3GPP TSG-RAN WG2 #109bis-e R2-20xxxxx

Electronic Meeting, April 20th – 30th 2020

Agenda Item: 6.10.1

Source: Ericsson

Title: [AT109bis-e][032][DCCA] RRC (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT109bis-e][032][DCCA] RRC (Ericsson)

Scope: Treat topics in 6.10.1, based on R2-2003383, R2-2003789, R2-2003381, R2-2003382 and comments. Discussion on non-controversial issues/proposals that might not need to be treated on-line can start immediately.

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 24 0700 UTC.

Part 2: CRs capturing agreements from this meeting (incl results from other discussions).

Since all the remaining proposals from [1] that were not agreed during the online session deal with early measurements, this email discussion has been merged with:

* [AT109bis-e][035][DCCA] Early Measurement Reporting (Ericsson)

Scope: Treat topics in 6.10.4, based on R2-2003790 and comments, and other papers if needed). Start non-controversial proposals immediately. Wait for on-line discussion for others. Can also have an immediate round of comments to clarify better the scope of on-line discussions.

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 24 0700 UTC

# 2 Discussion

## 2.1 Summary of online discussion on [1] and [2]

During the online session, [1] and [2] were discussed and the following agreements have been made:

* Two IEs: idleModeMeasurementsNR and idleModeMeasurementsEUTRA to be used in NR SIB1 to indicate whether the UE performs EUTRA and NR early measurements
* The cell quality derivation parameters (NR: *nrofSS-BlocksToAverage-r16* and *absThreshSS-BlocksConsolidation-r16*; LTE: *maxRS-IndexCellQual* and *threshRS-Index*) will be kept under the ssb-MeasConfig.
* A maximum of 8 cells per carrier can be reported for early measurements in LTE/NR rel-16.
* In LTE, a need code of “Need OR” to be used for the following IEs inside ssb-MeasConfig of MeasIdleCarrierListNR: measTimingConfig-r15, maxRS-IndexCellQual-r15, threshRS-Index-r15 and ssb-ToMeasure-r15.
* To use a new rel-16 IE (in 36.331) to enable the reporting of up to 8 EUTRA carriers in early measurement results
* Confirm the use of the new rel-16 IE *SCellToAddModList* IE (included in latest 36.331 DCCA CR) for SCell addition/modification in *RRCConnectionResume.*
* The *sPCellCommonConfig* for the PSCell is saved as part of the UE AS Inactive AS context.
* Add *p-maxEUTRA, p-maxUE-FR1,* and *tdm-patternConfig* in the *RRCConnectionResume* message. We allow the network to release these configurations when the UE is resumed without SCG. TBD if need codes is “Need OR” etc
* Field descriptions of harq-ACK-SpatialBundlingPUCCH, harq-ACK-SpatialBundlingPUSCH, harq-ACK-SpatialBundlingPUCCH-secondaryPUCCHgroup, and harq-ACK-SpatialBundlingPUSCH-secondaryPUCCHgroup to be updated as shown above to clarify the spatial bundling for the primary and secondary PUCCH can be disabled/enabled independently.

## 2.2 Remaining issues

In [1], the following were proposed for further discussion:

*Proposal 1: RAN2 to decide which of the following options should be adopted for the network to request early measurements and for the UE to indicate early measurement availability:*

*1. UE indicates the measurements it has (in RRC(connection)SetupComplete, RRC(Connection)ResumeComplete) and network indicates the measurements it wants (in UEInformationRequest, RRC(Connection)Resume)*

*2. The idleModeMeasurements in SIB (SIB2 in LTE, SIB1 in NR) indicates what measurements the network wants to be reported*

*Proposal 6: In NR, the need codes for the following IEs in NR inside ssb-MeasConfig of MeasIdleCarrierListNR to be further discussed: nrofSS-BlocksToAverage, absThreshSS-BlocksConsolidation, smtc, and ssb-ToMeasure*

