3GPP TSG-RAN WG2 Meeting #109bis\_e R2-20xxxxx

Electronic meeting, 20th April to 24th April 2020

Agenda Item: x.x.x

Source: Ericsson (rapporteur)

Title: RRC Open issues for DCCA

Document for: Discussion, Decision

# Introduction

This document captures the following email discussion:

* [Post109e#37][DCCA] RRC open Issues (Ericsson)

Scope: WI RRC review Resolve FFSs that don’t require major technical discussion (like need codes). Ensure that all agreements are captured properly

Intended outcome: Agreeable CR (deadline as above)

Intended outcome 2: Open Issues list with RRC impact (April 1)

In Section 2, the known open issues already identified during previous meetings are discussed.

In Section 4, new open issues identified by the rapporteur are discussed.

In Section 4, companies are invited to provide input regarding any open issues not addressed by the rapporteur.

# Phase 1

## Known Open issues

In RRC CRs [1] [2], the following editor notes are left:

38.331

*#1: 5.3.13.4 Reception of the RRCResume by the UE*

Editor’s note: FFS if the *idleModeMeasuremnetReq* indicates all results (EUTRA and NR), or can request only NR results. The procedure below assumes the former.

*#2: 5.7.z.3 Reception of the UEInformationRequest message*

Editor’s note: FFS if the *idleModeMeasurementReq* indicates all results (EUTRA and NR), or can request only E-UTRA or NR results. The procedure below assumes the former.

*#3: 5.7.x.2 Initiation*

Editor’s note: FFS if one IE (*idleModeMeasurements* with ENUMERATED {eutra, nr, both}) or two separate IEs (i.e. one for NR, one for EUTRA) is to be used to indicate to the UE to perform EUTRA and/or NR early measurements.

*#4: 6.3.2 MeasIdleConfig*

Editor’s note: FFS if *nrofSS-BlocksToAverage* and *absThreshSS-BlocksConsolidation* should be defined together with the *carrierFreqNR* (i.e. outside the *ssb-MeasConfig* structure)

36.331

*#5: 5.3.3.4a Reception of the RRCConnectionResume by the UE*

Editor’s note: FFS if the *idleModeMeasurementReq* indicates all results (EUTRA and NR), or can request only EUTRA or NR results. The procedure below assumes the former.

*#6: 5.6.5.3 Reception of the UEInformationRequest message*

Editor’s note: FFS if the *idleModeMeasurementsReq* indicates all results (EUTRA and NR), or can request only EUTRA or NR results. The procedure below assumes the former.

*#7: 6.2.2 RRCConnectionResumeComplete*

Editors Note: FFS whether to have a separate availability indicator for rel-16 idle/inactive measurements.

*#8: 6.2.2 RRCConnectionSetupComplete*

Editors Note: FFS whether to have a separate availability indicator for rel-16 idle/inactive measurements.

*#9: 6.2.2 UEInformationRequest*

Editors Note: FFS whether to have a separate rel-16 idle/inactive measurement request or the idleModeMeasurementReq-r15 can be reused for rel-16 as well.

*#10: 6.3.5 MeasIdleConfig*

Editors note: FFS if *maxRS-IndexCellQual* and *threshRS-Index* should be defined together with the carrierFreqNR (i.e. outside the *ssb-MeasConfig* structure)

### Issue DCCA\_1 (Granular reporting and availability indication of early measurements)

Issues #1,#2, #5, #6, #7, #8, and #9 are related to the granular early measurement request/reporting that was discussed before/during RAN2-109e [3][4][5]. The proponents of the granular reporting proposed to have both granular request (where the network can explicitly request E-UTRA, NR, or both measurements) and granular availability indication (where the UE can explicitly indicate it has E-UTRA, NR, or both measurements), and this was captured in a TP in [6]. In [7], it is proposed that the indicator *idleModeMeasurements* (SIB2 in LTE, SIB1 in NR) is used to implicitly indicate to the UE whether it should report E-UTRA, NR, or both measurements (but no granular availability indication from the UE). The companies that didn’t support the granular request/reporting cited as their main reason that it will lead to unnecessary complexity [3].

