3GPP TSG-RAN WG3 Meeting #121 R3-234614

**Toulouse, France, 21 – 25 Aug, 2023**

**Agenda Item: 24.2**

**Source: Huawei**

**Title: Summary of offline discussions on CB: # R18ES**

**Document for: Discussion and approval**

# 1 Introduction

**CB: # R18ES**

**- Work on the reply LS to SA2**

**- Check RAN2 progress on paging enhancements**

**- Capture agreements to TP**

(moderator - HW)

Summary of offline disc [R3-234614](Inbox%5CR3-234614.zip).

# 2 For Chairman’s note

**Editor notes in F1AP and XnAP**

* **Maximum SSB areas is 64**
* **In F1AP BLCR, keep the criticality “reject” for the SSBs within the cell to be Activated List IE included in the GNB-CU CONFIGURATION UPDATE message, and remove the FFS.**

**Paging enhancement**

**Take the texts in the SoD as baseline, and send the draft reply LS to SA2 in Oct. meeting when we receive RAN2 reply LS**

**Working assumption: To support CN paging enhancement, the recommended SSB list for Paging could be transferred in the NGAP UE context release complete message, and sent back in the NGAP Paging message in the transparent container**

**Cell DTX/DRX**

**WA: Support the exchange of the Cell DTX/DRX configuration over Xn.** FFS on the activation/deactivation status exchange.

**Proposal: agree the following TPs**

* R3-234668 (revison of R3-233991) for XnAP TP
* R3-234669 (revision of R3-234320) for F1AP TP
* R3-234670 (revision of R3-234427) for TS38.300 TP.

To be continued:

* Whether there is a need to **always update SSB bitmap** (sent by gNB-DU in Served Cell Information and then broadcasted in SIB1) upon every SSB (de) activation

# 3 Discussion

The online discussion minutes are copied below.

**To support CN paging enhancement, the recommended SSB list for Paging could be transferred over NG in the UE context release message?**

**Work on reply LS to SA2.**

**Introduce a new cause value “SSB not Available” in XnAP and F1AP to indicate that none of the requested SSB beam(s) can be successfully activated.**

## 3.1 Inter-node beam activation

### Issue 1: Beams deactivation: Whether to introduce a cause for beams deactivation (e.g. ‘energy saving’) over F1/Xn

**XnAP**

* R3-233991

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| >>Coverage Modification Cause | O |  | ENUMERATED (coverage, cell edge capacity, ..., network energy saving) | Indicates the reason for the coverage modification in NG-RAN node1. NOTE: The value 'network energy saving' is used only for the SSB inactivation case, i.e. SSB Coverage State value equals to '0'. | YES | ignore |

* R3-234134/R3-234309

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| >>Coverage Modification Cause | O |  | ENUMERATED (coverage, cell edge capacity, ..., energy saving) | Indicates the reason for the coverage modification in NG-RAN node1. | YES | ignore |

**F1AP:**

* **Option 1: R3-233992**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Coverage Modification List |  | *1* |  |  | - |  |
| >Coverage Modification Item |  | *1 .. <maxCellingNBDU>* |  |  | - |  |
| >>NR CGI | M |  | 9.3.1.12 |  | - |  |
| >>Cell Coverage State |  |  | INTEGER (0..63, …) | Value '0' indicates that the cell is inactive. Other values Indicates that the cell is active and also indicates the coverage configuration of the concerned cell. | - |  |
| >>SSB Coverage Modification List |  | *0..1* |  |  | - |  |
| >>>SSB Coverage Modification Item |  | *1..<maxnoofSSBAreas>* |  |  | - |  |
| >>>>SSB Index | M |  | INTEGER (0..63) |  | - |  |
| >>>>SSB Coverage State | M |  | INTEGER (0..15, …) | Value '0' indicates that the SS/PBCH block is inactive. Other values Indicates that the SS/PBCH block is active and also indicates the coverage configuration of the concerned SS/PBCH block. | - |  |
| >>SSB Inactivation Cause | O |  | ENUMERATED (network energy saving, …) |  | YES | ignore |