*Proposal 8b: RAN2 to discuss further enhancements to the cell quality derivation and beam result handling procedures (to clarify and if possible, reuse existing measurement procedures in 331 or 304 specs).*

*Proposal 9b: RAN2 to discuss the ASN.1 and procedural impact of supporting 8 E-UTRA carriers in rel-16 early measurements in LTE.*

The contributions regarding early measurement were summarized in [3], and the following were proposed (prefix “A” added to differentiate from the proposals from [1] listed above):

Proposals for easy agreement:

*Proposal A\_1 Granular request of early measurements (i.e. EUTRA, NR, or both) to be supported in RRC(Connection)Resume and UEInformation messages. TP proposed in [4] to be captured in 36/38.331.*

*Proposal A\_2 Granular availability indication of early measurements (i.e. EUTRA, NR, or both) to be supported in RRC(Connection)ResumeComplete and RRC(Connection)SetupComplete messages. TP proposed in [4] to be captured in 36/38.331.*

*Proposal A\_7 In LTE/NR rel-16, the measIdleConfig is included in the AS-Config IE to enable early measurement configuration available during UE context retrieval.*

*Proposal A\_8 Add SMTC2-LP in NR ssb-MeasConfig for early measurement configuration.*

*Proposal A\_9 No changes required regarding the qualityThreshold field description.*

Proposals for further discussion:

*Proposal A\_3 In NR, use “need S” for SSB related configurations in MeasIdleCarrierNR-r16 (including nrofSS-BlocksToAverage-r16, absThreshSS-BlocksConsolidation-r16, smtc-r16 and ssb-ToMeasure-r16).*

*Proposal A\_4 The NOTE regarding UE behaviour on SSB configuration differences between dedicated and broadcasted signalling to be updated as: The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier provided according to dedicated signaling is different from the SSB configuration according to broadcasted signalling in the serving cell, if any.*

*Proposal A\_5 When the UE is configured to measure more frequencies than it is configured to report, it is left up to UE implementation on which frequencies to include in the early measurement report.*

*Proposal A\_6 RAN2 to discuss if early measurements can be explicitly forwarded to the SN via new IEs in CG-ConfigInfo.*

*Proposal A\_10 The proposals in [*5*] to be considered during RAN2-109bis-e offline discussion (or subsequent RRC ASN.1 review)*

Consolidating the proposals from the two summaries and taking into consideration that the proposals in [3] take the contributions to this meeting into account ([4], [12], [13], [14]), the easy agreement proposals in [3] are also suggested here:

**Proposal 1   Granular request of early measurements (i.e. EUTRA, NR, or both) to be supported in *RRC(Connection)Resume* and *UEInformation* messages. TP proposed in [4] to be captured in 36/38.331.**

**Proposal 2   Granular availability indication of early measurements (i.e. EUTRA, NR, or both) to be supported in *RRC(Connection)ResumeComplete* and *RRC(Connection)SetupComplete* messages. TP proposed in [4] to be captured in 36/38.331.**

**Proposal 3   In LTE/NR rel-16, the *measIdleConfig* is included in the AS-Config IE to enable early measurement configuration available during UE context retrieval.**

**Proposal 4   Add *SMTC2-LP* in NR *ssb-MeasConfig* for early measurements.**

**Proposal 5   No changes required regarding the *qualityThreshold* field description.**

The other open issues are discussed below.

#### ***2.2.1 Need codes for ssb-MeasConfig IEs in NR (Issue #DCCA\_5)***

In the RRC open issues email discussion [1], the need code for *ssb-MeasConfig* IEs in LTE and NR was discussed (issue #DCCA\_5). There was a consensus for the LTE case, but for NR (nrofSS-BlocksToAverage-r16, absThreshSS-BlocksConsolidation-r16, smtc-r16 and ssb-ToMeasure-r16), it was not clear whether to use “Need R” or “Need S”, and it was proposed to discuss this further in this meeting.