**Question 1: For LTE/NR rel-16, which of the following options discussed above should be adopted for the network to request early measurements and for the UE to indicate early measurement availability:**

1. ***Granular (Explicit):* UE explicitly indicates the measurements it has (in *RRC(connection)SetupComplete, RRC(Connection)ResumeComplete*) and network explicitly indicates the measurements it wants (in *UEInformationRequest, RRC(Connection)Resume*) (as captured in the TP in [6])**
2. ***Granular (Implicit):* network explicitly indicates the measurements it wants to be reported in the** *idleModeMeasurements* in **SIB (SIB2 in LTE, SIB1 in NR), (as proposed in [7])**
3. ***Non-Granular:* UE has one indicator to indicate early measurements (be them for E-UTRA and/or NR carriers), and network has one indicator to request early measurements (upon which the UE sends all measurement results it has available)**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | b);  and a) in case idleModeMeasurements is set to ‘both’ | We think option a) and b) are not conflict.  idleModeMeasurement in SIB is cell specific configuration, in case idleModeMeasurements is set to “eutra or nr” (not both), it implies the network is only capable of processing idle/inactive measurement results of a specific RAT. Then it makes sense that UE indicates this measurement availability only if the UE has the results of corresponding RAT.  If idleModeMeasurement is SIB is set to both, it implies the network is able to process both eutra and nr results. However, based on UE’s service type and network policy, it is beneficial if network can ask the UE to only report the concerned results to network. |
| Huawei, HiSilicon | c) | Whether a cell wants the UE to measure LTE and/or NR results is already expressed in SIB and in most cases the UE will not have valid results other than that, so there is no need to add anything |
| MediaTek | a) or c) | We think early measurement on LTE and NR targets are different feature. Thus we are fine to have different availability indicator and request indicator for LTE and NR measurement. We could accept to have simple indicator if majority prefer single indicator.  However, we prefer NOT to use Implicit way. After going to CONNECTED mode, the content of response message (e.g. *UEInformationResponse*) should depends on the request in the request message (e.g. *UEInformationRequest*). We don’t think it is a good idea to use indicator in SIB at that time. |
| NEC | b) | Given the UE is moving and the network may have different policy or preference, the SIB indication is more suitable way. |
| CATT | b) | We prefer b) that network can explicitly indicate the measurements it wants to be reported in the idleModeMeasurements in SIB, the UE can acquire the SIB and perform measurement. The UE will report measurement results what it has measured according to the indicator in SIB. |
| Futurewei | b) | Slightly prefer b) since it provides network instruction while the scheme is still simple. |
| Samsung | c) | Similar view as expressed by Huawei.  Alike MTK we prefer option a) over option b, assuming that for option b) we will introduce statements in the specification that UE  1) Reports availability according to the bit in SIB and/ or  2) Includes results according to the bit in SIB? |
| Nokia | c) | Agree with Huawei |
| LG | a) or b) | It is possible that network configures LTE and NR early measurements to a UE but a cell in the validity area indicates only ‘NR’. In this case, reporting ‘LTE’ measurements may not be necessary.  b) implicit indication could be simple, but we agree with MTK that a) is enables more precise instruction by network. |
| OPPO | c) | Agree with Huawei. |
| vivo | a) or b) | Indicating all results (EUTRA and NR) is the simplest way, but if network cannot support CA or EN-DC or will not configure the UE perform CA or EN-DC in a period of time for network purpose, UE reports the results that will not be used by the network. |
| Ericsson | a) or b) (preference to a) | We would like to point out that this is not just a resource optimization, it could help also resolve the case where the network supports only rel-15 early measurements but UE has both LTE and NR results. If the UE just indicates availability and network just requests via UE information request, without any indication of what is available or what the network wants, a UE may end up sending a measurement result that contains both LTE and NR results, which the network will not be able to understand. |
| Qualcomm | Prefer c)  but b) can be acceptable if majority prefer to introduce granular request / availability | We basically agree with Huawei that in most cases the UE will not have valid results other than what SIB indicates. Thus, we don’t think it is an essential feature to purse at this stage.  If Majority prefers to introduce the granular, we can accept b) which doesn’t require to introduce new RRC signalling. We don’t prefer to introduce new RRC signalling for not essential feature. |

Summary: There is no clear consensus. However, a majority of the companies (8 out of 12) want to have either option a or b (i.e. some sort of granularity). Thus, it is proposed:

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

### Issue DCCA\_2 (Selective early measurement performance)

Issue #3 is related to the RAN2-109e agreement:

* In NR rel-16, the *idleModeMeasurements* can be used to specify whether the UE is required to perform early measurements on EUTRA, NR or both carriers. FFS if one IE (i.e. ENUMERATED {eutra, nr, both} or separate IEs (i.e. one for EUTRA, one for NR) is to be used.