* Option 2: R3-234135

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Coverage Modification List |  | *1* |  |  |
| >Coverage Modification Item |  | *1 .. <maxCellingNBDU>* |  |  |
| >>NR CGI | M |  | 9.3.1.12 |  |
| >>Cell Coverage State |  |  | INTEGER (0..63, …) | Value '0' indicates that the cell is inactive. Other values Indicates that the cell is active and also indicates the coverage configuration of the concerned cell. |
| >>SSB Coverage Modification List |  | *0..1* |  |  |
| >>>SSB Coverage Modification Item |  | *1..<maxnoofSSBAreas>* |  |  |
| >>>>SSB Index | M |  | INTEGER (0..63) |  |
| >>>>SSB Coverage State | M |  | INTEGER (0..15, …) | Value '0' indicates that the SS/PBCH block is inactive. Other values Indicates that the SS/PBCH block is active and also indicates the coverage configuration of the concerned SS/PBCH block. |
| >>>>Coverage Modification Cause | O |  | ENUMERATED(CCO, Energy Saving, …) |  |

**Proposal: No consensus.**

### Issue 2: Editor notes in F1AP and XnAP

* Maximum SSB areas is 64
* In F1AP BLCR, keep the criticality “reject” for the *SSBs within* the *cell to be Activated List* IE included in the GNB-CU CONFIGURATION UPDATE message, and remove the FFS.

**Proposal:**

### Issue 3: Timer for SSB activation in the Cell Activation request over XnAP and F1AP?

**Proposal: no consensus. This topic is stopped for this release.**

### Issue 4 – low priority: Beam activation: Whether the DU sends its own preferred beam activation to the CU, so the CU sends the decision to the DU?

**Proposal: no consensus. This topic is stopped for this release.**

### Issue 5 – Low priority: SIB1 SSB broadcast

Whether there is a need to **always update SSB bitmap** (sent by gNB-DU in Served Cell Information and then broadcasted in SIB1) upon every SSB (de) activation. The following options can be considered:

• Option 1: SSB bitmap is always updated upon SSB (de)activation along with updating SSB Coverage State and SSBs Activated List

• Option 2: There is no need to always update SSB bitmap upon every SSB (de)activation. Just changing the “SSB coverage state” or “SSB Activated List” is sufficient

**Proposal: to be continued at next meeting.**

## 3.2 Paging enhancements

The moderator noticed that RAN2 had finished online NES discussion. The LS from SA2 was noted, and section 7.3.6 will possibly not be treated at this meeting.

|  |
| --- |
| [R2-2307063](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_123%5CDocs%5CR2-2307063.zip) Reply LS on the enhancements to restricting paging in a limited area (S2-2307984; contact: Qualcomm) SA2 LS in Rel-18 Netw\_Energy\_NR-Core To:RAN3 Cc:RAN2=> Noted7.3.6 OthersThis will be downprioritized[R2-2307458](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_123%5CDocs%5CR2-2307458.zip) MAC CE for activating/deactivating SP CSI report configurations for NES Ericsson discussion Rel-18 Netw\_Energy\_NR-Core[R2-2307650](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_123%5CDocs%5CR2-2307650.zip) Restricting Paging to limited area Qualcomm Incorporated discussion Rel-18[R2-2308045](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_123%5CDocs%5CR2-2308045.zip) Discussion on RAN1 and RAN3 led NES techniques Huawei, HiSilicon discussion Rel-18 Netw\_Energy\_NR-Core[R2-2308154](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_123%5CDocs%5CR2-2308154.zip) Skip monitoring of CSI-RS during non-active periods Sony discussion Rel-18 FS\_Netw\_Energy\_NR |

### Issue 1: Reply to SA2 assumption/questions.

The reply LS in R3-233729 is copied as follows, together with RAN3 reply:

[RAN3 considers to include the Recommended SSBs List in the exising Recommended Cells for Paging IE. ]

**The assumption:** If the initial paging attempt using the potential new parameter of "List of recommended beams" fails, how paging escalation happen will be controlled by the AMF based on existing procedures.