In [6], it is pointed out that if “need S” is used for ss-MeasConfig IEs, there will be a need to consider the cases that one IE is configured in only SIB but not in RRC release, or only in RRC release but not in SIB, resulting in complex UE behaviour and specification complexity. It was thus proposed to define the simplest UE behaviour: all these IEs use “Need R”, i.e. when these IEs are not provided in both RRC release and SIB, the UE doesn’t perform early measurements on the concerned frequency.

In [7], it is pointed out that using “need R” may create confusion regarding UE’s behaviour in case of absence in dedicated signaling while there is a value in SIBx or SIB4. Specifically, in case where the SSB measurement is configured via SIB and all other parameters are provided by dedicated signaling, the UE will acquire SSB measurement configuration from either SIB4 or SIBx. Since these IEs are specified as Need S in SIB4, it looks incompatible to use Need R in SIBx. And thus, it was proposed to use “Need S” instead.

In [8], it is proposed to use “Need R” for IEs in *ssb-MeasConfig* in NR SIB11. However, the discussion/reasoning therein was only considering the whole IE *ssb-MeasConfig* and not the individual IEs within that IE. That is already captured in the updated running CR [10].

The rapporteur has the same understanding as in [7] and that defining the need codes in alignment with the SIB4/x is the most reasonable way. And no extra specification work, as implied in [6], is required because the early measurement procedure already ensures that if the ssb-MeasConfig is provided in RRC Release, the UE will not try to perform delta configuration between the broadcasted and SIB values (as shown below).

1> for each entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* that does not contain an *ssb-MeasConfig* received from the *RRCRelease* message:

2> if there is an entry in *measIdleCarrierListNR* in *measIdleConfigSIB* of *SIB11* that has the same carrier frequency and subcarrier spacing as the entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig* and that contains *ssb-MeasConfig*:

3> store or replace the SSB measurement configuration from *SIB11* into *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

2> else if there is an entry in *carrierFreqListNR* of *SIB4* with the same carrier frequency and subcarrier spacing as the entry in *measIdleCarrierListNR* within *VarMeasIdleConfig*:

3> store or replace the SSB measurement configuration from *SIB4* into *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*;

2> else:

3> remove the *ssb-MeasConfig* of the corresponding entry in the *measIdleCarrierListNR* within *VarMeasIdleConfig*, if stored;

Thus, it is proposed:

**Proposal 6   In NR, use “need S” for SSB related configurations in *MeasIdleCarrierNR-r16* (including *nrofSS-BlocksToAverage-r16, absThreshSS-BlocksConsolidation-r16, smtc-r16* and *ssb-ToMeasure-r16*).**

**Question 1: For NR, do companies agree the usage of “need S” for SSB related configuration in *MeasIdleCarrierNR-r16?***

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| **Company**  | **Agree/Disagree** | **Comments** |
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In [7], the issue is discussed further, addressing the following NOTE in the early measurement procedure

*The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier provided via dedicated signaling is different from the SSB configuration broadcasted in the serving cell, if any.*

Specifically, how the UE determines the difference between SIB and dedicated signalling, in case the values are absent (either in SIB/dedicated) and default values are to be assumed. For example, if the SMTC is absent in SIB, it is specified that the value of 5ms is to be assumed. Thus, if the UE was given an SMTC of 5ms in Release for a certain carrier, but the SMTC value for that carrier is absent in the SIB4/11, can the UE still assume the values to be the same and continue the early measurement?