In [8], it was proposed to define the *idleModeMeasurements* in SIB1 to be of type ENUMERATED {eutra, nr, both}, and the UE performing the early measurements accordingly. In [7], it was proposed to use separate IEs, *idleModeMeasurementsNR* and *idleModeMeasurementsEUTRA* instead. From both functionality and complexity point of view, there seems to be no significant difference between the two options.

**Question 2: For NR rel-16, which of the following options discussed above should be adopted for the network to indicate to the UE which RAT(s) to perform early measurements on:**

1. ***One IE:*** *idleModeMeasurements* in SIB1, with type ENUMERATED {eutra, nr, both} (as captured in the TP in [8])
2. ***Two IEs:*** *idleModeMeasurementsNR* and *idleModeMeasurementsEUTRA**(as proposed in [7])*

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | a) | We didn’t see extra benefit by defining two separate fields. |
| Huawei, HiSilicon | a) or b) | It makes no functional difference and ASN.1 coding has the same size. |
| MediaTek | b) | No strong view. Option b) seems more aligned with LTE. |
| NEC | a) | not strong opinion, but do not see specific benefit for b) |
| CATT | b) | We don’t see a significant difference in the two options. |
| Futurewei | a) | One IE is straight forward. |
| Samsung | b) | Although no strong view, prefer to align with LTE (procedure text is somewhat more straightforward) |
| Nokia | b) | No strong view but in order to just align with LTE it might be worthwhile to do separate IEs in order to be able to have as similar as possible procedural text. But anyway regardless of way to go functionality will be same. |
| LG | Slightly b) | There is no functional difference and size, but we slightly prefer to keep consistency with LTE spec. |
| OPPO | b) | No strong opinion. But it seems it is clear to set two separate configurations. |
| vivo | a) or b) | But b) seems more aligned with LTE |
| Ericsson | a) | There is no extra benefit by defining two separate fields, and the only reason we have two separate fields in LTE is because we have euCA in rel-15. |
| Qualcomm | b) | Align with LTE |

Summary: There is no clear consensus. However, option b is supported by slightly more companies. Thus, considering there is no real functional or coding overhead difference between the two options, it is proposed:

1. Two IEs: *idleModeMeasurementsNR* and *idleModeMeasurementsEUTRA* to be used in NR SIB1 to indicate whether the UE performs EUTRA and NR early measurements.

### Issue DCCA\_3 (Cell quality derivation parameters in *ssb*-*MeasConfig*)

Issues #4 and #10 is related to the issue raised in [9], and the reason cited there was:

In addition, *nrofSS-BlocksToAverage-r16* and *absThreshSS-BlocksConsolidation-r16* are also defined in ssb-MeasConfig-r16 for early measurement configurations. These are used for derivation of cell measurement results. But parameters related to cell level measurement results do not have to be updated from SIB during cell re-selection. For example, *qualityThreshold-r16* for each SSB measurement object, which defines the threshold of cell level quality for early measurement reporting, is defined out of *ssbMeasConfig-r16*. Therefore, we propose that *nrofSS-BlocksToAverage-r16* and *absThreshSS-BlocksConsolidation-r16* are defined out of ssb-MeasConfig-r16.

**Question 3: In *MeasIdleConfig*, where should the IEs *nrofSS-BlocksToAverage-r16* and *absThreshSS-BlocksConsolidation-r16 (*NR*)* and *maxRS-IndexCellQual* and *threshRS-Index* (LTE) be defined:**

1. ***Within ssb-MeasConfig (as in the current CRs [1][2])***
2. ***Outside ssb-MeasConfig (directly under MeasIdleCarrierNR)***