**[answer]**: RAN3 confirms and expects the AMF can do the paging escalation based on the existing mechanisms. – to be revised during the draft view.

**Q1:** Q1: SA2 understands that the beam-based paging is most efficient towards low mobility and static UEs. How is the gNB expected to determine whether the UE is static or not across multiple RRC connections from the same UE considering TS 33.501 contains requirements on 5G-S-TMSI reallocation?

**[Answer]:** NG-RAN can determine the UE mobility state at least based on the subscription information i.e., the "Expected UE behaviour" IE from the AMF.

**Q2**: SA2 would like to ask about the validity condition of the potential “List of recommended beams” container that is stored in the AMF. What is the AMF condition to delete the stored "List of recommended beams"?

**[Answer]**: RAN3 consdiers that the AMF itself can decide the validity condition of the potential “List of recommended beams”, e.g., the same as the handling of the existing Recommended Cells for Paging, Last Visited Cell Information in TS 38.413. It is up to the AMF implemention to determine to delete it when the UE moves to the connected state, or under other conditions. –can be revisited during the draft view.

Proposal: take the texts as baseline, and send the draft reply LS to SA2 in Oct. meeting when we receive RAN2 reply LS

### Issue 2: Working assumption or agreement?

To support CN paging enhancement, the **recommended SSB list for Paging** could be transferred in the NGAP UE context release complete message, and sent back in the NGAP Paging message in the transparent container.

Proposal: take it as WA.

## 3.3 Cell DTX/DRX

RAN1 agreement on the activation/deactivation is provided in the R3-233708.

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| RAN1 has discussed the topic of Cell DTX/DRX.RAN1 has made the following agreements:* Support of L1 signaling at least for activation/deactivation of a cell DTX and/or DRX configuration is feasible (e.g., in terms of enabling/disabling the feature) from RAN1 perspective.
* RAN1 supports the group common L1 signaling using PDCCH for cell DTX/DRX activation and deactivation without HARQ feedback.
	+ subject to UE capability
	+ RAN1 asks RAN2 to consider the additional support of a MAC CE based indication.
* For the group common L1 signalling using PDCCH for cell DTX/DRX activation and deactivation
	+ Based on new DCI format 2\_X
		- DCI size budget is not increased
		- Number of required BDs is not increased
		- FFS: PDCCH monitoring configuration for the new DCI format is identical to PDCCH monitoring configuration for DCI format 2\_6 if the UE monitors both DCI formats
			* FFS new RNTI is used

RAN1 is further working on the details of the group common L1 signaling using PDCCH and will inform RAN2 as further details are agreed and made available. |

The parallel RAN2 meeting made the following agreements.

**Agreements:**

1 Activation/deactivation is per serving cell. FFS if the configuration is per cell or per MAC entity

2 RAN2 will reuse the start timer formula of the onDurationTimer from UE C-DRX (including SlotOffset) to specify the start of cellDTX-onDurationTimer (and cellDRX-onDurationTimer) in 38.321.

3 The gNB should ensures that there is at least partial overlapping between UE C-DRX on-duration and cell DTX/DRX on-duration. It is up to network implementation to ensure the alignment. We will capture this in stage 2 specification.

 Understanding is that alignment means that the cell DTX/DRX and C-DRX periodicity should be multiple of each other. FFS if we anything needs to be specified in stage 3 (i.e. in IE description)

4 As a baseline legacy C-DRX reconfiguration is used to change UE C-DRX configuration once Cell DTX/DRX is activated/deactivated.

5 RAN2 specifies *cellDTX-onDurationTimer* (and *cellDRX-onDurationTimer*) to have the same value range as UE C-DRX on-duration timer.