The rapporteur’s understanding is that what matters is the value that ends up being used for a specific parameter (i.e. it doesn’t matter if SIB4 includes an SMTC value of 5ms or that field is absent and the default value of 5ms is used). Thus, it is proposed a simple modification of the NOTE as below will be sufficient to clarify that:

*The UE is not required to perform idle/inactive measurements on a given carrier if the SSB configuration of that carrier according to dedicated signaling is different from the SSB configuration according to broadcasted signalling in the serving cell, if any.*

**Proposal 7   The NOTE regarding UE behavior on SSB configuration differences between dedicated and broadcasted signaling to be updated as above to avoid any confusion of the handling when some of the parameters are absent and default values are used.**

**Question 2: Do companies agree to the proposed changes to the NOTE about UE behavior on handling differences between dedicated and broadcasted SSB configurations for early measurement?**

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| **Company**  | **Agree/Disagree** | **Comments** |
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#### ***2.2.2 Beam results and cell quality derivation (Issue #DCCA\_7)***

This issue was discussed in [1] and there seems to be a common understanding that some improvements could be made to reuse the already existing measurement procedures in the 331 (or 304) specifications, and prevent unnecessary duplication. However, there was no concrete proposals. On top of that, some of the comments were on top of v16.0.0 of the RRC spec, while other comments were on top of the updated WI CRs [9][10], which have some major differences from that of v16.0.0, specifically regarding early measurement handling.

Thus, companies are welcome to provide their view on the changes required to the idle/inactive measurement procedures on top the current WI CRs. Only comments regarding 38.331 are sufficient as they can be directly applied to 36.331 as well.

**Question 3: Companies are encouraged to provide the required changes to streamline the idle/inactive measurement procedures, specifically, the handling of beam measurements and cell quality derivation. Whenever possible, please include the required procedural text additions/modification on top of the current WI CR [10].**

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| **Company**  | **Comments** |
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#### ***2.2.3 Support of the reporting of 8 EUTRA carriers in LTE early measurement results (Issue #DCCA\_8)***

It has been agreed (in [1] and also confirmed in the online meeting) to introduce a new IE in LTE to enable the reporting of up to 8 EUTRA carriers, as compared to the 3 that the UE can report in rel-15 euCA. However, there was one open issue regarding on how to capture this: *whether the new IE should contain the result of all the 8 carriers, or just the additional 5.* Many companies have indicated their preference to have it contain only the additional carriers. In [5], the way to capture that is provided as shown below:

MeasResultListIdle-r15 ::= SEQUENCE (SIZE (1..maxIdleMeasCarriers-r15)) OF MeasResultIdle-r15

MeasResultIdle-r15 ::= SEQUENCE {

 measResultServingCell-r15 SEQUENCE {

 rsrpResult-r15 RSRP-Range,

 rsrqResult-r15 RSRQ-Range-r13

 },

 measResultNeighCells-r15 CHOICE {

 measResultIdleListEUTRA-r15 MeasResultIdleListEUTRA-r15,

 ...

 } OPTIONAL,

 ...

}

MeasResultListIdle-r16 ::= SEQUENCE (SIZE (1..maxIdleMeasCarriers-v16xy)) OF MeasResultIdleListEUTRA-r15

maxIdleMeasCarriers-r15 INTEGER ::= 3 -- Maximum number of neighbouring inter-

 -- frequency carriers measured in RRC\_IDLE and RRC\_INACTIVE

maxIdleMeasCarriers-v16xy INTEGER ::= 5 -- Additional number of neighbouring inter-

 -- frequency carriers measured in RRC\_IDLE and RRC\_INACTIVE

maxIdleMeasCarriers-r16 INTEGER ::= 8 -- Maximum number of neighbouring inter-

 -- frequency/inter-RAT carriers measured in RRC\_IDLE and RRC\_INACTIVE

Another issue related to this that was discussed via company contributions is on how to handle the scenario when there is a difference between the number of carriers the UE is configured to measure and those that the UE can report. In [6], it is pointed out that this problem already existed in rel-15 euCA, where the UE can be configured to be measure up to 8 carriers, but can report only up to 3. Corrections were proposed in RAN2\_108 for euCA (*R2-1915668),* but it was agreed to leave it to UE implementation on which carriers to select to report. Thus, it was proposed to keep the same approach for LTE rel-16 as well.