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | a) for nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation;  b) for maxRS-IndexCellQual and threshRS-Index | nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidations parameters are used for cell quality derivation. In case a frequency is configured for both early measurement and cell-reselection (in SIB4). And the nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation fields received from RRCRelease are different from the ones received in SIB4. It will force the UE to calculate two sets of RSRP/RSRQ results.  So we think these two fields should be included in ssb-MeasConfig, thus the UE is not required to continue early measurement if it receives different values from RRCRelease and SIB4 (based on the NOTE in spec); However, if the fields are sent differently in SIBx, we think the UE can still use the dedicated configurations for measurement. This was not discussed in RAN2 before, if companies have the same view, it can be further clarified in specification (e.g. the NOTE).  For maxRS-IndexCellQual and threshRS-Index, these are only used for early measurement, there is no problem if it is configured differently in SIB and RRCRelease, so we think these can be put outside ssb-MeasConfig. |
| Huawei, HiSilicon | a) for nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation;  b) for maxRS-IndexCellQual and threshRS-Index | Same motivations like ZTE. |
| MediaTek | a) | If the NW only provide frequency and SCS in dedicate message and the UE has to get the SSB configuration from SI, we prefer to use the same cell quality derivation parameters as in cell reselection. In this case, as explained by ZTE, the UE could avoid calculating 2 different set of measurement result.  For LTE, we understand that *maxRS-IndexCellQual* and *threshRS-Index* are also used for inter-RAT cell reselection and thus same motivation applies. We don’t see the reason that LTE and NR should have different solution. |
| NEC | a) for nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation  b) for maxRS-IndexCellQual and threshRS-Index | For nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidations, we agree with ZTE.  For maxRS-IndexCellQual and threshRS-Index, it seems reasonable to define together with carrierFreqNR rather than put these within ssb-MeasConfig. |
| CATT | b) | In our understanding, there will also be two sets of RSRP/RSRQ results which we consider it acceptable for LTE when maxRS-IndexCellQual and threshRS-Index fields received from RRCRelease are different from the ones received in SIBs if the two fields are defined outside ssb-MeasConfig. Hence, we propose to use the same principle for both NR and LTE. In addition, it seems simpler to define the two fields outside ssb-MeasConfig to let the UE can still use the dedicated configurations for measurement when the fields are sent differently in SIBs instead of adding or changing the notes in current spec. |
| Futurewei | a) | No strong opinion. Don’t see any show-stopper on simply adopt a) for all the parameters. |
| Samsung | a) | For same reasons as expressed by others i.e. should avoid that UE cannot re-use results of measurements performed for cell re-selection |
| Nokia | a) for both | Maybe there is some misunderstanding on our part regarding LTE part but isn’t it so that LTE UE also perfroms reselection evaluation of NR cells as well as early measurements thus argumentation for NR and LTE should be same? |
| LG | a) for nrofSS-BlocksToAverage and absThreshSS-BlocksConsolidation;  b) for maxRS-IndexCellQual and threshRS-Index | Also same understanding with ZTE. |
| OPPO | a) | Confused with the difference between a) and b). |
| vivo | a) | Agree with Samsung, should avoid UE not be able to re-use results of measurements for cell reselection. |
| Ericsson | a) | We agree with the comments from MediaTek (i.e. the IEs are already used in LTE for inter-RAT cell re-selection) |
| Qualcomm | a) for both | We agree with MediaTek, i.e. no reason to make change for IEs which are already used in LTE inter-RAT cell re-selection. |

**Summary**: The majority of the companies (7) want to keep the IEs as they are (inside *ssb-MeasConfig*), while 4 companies want to keep it as it is for NR but take the IEs outside the *ssb-MeasConfig* for LTE, and 1 company want the change for both LTE and NR. The rapporteur’s understanding is that since the IEs are already used in LTE as well for inter-RAT cell re-selection measurements, taking them outside the *ssb-MeasConfig* will result in the UE calculating the cell quality derivations twice for cells that are candidate for cell re-selection and early measurements. Thus, it is proposed,

1. 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.

### Issue DCCA\_4 (Maximum number of cells per carrier to be reported)

In both 36.331 and 38.331, there is an FFS regarding the maximum number of cells per carrier for idle/inactive measurements for rel-16

36.331

maxCellMeasIdle-r16 INTEGER ::= 8 -- Value FFS

38.331

maxCellMeasIdle-r16 INTEGER ::= 65535 -- Maximum number of cells per carrier for idle/inactive measurements is FFS

In LTE euCA, the *maxCellMeasIdle-r15* is defined to be 8. A simple approach in rel-16 could be to adopt the same limitation as in LTE euCA (i.e. up to 8 cells per carrier can be included in the idle/inactive measurement results).

