3GPP TSG-RAN WG2 Meeting #116bis Electronic R2-220xxxx

Elbonia, January 2022

**Agenda item:**

**Source: Ericsson**

**Title: NTN RRC open issues towards RAN2#117**

**WID/SID: NR\_NTN\_solutions\_Core**

**Document for: Discussion and Decision**

# Introduction

* [Post116bis-e][083][feMIMO] 38331 and LS out (Ericsson)

Scope: Updated running CR taking into account agreements of R2-116bis-e. Best effort review. Endorsement if possible. Capture TS related Open Issues, not captured elsewhere and suggest how to treat. Determine agreeable LS out to RAN1 acc to agreements from [AT116bis-e][052] and [AT116bis-e][059], relevant discussions, draft from [AT116bis-e][052]

Intended outcome: Updated Running CR, reviewed, baseline for next meeting. TS related Open issue with suggestion how to treat. Approved LS out.

Deadline: Short

**Each open issue** should be associated with **suggested treatment/handling**.

* 1. **Company input into Pre117-e-offline (i.e. no company tdocs)**
  2. Company tdocs invited.
  3. CR rapporteur handled issue (CR rapporteur will propose resolution as input to next meeting).
  4. Other, e.g. immature area, reference to dependency, unclear status etc.

# 2 Contact Points

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

|  |  |  |
| --- | --- | --- |
| Company | Name | Email Address |
| Ericsson | Helka-Liina Määttänen | Helka-liina.maattanen@ericsson.com |
| Huawei, HiSilicon | David Lecompte | david.lecompte@huawei.com |
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# 3 Open issue list

Intention is to list open issues not addressed in the LS, or pure RAN2 aspects of those open issues not explained in the LS

**Open issue 1:** There is FFS for sfnSchemePdsch in PDSCH-Config to be applicable for BWP-DownlinkCommon.

***sfnSchemePdsch***

This parameter is used to configure SFN scheme for PDSCH: scheme 1 (sfnSchemeA) or TRP-based pre-compensation (sfnSchemeB). All downlink BWPs (except initial BWP and FFS: BWP-DownlinkCommon) within a CC should have the same configuration of SFN scheme

1. Other, e.g. immature area, reference to dependency, unclear status etc.

**Open issue 2:** pucch-PowerControlSet to be aligned with the corresponding MAC CE design

RAN2 agreed to have new IE for power control for mTRP FR1 and this is started in running RRC, however, this needs to be aligned with MAC CE design and further input from RAN1 about number of sets configured.

* add a new IE for power control for mTRP FR1 operation and consult on the number of power control sets to be configured.
* [060] Introduce the new MAC CE(s) to support PUCCH Power control set update (with power control) for FR1 cases. FFS, detail MAC CE design based on new RRC IE for FR1-dedicated power control set.

1. **Company input into Pre117-e-offline (i.e. no company tdocs)**
2. Company tdocs invited.

**Open issue 3:** BFD/BFR RRC configuration is not implemented. Rows 60-62, 67.

Related RAN2 agreements are:

* One SR configuration is associated with one PUCCH-SR resource. Up to two SR configurations are signaled for multi TRP BFR i.e. up to two *schedulingRequestId* for multi TRP BFR are included in *MAC-CellGroupConfig*.

Further, RAN1 excel seems to have missing the BFD resources to be configured

1. **Company input into Pre117-e-offline (i.e. no company tdocs)**
2. Company tdocs invited.