In [7], on the other hand, it was proposed to introduce the priority of each measured frequency, where the priority indicator is used to select the measured target frequency and rank the measurement results.

The rapporteur’s understanding is the same as in [6], specifically regarding that even if a frequency priority is to be included, it may differ from cell to cell and the UE behavior will become complicated regarding how to handle dedicated vs broadcasted frequency priorities.

**Proposal 8  The new rel-16 IE (in 36.331) to enable the reporting of up to 8 EUTRA carriers in early measurement results, will be used to include only the additional 5 carriers that can be reported in rel-16 (as captured in [5])**

**Question 4: Do companies agree to the proposal above to use the new rel-16 IE to report only the additional 5 E-UTRA carriers?**

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| **Company**  | **Agree/Disagree** | **Comments** |
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**Proposal 9  When the UE is configured to measure more frequencies than it is configured to report, it is left up to UE implementation on which frequencies to include in the early measurement report.**

**Question 5: Do companies agree to the proposal above to leave it up to UE implementation to handle the differences between number of carriers the UE is configured to measure and report?**

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| **Company**  | **Agree/Disagree** | **Comments** |
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#### ***2.2.4 Forwarding early measurements to SN in INM (Issue #DCCA\_14)***

In [11], it is pointed out that the early measurements can be useful for the SN in selecting SCells for the SCG. Current specification does not prevent the forwarding the early measurements to the SN during, but since different format/IEs are used for connected measurements and early measurements, the network has to convert the early measurement results to the IEs used in CG-ConfigInfo (i.e. *MeasResult2EUTRA/MeasResult2NR*). Such a conversion will be transparent to the SN (i.e. the SN will not be able to know if the measurements are regular connected mode measurements or early measurements). Thus, it is proposed to explicitly include the early measurement results in the *CG-Configinfo*, so that the SN can differentiate between regular and connected mode measurements and make a more informed decision (as the accuracy of early measurements and connected mode measurements is different).

**Question 6: Do companies agree that the early measurement report can be forwarded to the SN?**

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| **Company**  | **Agree/Disagree** | **Comments** |
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**Question 7: If answering yes to question 6, will the early measurement report be forwarded to the SN explicitly or implicitly (i.e. *implicit*: the existing measurement IEs in CG-ConfigInfo reused also for early measurement results, *explicit*: new IE(s) introduced for the sake of early measurements)**

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| **Company**  | **Implicit/Explicit** | **Comments** |
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#### ***2.2.5 Any other issues***

Besides the issues discussed in previous sections, companies are invited to list other open issues related to the DCCA RRC.

**Question 8: Any other open issues related to the DCCA RRC CRs?**

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| **Company**  | **Comments** |
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# 3. Summary

Based on the discussion in the previous sections the following are proposed:

Proposals for easy agreement:

Proposals for further discussion:

# References

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4. [R2-2003385](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003385.zip), Granular reporting of early measurement results, Ericsson, MediaTek Inc., ZTE Corporation, LG Electronics Inc., Vivo, AT&T, Vodafone, InterDigital Inc., Telecom Italia S.p.A, RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
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8. [R2-2003221](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003221.zip), Need codes for Ies in ssb-MeasConfig in NR SIB11, LG Electronics Inc., RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
9. [R2-2003381](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003381.zip), CR for 36.331 for CA\_DC\_enhancements, Ericsson, RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
10. [R2-2003382](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003382.zip), CR for 38.331 for CA\_DC\_enhancements, Ericsson, RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
11. [R2-2003200](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003200.zip), Reporting early measurements to SN in INM , Ericsson, RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
12. [R2-2003384](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_109bis-e/Docs/R2-2003384.zip), Early measurement configuration in UE context retrieval, Ericsson, Qualcomm Incorporated, LG Electronics Inc., CATT, OPPO, AT&T, Vodafone, Telecom Italia S.p.A, Intel Corporation, InterDigital Inc., RAN2#109bis\_e, Electronic meeting, 20th April to 24th April 2020
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