**Question 4: Do companies agree to adopt the LTE euCA limitation of a maximum of 8 cells per carrier for idle/inactive measurement results also for LTE/NR rel-16?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | Agree |  |
| Huawei, HiSilicon | Ok |  |
| MediaTek | Agree | Reporting 8 cells per carrier seems enough |
| NEC | Agree |  |
| CATT | Agree |  |
| Futurewei | Agree |  |
| Samsung | Fine |  |
| Nokia | OK |  |
| LG | Agree |  |
| OPPO | Agree |  |
| vivo | Agree |  |
| Ericsson | Agree |  |
| Qualcomm | Agree |  |

**Summary**: There is a consensus that reporting a maximum of 8 cells per carrier is sufficient.

1. A maximum of 8 cells per carrier can be reported for early measurements in LTE/NR rel-16.

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

Another issue is related to the need codes of the IEs in *MeasIdleConfig*. Since the *MeasIdleCarrierListEUTRA* and *MeasIdleCarrierListNR* are utilized both in *MeasIdleConfigSIB* and *MeasIdleConfigDedicated*, it is not clear on how to specify the need code of the IEs within that. Also, the way the need codes for the corresponding IEs to specify the SSB configuration are defined in SIBs in LTE and NR differently. For example, in SIB24 of LTE, we have:

CarrierFreqNR-r15 ::= SEQUENCE {

carrierFreq-r15 ARFCN-ValueNR-r15,

multiBandInfoList-r15 MultiFrequencyBandListNR-r15 OPTIONAL, -- Need OR

multiBandInfoListSUL-r15 MultiFrequencyBandListNR-r15 OPTIONAL, -- Need OR

measTimingConfig-r15 MTC-SSB-NR-r15 OPTIONAL, -- Need OR

subcarrierSpacingSSB-r15 ENUMERATED {kHz15, kHz30, kHz120, kHz240},

ss-RSSI-Measurement-r15 SS-RSSI-Measurement-r15 OPTIONAL, -- Cond RSRQ2

cellReselectionPriority-r15 CellReselectionPriority OPTIONAL, -- Need OP

cellReselectionSubPriority-r15 CellReselectionSubPriority-r13 OPTIONAL, -- Need OR

threshX-High-r15 ReselectionThreshold,

threshX-Low-r15 ReselectionThreshold,

threshX-Q-r15 SEQUENCE {

threshX-HighQ-r15 ReselectionThresholdQ-r9,

threshX-LowQ-r15 ReselectionThresholdQ-r9

} OPTIONAL, -- Cond RSRQ

q-RxLevMin-r15 INTEGER (-70..-22),

q-RxLevMinSUL-r15 INTEGER (-70..-22) OPTIONAL, -- Need OR

p-MaxNR-r15 P-MaxNR-r15,

ns-PmaxListNR-r15 NS-PmaxListNR-r15 OPTIONAL, -- Need OR

q-QualMin-r15 INTEGER (-43..-12) OPTIONAL, -- Need OP

deriveSSB-IndexFromCell-r15 BOOLEAN,

maxRS-IndexCellQual-r15 MaxRS-IndexCellQualNR-r15 OPTIONAL, -- Need OR

threshRS-Index-r15 ThresholdListNR-r15 OPTIONAL, -- Need OR

...,

[[ multiBandNsPmaxListNR-v1550 MultiBandNsPmaxListNR-1-v1550 OPTIONAL, -- Need OR

multiBandNsPmaxListNR-SUL-v1550 MultiBandNsPmaxListNR-v1550 OPTIONAL, -- Need OR

ssb-ToMeasure-r15 SSB-ToMeasure-r15 OPTIONAL -- Need OR

]]

}

While in SIB4 of NR, we have:

InterFreqCarrierFreqInfo ::= SEQUENCE {

dl-CarrierFreq ARFCN-ValueNR,

frequencyBandList MultiFrequencyBandListNR-SIB OPTIONAL, -- Cond Mandatory

frequencyBandListSUL MultiFrequencyBandListNR-SIB OPTIONAL, -- Need R

nrofSS-BlocksToAverage INTEGER (2..maxNrofSS-BlocksToAverage) OPTIONAL, -- Need S