# 4 Other

Please indicate more open issues not covered by the LS

**Q: Please list more open issues**

|  |  |
| --- | --- |
| Company | Issues |
| Ericsson | * Many maxNRof values are not added in the CR(e.g. rows 24,25). Suggestion: rapporteur provides in next version towards 117 * Row 18 “PDSCH configuration for each CC/BWP. The reference CC/BWP includes the Rel-17 TCI state pool (a list of TCI states) for PDSCH” not implemented. Suggestion: rapp provides in next version towards 117 * Rows 16,17 DLorJOint-TCIState-Id-r17 not implemented in CSI-AssociatedReportConfigInfo or NZP-CSI-RS-Resource. Suggestion: rapp provides in next version towards 117 * Rows 36,37 not implemented. Pending on the details of new IE PUCCH-PowerControlSetInfo. Suggestion: to be handled later. |
| Huawei, HiSilicon | 1. Regarding to mTRP BFR, not sure if CFRA is supported. In Rel-16, the candidateBeamRSList of SpCell contains CFRA resources (i.e., SSB/CSI-RS index and preamble index). However, if RAN1 agreed that CFRA is not supported, we need to discuss how to configure candidate beams for SpCell.  2. Regarding to L1 inter-cell measurement, in the current RRC running CR, all SSB resources in a CSI-SSB-Resource set are associated with one same additional PCI. However, RAN1 also has agreement in RAN1 #104bis-e: “*In one reporting instance, depending on NW configuration, beam(s) associated with a non-serving cell can be mixed with that associated serving-cell*”. This could mean that the additional PCI could be per SSB index. Also, RAN1’s description is: “ *A CSI-SSB-ResourceSet configured for L1-RSRP measurement/reporting includes at least a set of SSB indices where PCI indices are associated with the set of SSB indices, respectively*.” in which it seems there are multiple PCIs in one CSI-SSB-ResourceSet RAN2 to discuss if the current CR meets RAN1’s intention.  **We can ask RAN1 to confirm this configuration in the LS.**  3. Regarding to TCI mode indication (joint or separate), in the current RAN1 RRC list, there is no parameter provided to indicate which TCI mode is used. RAN2 to discuss where to put this parameter. Before determining this, we need to understand can different serving cells in a cell group use different TCI framework (Rel-16 or Rel-17)? And can different serving cells in a cell group use different TCI mode (joint or separate) if Rel-17 unified TCI framework is configured?  **We can ask RAN1 about the above questions in the LS.**  4. Regarding to PUCCH-SpatialRelationInfo, in the current running CR, one additional PCI is added in this IE. However, we don’t see RAN1 agreements related to this. In inter-cell BM, PUCCH beam direction is following UL TCI state or joint TCI state. In inter-cell mTRP, now only multi-DCI multi-PDSCH is discussed, and there is no discussion in PUCCH spatial relation. RAN2 can discuss whether this is needed. |
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# 5 Conclusion

Annex agreements

List of RAN2 agreements

RAN2#115

* MAC entity maintains separate beamFailureDetectionTimer and BFI\_COUNTER for each BFD-RS set of a serving cell configured with multiple BFD-RS sets.
* beamFailureDetectionTimer and beamFailureInstanceMaxCount configuration is configured independently for each TRP of serving cell.
* If the MAC entity receives beam failure instance indication for a BFD-RS set of a serving cell, it shall perform the following:

- (re-)start beamFailureDetectionTimer corresponding to that BFD-RS set of the serving cell;

- increment BFI\_COUNTER corresponding to that BFD-RS set of the serving cell by 1.

- If BFI\_COUNTER >= beamFailureInstanceMaxCount corresponding to that BFD-RS set of the serving cell:

- trigger a BFR for the BFD-RS set of the Serving Cell;

For the case of both intra cell and inter cell:

* BFD-RS set ID is included in BFR MAC CE to identify the failed TRP.

For the case of intra cell (FFS for inter cell).

* If beam failure is detected on both TRPs (i.e. BFD-RS sets) of an SCell, BFR is triggered for that SCell.

- FFS whether UE transmits a) legacy BFR MAC CE or b) new BFR MAC CE indicating both failed TRPs as well as the beam failure recovery information for both TRPs.

* If beam failure is detected on both TRPs (i.e. BFD-RS sets) of SpCell, random access procedure is initiated on SpCell.

- FFS whether UE transmits a) legacy BFR MAC CE or b) new BFR MAC CE indicating both failed TRPs as well as the beam failure recovery information for both TRPs.

