minimum scheduling offset for cross-slot scheduling of a cell group for power saving in RRC\_CONNECTED may initiate the procedure in several cases, including upon being configured to provide its minimum scheduling offset preference for the cell group and upon change of its minimum scheduling offset preference for the cell group. |  |
| H392 | 3 | 5.7.4.2 | For prohibit timers T346a, T346b, T346c, T346d, T346e, the UE maintains one instance of this timer per cell group. The “associated with the cell group” should be added as the texts in red to make it clearer. | A possible change could be：  1> if configured to provide its preference on DRX parameters of a cell group for power saving:  2> if the UE did not transmit a *UEAssistanceInformation* message with *drx-Preference* for the cell group since it was configured to provide its preference on DRX parameters for power saving; or  2> if the current preference on DRX parameters of the cell group is different from the one indicated in the last transmission of the *UEAssistanceInformation* message including *drx-Preference* for the cell group and timer T346a associated with the cell group the is not running:  3> start the timer T346a with the timer value set to the *drx-PreferenceProhibitTimer*;  3> initiate transmission of the *UEAssistanceInformation* message in accordance with 5.7.4.3 to provide its preference on DRX parameters of the cell group for power saving;  Same changes need to be applied to T346b, T346c, T346d, T346e in the following similar texts. |  |
| H393 | 3 | 5.3.5.9 | For prohibit timers T346a, T346b, T346c, T346d, T346e, the UE maintains one instance of this timer per cell group. The “associated with the cell group” should be added as the texts in red to make it clearer. | A possible change could be：  1> if the received *otherConfig* includes the *drx-PreferenceConfig*:  2> if *drx-PreferenceConfig* is set to *setup*:  3> consider itself to be configured to provide its preference on DRX parameters for power saving for the cell group in accordance with 5.7.4;  2> else:  3> consider itself not to be configured to provide its preference on DRX parameters for power saving for the cell group and stop timer T346a associated with the cell group, if running;  Same changes need to be applied to T346b, T346c, T346d, T346e in the following similar texts. |  |
| H394 | 3 | 5.3.7.2 | Similar comment as I202 but for RRC connection re-establishment. The release of the applicable UAI PowSav features and the stop of the timers do not indicate that this is applicable to all the instances for the different cell groups when initiating RRC connection re-establishment procedure. | A possible change could be：  1> release *drx-PreferenceConfig* for any configured cell group, if configured, and stop all instances of the timer T346a, if running;  1> release *maxBW-PreferenceConfig* for any configured cell group, if configured, and stop all instances of the timer T346b, if running;  1> release *maxCC-PreferenceConfig* for any configured cell group, if configured, and stop all instances of the timer T346c, if running;  1> release *maxMIMO-LayerPreferenceConfig* for any configured cell group, if configured, and stop all instances of the timer T346d, if running;  1> release *minSchedulingOffsetPreferenceConfig* for any configured cell group, if configured, and stop all instances of the timer T346e, if running; |  |
|  |  |  |  |  |  |

# 3 Open issues/RIL for LTE Power Saving RRC CR

| **ID** | **Class** | **Section** | **Description** | **Proposed Change** | **Comments** |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

# 3 Conclusion

Ipsum Lorem

# 4 References

1. R2-2003125 - CR for 38.331 for Power Savings
2. R2-2003126 - CR for 36.331 for Power Savings
3. R2-2003869 - Rel-16 ASN.1 review plan, phase 2