absThreshSS-BlocksConsolidation ThresholdNR OPTIONAL, -- Need S

smtc SSB-MTC OPTIONAL, -- Need S

ssbSubcarrierSpacing SubcarrierSpacing,

ssb-ToMeasure SSB-ToMeasure OPTIONAL, -- Need S

deriveSSB-IndexFromCell BOOLEAN,

ss-RSSI-Measurement SS-RSSI-Measurement OPTIONAL,

q-RxLevMin Q-RxLevMin,

q-RxLevMinSUL Q-RxLevMin OPTIONAL, -- Need R

q-QualMin Q-QualMin OPTIONAL, -- Need S

p-Max P-Max OPTIONAL, -- Need S

t-ReselectionNR T-Reselection,

t-ReselectionNR-SF SpeedStateScaleFactors OPTIONAL, -- Need S

threshX-HighP ReselectionThreshold,

threshX-LowP ReselectionThreshold,

threshX-Q SEQUENCE {

threshX-HighQ ReselectionThresholdQ,

threshX-LowQ ReselectionThresholdQ

} OPTIONAL, -- Cond RSRQ

cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need R

cellReselectionSubPriority CellReselectionSubPriority OPTIONAL, -- Need R

q-OffsetFreq Q-OffsetRange DEFAULT dB0,

interFreqNeighCellList InterFreqNeighCellList OPTIONAL, -- Need R

interFreqBlackCellList InterFreqBlackCellList OPTIONAL, -- Need R

...

}

**Question 5: In LTE, do companies agree to use the same need codes for the IEs within *ssb-MeasConfig* of *MeasIdleCarrierNR* as in the corresponding IEs in SIB24?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | Agree |  |
| Huawei, HiSilicon | Need OR | See explanations in question 6. |
| MediaTek | Need OR | We understand the configuration is either from RRC Release or from SI. There is no delta configuration for this thus “Need OR” is more suitable. |
| NEC | Agree |  |
| CATT | Agree |  |
| Samsung | Need OR | As also for dedicated there is no delta signalling as expressed by MTK |
| Nokia | Agree |  |
| LG | Agree |  |
| OPPO | Agree |  |
| vivo | Need OR |  |
| Ericsson | Agree |  |
| Qualcomm | Agree (Need OR) |  |

**Summary**: There is a consensus that in LTE early measurement configuration, the same need codes (Need OR) to be used in *ssb-MeasConfig* IEs as in the SIB24. reporting a maximum of 8 cells per carrier is sufficient.

1. 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*.

**Question 6: In NR, do companies agree to use the same need codes for the IEs within *ssb-MeasConfig* of *MeasIdleCarrierNR* as in the corresponding IEs in SIB4?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | Agree | For fields defined as “Need S”, the UE applies default value/behaviour if the field is absent. For instance, for smtc, the UE applies 5ms periodicity if the field is absent. Then we need to discuss how UE determines the configuration mismatch when dedicated signalling does not include smtc, while UE moves to another cell whose SIB includes smtc with 5ms (or vice versa).  In our view, this may happen in inter-vendor scenario. Although the values indicated by RRCRelease and SIB are different, the UE’s behaviours are the same, so we would prefer the UE to continue idle/inactive measurement in this case. |
| Huawei, HiSilicon | Need R | because:  - the only UE action specified for these parameters is "store or replace" so there is no UE action specified upon absence and need S in not suitable  - this makes is clear that there is no delta signalling for the "store or replace" operation in VarMeasIdleConfig  - "need S" would give the impression that UE takes the "default action" in case of absence in dedicated signalling while there is a value in SIBx or SIB4 (or in case of absence in SIBx while there is a value in SIB4).  This is the same situation like for connected RRM measurements where the UE acts upon a variable and in MeasObjectNR and ReportConfigNR, all fields are Need M or Need R depending whether there is delta signalling or not. |
| MediaTek | Need R | Same view as Huawei |
| NEC | Agree | agree with ZTE to clarify the default behaviour, when the field is absent.  Regarding “absent in dedicated and present in SIB” (or vice versa) commented by Huawei, it would be good to clarify that. To our understanding (maybe incorrect), the ssb-MeasConfig itself can be Optional with Need R (as commented by ZTE to running CR) which is currently Need N in MeasIdleCarrierNR. We also assume there is no mix of dedicated and SIB for IEs within the ssb-MeasConfig. |
| CATT | Agree |  |
| Futurewei | Need R | Agree with Huawei’s view. |
| Samsung | Not sure | Maybe best to conclude with updated procedure text that clarifies UE behaviour when certain fields are *not configured*. In principle this is a different aspect than what to do upon absence, so need R seems appropriate. However, in several similar cases need S is used  (resolving need codes is maybe also more something for ASN.1 review session) |
| Nokia | Need R |  |
| LG | Need R | Same understanding with Huawei. |
| OPPO | Agree |  |
| Vivo | Agree |  |
| Ericsson | Not sure | There are valid argument for both Need R and Need S. Also, in LTE, even though need OR was used, in the field description of *measTimingConfig-r15,* it was mentioned to use 5ms if this field is not included, which is what we typically do for Need S. |
| Qualcomm | Need R | We basically agree with Huawei:   * Need R is generally used when delta signalling is not allowed. * Unlike CONNECTED RRM, SMTC can come from either SIB or RRC release. If we have to define UE default behaviour, it should be SMTC is not provided in both SIB and RRC release. It seems not a typical approach of RRC spec. And we have concern that it will bring a lot of issues and CRs     With “Need R”, we think it is good to have simple UE behaviour that when SMTC is not provided in both RRC release and SIB, the UE doesn’t perform early measurements on the concerned frequency. |