* FFS what is meant in detail by “beam failure is detected on both TRPs”

RAN2#116

* RAN2 to support separate DL and UL and joint TCI state configurations. Details FFS.
* 1a: RAN2 to use the terminology "primary TRP (pTRP)" and "additional TRP (aTRP)" for RAN2 discussion purposes. FFS whether these will really be needed in Stage-2/3 specifications.
* 1b: RAN2 does not consider RLM for aTRP in Rel-17 work
* 2a: No RRM enhancements are done in Rel-17 (unless later found critical to the functionality).
* 2b: Add SSB/PCI information for ICBM as cell-level information and link unified TCI state information to that. FFS on exact Stage-3 details.
* 2c: RAN2 starts the RRC CR work based on latest RAN1 input before sending general RRC LS to RAN1.
* 3: The RAN1 parameters for "MultiBeam" are only applicable to ICBM with unified TCI framework (i.e. not to mTRP). Discuss further in Stage-3 phase how the UL PC configuration parameters are defined.
* 4: Rel-17 MPE configuration can be included in PHR-Config. Will ask R1 whether MPE information can apply to both ICBM and mTRP
* 6: RAN2 assumes "mTRP" parameters are not for ICBM and starts Stage-3 work based on that assumption. If ambiguities are found, LS can be sent to RAN1 to ask for clarification from next meeting.
* 7: RAN2 will use one RRC CR for the FeMIMO WI and start the work in post-meeting email discussion. Can discuss RRC structure during the discussion before going for final Stage-3 details.
* FFS if to Introduce the new PUCCH spatial relation activation/deactivation MAC CE for mTRP PUCCH repetition i.e. activating two spatial relation info’s (for FR2) for a group of PUCCH resources in a CC.
* RAN2 to discuss how to support PHR reporting for mTRP PUSCH repetition, and may address e.g:

New MAC CE design including the function which TRP is applied for PHR reporting.

How to incorporate the additional MPE information coming in Rel-17 to the new PHR format

Whether use legacy parameters (timer, threshold, etc.) or adding TRP specific parameters

PHR triggering conditions

* R2 assumes to revise the legacy PUSCH Pathloss Reference RS Update MAC CE with additional field(s) to differentiate the TRP for mTRP PUSCH repetition. other aspects are FFS.
* New BFR MAC CE including beam failure recovery information of both failed TRPs is transmitted when beam failure is detected for both TRPs of SCell. The Following pieces of information are included in enhanced BFR MAC CE for M-TRP BFR

Info 1: For the Identity of serving cell of failed TRP, Ci/SP fields are included.

Info 2: For indicating whether candidate beam is available or not for a failed TRP of serving cell, AC field is included.

Info 3: Candidate beam (if available) for a failed TRP is indicated by including the Candidate RS ID field.

* Both single octet bitmap (7 Ci bits and 1 SP bit) and 4 octet bitmap (31 Ci bits and 1 SP bit) formats are supported for enhanced BFR MAC CE.
* Both truncated and non-truncated enhanced BFR MAC CE are supported.
* Triggered BFRs for a BFD-RS set of a SCell shall be cancelled when a MAC PDU is transmitted and this PDU includes enhanced BFR MAC CE (or Truncated enhanced BFR MAC CE, if supported) which contains beam failure recovery information (i.e. candidate beam available or not, candidate beam if available) of that BFD-RS set of the SCell.
* if a PDCCH addressed to C-RNTI indicating uplink grant for a new transmission is received for the HARQ process used for the transmission of the enhanced BFR MAC CE which contains beam failure recovery information of a BFD-RS set of a serving cell: *BFI\_COUNTER* corresponding to the BFD-RS set of the serving cell is set to 0.
* if the SCell is deactivated, *BFI\_COUNTER* corresponding to each BFD-RS set of the serving cell is set to 0.
* if Random Access procedure initiated on SpCell due to beam failure detection on both TRPs (i.e. BFD-RS sets) of SpCell is successfully completed: *BFI\_COUNTER* corresponding to each BFD-RS set of the SpCell is set to 0.
* if the beamFailureDetectionTimer corresponding to a BFD-RS set of a serving cell expires; or if beamFailureDetectionTimer, beamFailureInstanceMaxCount, or any of the reference signals used for beam failure detection corresponding to a BFD-RS set of a serving cell is reconfigured by upper layers: BFI\_COUNTER for this BFD-RS set of the serving cell is set to 0.
* For SCell configured with multiple TRPs, SR can be triggered irrespective of whether beam failure is detected on one or both TRPs of SCell.
* For SpCell configured with multiple TRPs, SR can be triggered if beam failure is detected on only one TRP of SpCell.
* The cases for which SR is allowed (as per proposal 15, 16), SR is triggered if either of conditions a) and b) below are met:

- If UL-SCH resources are not available for a new transmission; or

- If UL-SCH resources are available for a new transmission but cannot accommodate the enhanced BFR MAC CE or enhanced truncated BFR MAC CE plus its sub header as a result of LCP.

* If a SR was triggered by BFR for a BFD-RS set of a serving cell and a MAC PDU is transmitted and this PDU includes an enhanced BFR MAC CE or a Truncated enhanced BFR MAC CE which contains beam failure recovery information for this BFD-RS set of the serving cell, pending SR is cancelled and the corresponding *sr-ProhibitTimer* is stopped, if running.
* If a SR was triggered by BFR for a BFD-RS set of an SCell and this SCell is deactivated, pending SR is cancelled and the corresponding *sr-ProhibitTimer* is stopped, if running.
* It is assumed that If beam failure is detected on both TRPs (i.e. BFD-RS sets) of an SpCell, UE initiate RACH procedure and transmits new BFR MAC CE including beam failure recovery information needed to recover both TRPs. (other options not excluded for now, it is FFS whether the UE can skip BFR information needed to recover one of the TRPs if there is not enough bits).
* The meaning of “beam failure is detected on both TRPs” is to be clarified, It is FFS which of the following options shall be applied:

Option 1 (12/17): “beam failure is detected on both TRPs” means that BFR is triggered for a TRP of the serving cell while the BFR for another TRP of same serving cell is still pending (i.e. not cancelled).

Option 2 (4/17): “beam failure is detected on both TRPs” means that BFR is triggered for a TRP of the serving cell while the BFR for another TRP of same serving cell is still pending (i.e. not successfully completed)

* Cell specific or TRP specific BFR / BFR cancellation when beam failure is detected on on both TRPs of SCell is to be determined. It is FFS which of the following options shall be applied:

Option 1(5/17): Cell specific BFR of SCell is triggered. Triggered Cell specific BFR of SCell is cancelled when BFR MAC CE containing beam failure information of both TRP of the SCell is transmitted.

Option 2 (12/17): TRP specific BFR for both the failed TRPs remains as pending. TRP specific BFR cancellation procedure (as discussed in Proposal 10) is applied for each TRP independently.

* It is FFS whether Triggered BFRs for a BFD-RS set of a SpCell shall be cancelled when a MAC PDU is transmitted and this PDU includes enhanced BFR MAC CE (or Truncated enhanced BFR MAC CE, if supported) which contains beam failure recovery information (i.e. candidate beam available or not, candidate beam if available) of that BFD-RS set of the SpCell.