6 RAN2 specifies *cellDTX-Cycle* (and *cellDRX-Cycle*) to have the same value range as UE C-DRX Long cycle.

7 Separate DTX and DRX configuration means that the features can be enabled separately (i.e. Cell DTX can be configured without Cell DRX)

8 On-duration and Cycle parameters are common between cell DTX and DRX, when both are configured. FFS if we have different *start offset* configuration for cell DTX and cell DRX

9 RAN2 will not introduce a MAC CE for cell DTX/DRX (de)activation.

10 Confirm working assumption, when the retransmission timer is running (if C-DRX is configured), the UE is expected to monitor PDCCH, like in legacy. It is up to the network whether it schedules retransmissions out of the Cell DTX active period, i.e., when the DRX retransmission timer is running, the UE should monitor PDCCH regardless of the Cell DTX.

11 We focus on the case where DTX in RRC can only be configured when C-DRX is configured. We will not optimize for the case where C-DRX is not configured.

### Issue 1: Turn the WA to agreement?

**WA: Support the exchange of the Cell DTX/DRX configuration over Xn.**

FFS on the activation/deactivation status exchange.

### Issue 2: Signaling details of the cell DTX/DRX

No discussion.

### Issue 3 whether the CU or DU determines the Cell DTX/DRX parameters configuration?

No conclusion.

## 3.4 others

NES mode, CHO etc.

The RAN2 parallel meeting made the following agreements on CHO, and there would have offline discussion. it is better for RAN3 to wait till further progress is made.

|  |
| --- |
| **Agreements** - We will support the CHO triggers for the use case of turning off the cell  |

## 3.5 TPs/LSs

XnAP TP - HW

F1AP TP -E///

Stage 2 TS 38.300 TP – only include the beam activation/deactivation – ZTE.

Others?

# 4 References

|  |  |  |
| --- | --- | --- |
| [R3-233708](Docs%5C%5CR3-233708.zip) | Reply LS on Cell DTX/DRX activation/deactivation (RAN1(Huawei/Intel)) | LS innoted |
| [R3-233729](Docs%5CR3-233729.zip) | Reply LS on the enhancements to restricting paging in a limited area (SA2(Qualcomm)) | LS innoted |
| [R3-233992](Docs%5CR3-233992.zip) | (TP to Netw\_Energy\_NR BLCR for TS 38.473, 38.413, 38.470 and 38.300) Network energy saving techniques (Huawei) | other |
| [R3-234426](Docs%5CR3-234426.zip) | left issues on network energy saving (ZTE) | discussion |
| [R3-234134](Docs%5CR3-234134.zip) | (TP to TS 38.423) Support of network energy saving techniques (Nokia, Nokia Shanghai Bell) | other |
| [R3-233930](Docs%5CR3-233930.zip) | Inter-node beam activation and paging enhancements (Qualcomm Incorporated) | discussion |
| [R3-233944](Docs%5CR3-233944.zip) | Discussion on network energy saving (Samsung) | discussion |
| [R3-233945](Docs%5CR3-233945.zip) | Introduction of Network Energy Saving for Paging IDLE UE (Samsung) | CR1013r, TS 38.413 v17.5.0, Rel-18, Cat. B |
| [R3-233991](Docs%5CR3-233991.zip) | (TP to Netw\_Energy\_NR BLCR for TS 38.423) Network energy saving techniques (Huawei) | other |
| [R3-234135](Docs%5CR3-234135.zip) | (TP to TS 38.473) Beam deactivation decision and signalling for energy saving (Nokia, Nokia Shanghai Bell) | other |
| [R3-234193](Docs%5CR3-234193.zip) | Discussion on NES related issues (Lenovo) | discussion |
| [R3-234308](Docs%5CR3-234308.zip) | Discussion on Cell DTX/DRX for NES (CATT) | discussion |
| [R3-234309](Docs%5CR3-234309.zip) | (TPs to TS38.423/TS38.473 BL CR) Discussion on new cause and paging enhancement for NES (CATT) | other |
| [R3-234319](Docs%5CR3-234319.zip) | Introduction of Network Energy Saving (Ericsson) | discussion |
| [R3-234320](Docs%5CR3-234320.zip) | Text Proposal on F1AP: Introduction of Network Energy Saving (Ericsson) | other |
| [R3-234427](Docs%5CR3-234427.zip) | TPs to BL CRs for network energy saving (ZTE) | other |