**Summary**: There is no consensus whether to use Need S or Need R for the IEs in *ssb-MeasConfig* in 38.331. The rapporteur’s proposal is to continue the discussion during the NR RRC ASN.1 review.

1. The need codes for the following IEs inside ssb-*MeasConfig* of *MeasIdleCarrierListNR* to be discussed in NR RRC ASN.1 review: *nrofSS-BlocksToAverage, absThreshSS-BlocksConsolidation, smtc,* and *ssb-ToMeasure*

## Other Open issues

The idle/inactive measurement procedures in the endorsed CRs [1][2] have been checked by the rapporteur and the following open issues have been identified:

1. The idle/inactive measurement procedure (5.7.x.2 in 38.331 and 5.6.20.2 in 36.331) contains the procedure for handling both the early measurement configuration as well as the early measurement performance. This seems to make the procedure hard to comprehend and different from the way connected mode measurements were handled, where we have separate clauses for measurement configuration and performing measurements.
2. The current procedures do not capture the cell quality derivation from beams.
3. The current procedures do not properly capture how the beam index and beam results are included in the early measurements.

The rapporteur has updated the running CRs (attached with this email discussion document) to address the above aspects.

### Issue DCCA\_6 (Separation of early measurement configuration and early measurement performance procedures)

**Question 7: Do companies agree with splitting the idle/inactive measurement procedures into the handling of measurement configurations and performing measurements, as captured in the updated running CRs?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | Agree |  |
| Huawei, HiSilicon | No strong preference | But in 36.331, the numbering is wrong (2a normally comes after 2) |
| MediaTek | Agree |  |
| NEC | Agree |  |
| CATT | Agree | It is clearer. |
| Futurewei | Agree | Slightly prefer specifying separately. |
| Samsung | Agree | We agree with the general intention to restructure. In principle there we see the following parts: (may provide further detailed suggestions later)  Handling of configuration in SI  Measurements to perform  Storing of measurement results  Actions upon reselection |
| Nokia | No strong prefernce | Proposal as such is OK (but also agree with Huawei comment about numbering) but also this is not required as such so we are OK with original structure as well. |
| LG | Agree | More readable |
| OPPO | No strong opinion |  |
| Vivo | Agree |  |
| Ericsson | Agree | Agree with the naming convention mentioned from Huawei. Propose to change it to 1a instead. |
| Qualcomm | Agree | Principle is fine, but we need to check during ASN.1 review |

**Summary**: There is a consensus that split of the early measurement configuration and performance in different sub clause.

1. Confirm that the early measurement configuration procedure will be captured in a subclause different from the early measurement performance procedure, in both LTE and NR. The section number for the LTE measurement configuration to be renamed to 1a.