RAN2#116bis

* RAN2 to conclude ““Joint DL/UL TCI” means that there is one TCI state ID for each codepoint, while “separate DL/UL TCI” means that there is one or two TCI state IDs for each codepoint.”
* P3: Can consider the R1 proposal with TCI state references, not ask q acc to P3, progress this offline.
* IT shall be possible to configure the parameter BeamAppTime differnet for different SCS
* FFS if parameter BeamAppTime is under the cell group config.
* Implement acc to RAN1 decisions wrt TCI state for PDCCH, applyunifiedtcistate applied to CORESET, introduce editor’s note about the potential issue (maybe something need to be captured in RRC, or in L1 TS, or need to move the IE).
* P6: Clarify which parameter is intended, resolve naming confusion, miáy be agreeable
* RAN2 assumes that unified TCI state related parameters for DL and Joint is implemented iin IE PDSCH-Config.
* RAN2 assumes UL TCI state is in UL BWP-Dedicated IE
* RAN2 agrees on Separate TCI state lists for joint/DL and UL in PDSCHConfig and UL BWP, respectively, and separate Id pools.
* RAN2 continues discussing MAC CE design for joint and separate TCI state operation as well as the UL/DL BWP association
* FFS if R2 need to select or whether both is applicable: The PO set(P0, alpha, closed loop index) is encoded in both UL TCI state as well in BWP-UL-Dedicated (that is outside of UL TCI state) and different values are enabled for each UL channel PUSCH, PUCCH, SRS. UE receives the UL pc configuration in either UL TCI states or in BWP UL-dedicated. Can maybe ask R1.
* FFS if pathlossRS is configured in UL TCI state which are configured in BWP-UL-Dedicated
* add a new IE for power control for mTRP FR1 operation and consult on the number of power control sets to be configured.
* Add second sri-PUSCH-MappingToAddModList, and select two SRI-PUSCH-PowerControl from two sri-PUSCH-MappingToAddModList
* RAN2 will ask in the LS that whether the per CORESET indications of followunifiedTCIstate of PDSCH is according to RAN1 intention and whether any limitation or condition needs to specified. FFS on exact question formulation as well as if broader question on functionality is added. Work on the FFS when formulating the questions in a draftLS.
* RAN2 will ask in the LS that about implementation suggestion for ApplyTCI-State-r17-DLList. Starting point:“RAN2 notes there is discrepancy with the description and comment related to ApplyTCI-State-r17-DLList. RAN2 has baseline implementation for this functionality where 1 bit “followunifiedTCIstateof PDSCH” is added in “AssociatedReportConfigInfo” where QCL for an aperiodic resource is currently configured. RAN2 would like to ask whether this implementation is according to intended functionality or whether this indication should be placed per NZP-CSI-RS resource. Note that it will be RAN2 signaling design whether supporting this functionality is 1 bit indication per field X, or by maintaining lists of field X.”
* A parameter “followUnifiedTCIstate-r17” is added to SRSResourceSet IE and RAN2 asks RAN1 whether the stated restrictions are enough and whether those should be placed in TS 38.331 or these will be specified by RAN1. FFS if the parameter can be later replaced by other ASN1 ways to indicate the same or exact parameter name. Can also ask more generally intention about SRS resource set
* Ask RAN1 about further input on how the 2 CBSR and RI restrictions are suppose to be config ured. FFS on exact question formulation that can be worked with the draftLS
* Ask RAN1 whether the parameter startPosition should be there in resourceMapping also Rel-17 as it is there in Rel15 and Rel 16.

**MPE:**

* Request the following further information from RAN1: A) How many resources (i.e. SSBRI/CRI ) can be configured in mpe-ResourcePool, and whether the resources are per BWP? B) For mTRP, does UE indicate CORESET pool ID, SRS resource set ID or something else in the mTRP PHR? C) Is the PCMax,f,c needed, and if yes is it included per indicated SSBRI/CRI value, or is it cell-specific?

**SI:**

* Allow NW to update UE SI information either via dedicated configuration, or via switching UE to pTRP for SI reception. FFS if these require specification modifications and whether there are critical issues with the mechanisms.
* When “beam failure is detected on both TRPs” of SCell, TRP specific BFR for both the failed TRPs remains as pending. TRP specific BFR cancellation procedure is applied for each TRP independently.
* Triggered BFRs for a BFD-RS set of a SpCell shall be cancelled when a MAC PDU is transmitted and this PDU includes enhanced BFR MAC CE (or Truncated enhanced BFR MAC CE, if supported) which contains beam failure recovery information (i.e. candidate beam available or not, candidate beam if available) of that BFD-RS set of the SpCell.
* Beam failure is detected on both TRPs” means that BFR is triggered for a TRP of the serving cell while the BFR for another TRP of same serving cell is not successfully completed
* One SR configuration is associated with one PUCCH-SR resource. Up to two SR configurations are signaled for multi TRP BFR i.e. up to two *schedulingRequestId* for multi TRP BFR are included in *MAC-CellGroupConfig*.
* [060] “Enhanced TCI state indication for UE-specific PDCCH MAC CE” can be applied for simultaneously activating two TCI states for a set of serving cells defined by legacy R16 parameters *simultaneousTCI-UpdateList1* and *simultaneousTCI-UpdateList2*.
* [060] Send LS to RAN1 to ask whether the “Enhanced TCI state indication for UE specific PDCCH MAC CE” can be applied to CORESET zero or not.
* [060] “Enhanced TCI state indication for UE specific PDCCH MAC CE” is not applicable to any of the configured CORESETs in a BWP if the CORESETs are configured with different *CORESETPoolindex* values in the BWP.
* [060] “Enhanced TCI state indication for UE specific PDCCH MAC CE” is applied only if *sfnSchemePdcch* is configured.
* [060] If the PDCCH reception includes two PDCCH candidates from corresponding search space sets, start or restart *drx-InactivityTimer* for this DRX group in the first symbol after the end of the PDCCH candidate that ends later in time. FFS how to capture this agreement in the TS 38.321 whether adding it as a NOTE or adding it in the normative text.
* [060] FFS whether to clarify the Active Time when the PDCCH repletion is configured.
* [060] Introduce the new PUCCH spatial relation activation/deactivation MAC CE for mTRP PUCCH repetition i.e. activating two spatial relation info’s (for FR2) for a group of PUCCH resources in a CC.
* [060] Introduce the new MAC CE(s) to support PUCCH Power control set update (with power control) for FR1 cases. FFS, detail MAC CE design based on new RRC IE for FR1-dedicated power control set.
* [060] To revise the legacy PUSCH Pathloss Reference RS Update MAC CE with additional field(s) to differentiate the TRP for mTRP PUSCH repetition, replace the Reserve bit (‘R’) to a TRP index field (‘T’) so that the MAC CE can indicate which TRP the PUSCH pathloss reference RS update can apply for.
* [060] For the enhancement BFR MAC CE design, it is FFS with:

• Two sets of serving cell bitmap (Option 2)

• A bitmap in addition to serving cell bitmap (Option 3)

* [060] FFS whether to support TRP level truncation.
* [060] MAC entity may stop, ongoing Random Access procedure due to a pending SR for BFR of a BFD-RS set of an SCell, which has no valid PUCCH resources configured, if a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains an Enhanced BFR MAC CE or a Truncated Enhanced BFR MAC CE which includes beam failure recovery information of that BFD-RS set of the SCell.
* [060] FFS, MAC entity may stop, ongoing Random Access procedure due to a pending SR for BFR of a BFD-RS set of SpCell, which has no valid PUCCH resources configured, if a MAC PDU is transmitted using a UL grant other than a UL grant provided by Random Access Response or a UL grant determined as specified in clause 5.1.2a for the transmission of the MSGA payload, and this PDU contains an Enhanced BFR MAC CE or a Truncated Enhanced BFR MAC CE which includes beam failure recovery information of that BFD-RS set of the SpCell
* [060] When the MAC entity has pending SR for beam failure recovery of a BFD-RS set and the MAC entity has one or more PUCCH resources overlapping with PUCCH resource for beam failure recovery of that BFD-RS set for the SR transmission occasion, the MAC entity considers only the PUCCH resource for beam failure recovery of that BFD-RS set as valid.