### Issue DCCA\_7 (Beam results and cell quality derivation)

**Question 8: Do companies agree with the way the cell quality derivation from beams is handled in the updated running CRs?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | No strong view. |  |
| Huawei, HiSilicon | Partially | The text for cell quality derivation from beams is generally ok (see one suggestion below) but it is rather strange to have a requirement to derive beam results after the requirement to derive cell results, while the beam results needs to be derived first. We would suggest to either:  - (36.331 style) keep in "performing measurements" only the setting of cell and beam results in the variable (no "derive" statement) and put a sentence e.g. at the beginning saying that NR cell and beam results are derived according to section xxx (new or refer to 38.304 section 5.2.1)  - (38.331 style) have the "derive" statements for beam results (according to beam and cell quantities), then for cell results, then the rest of the text is ok  (Note: the suggestion is not to have a different approach for the 36.331 CR and for the 38.331 CR, it is just to state that the requirements to derive NR cell/beam results are worded in two different flavours in these two specifications and either could be reused).  In the text (supposing it is kept) for cell quality derivation from beams, "derive each cell measurement quantity" should be changed "derive the cell measurement quantity" because there is "for each cell measurement quantity" above. |
| MediaTek | Agree the principle | We agree to follow the same principle for cell quality derivation as in CONNECTED mode. To avoid similar text in several spec section, we prefer to follow the 36.331 style mentioned by Huawei (refer to a new section or 38.304 section 5.2.1). |
| CATT | Agree | Seems ok |
| Futurewei | Agree |  |
| Samsung | Agree the principle | We agree to follow the same principle for cell quality derivation as in CONNECTED mode. For 36.331 it seems possible to actually refer to 5.5.3.3 (just needs to be generalised a bit).  Also, isn’t convention that procedures used in both connected and idle and connected are normally specified in .331. |
| Nokia | Partially | Agree with Huawei |
| LG | No strong view |  |
| OPPO | Agree |  |
| Vivo | No strong view |  |
| Ericsson | Agree |  |
| Qualcomm |  | In principle, we agree with Huawei, i.e. refer to a similar text to avoid similar text. |

**Question 9: Do companies agree with the way the beam index/results are included in the early measurements in the updated running CRs?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | No strong view |  |
| Huawei, HiSilicon | Partially | See question above. |
| MediaTek | Agree the principle |  |
| CATT | Agree |  |
| Futurewei | Agree |  |
| Nokia | No strong view |  |
| LG | No strong view |  |
| OPPO | Agree |  |
| Vivo | No strong view |  |
| Ericsson | Agree |  |
| Qualcomm | Agree the principle |  |

**Summary**: The way the beam result and cell quality derivation are captured in the updated CRs seems to be agreeable in principle. However, there were comments that modifications could be made to make the procedure clearer (e.g. capturing of beam results before performing cell quality derivation). The rapporteur proposes to update the procedures taking the comments into account during phase 2.

1. To agree in principle to the beam results and cell quality derivation handling in the latest CRs. Updates to be made during phase 2 to clarify the procedures further.

### Issue DCCA\_8 (Support of the reporting of 8 EUTRA carriers in LTE early measurement results)

Another open issue related to early measurements in LTE is regarding how to capture the RAN2-109e agreements on the number of carriers that can be reported, i.e.

* *For early measurement configuration and reporting, ASN.1 signalling to allow the configuration of*
  + *up to 8 E-UTRA and 8 NR carries to be measured*
  + *up to 8 E-UTRA and 8 NR carriers to be reported*
  + *up to 32 beams to be included in the NR results*

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

and

maxIdleMeasCarriers-r15 INTEGER ::= 3 -- Maximum number of neighbouring inter-frequency carriers measured in RRC\_IDLE and RRC\_INACTIVE

One way of capturing this could be to define a rel-16 IE for E-UTRA measurements, for example:

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

VarMeasIdleReport-r16 ::= SEQUENCE {

measReportIdle-r16 MeasResultListIdle-r16,

measReportIdleNR-r16 MeasResultListIdleNR-r16 OPTIONAL

}

If such an approach is to be employed, the idle/inactive measurement procedure text has to be checked to see if any corresponding updates are necessary.

**Question 10: What are companies views regarding on how to capture the agreement from RAN2-109e in 36.331 to enable up to 8 EUTRA carriers to be reported for early measurements?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | We are ok to define a rel-16 IE, but since we reuse legacy idleModeMeasurement field for EUTRAN early measurement, we are wondering whether a Rel-16 UE knows the eNB is in Rel-15 version or Rel-16 version? Is there a problem that the UE uses Rel-16 IE for reporting but an old eNB cannot decode it? |
| MediaTek | In R15 LTE euCA, the UE could report up to 3 LTE carriers according to the ASN.1 define in *MeasResultListIdle-r15*. We do not see strong need to extend the number of reporting carrier for now. But if we want to do this, we have to consider the backward compatible issue. A new UE capability saying that it could include more than 3 carrier for LTE early measurement reporting and a new NW control to indicate whether the UE should using the R16 IE to report LTE early measurement results may be needed. |
| NEC | Prefer to define new Rel-16 IE. |
| CATT | For ZTE’s question, we think the UE can implicitly know the version of eNB based on eNB’s IE version in broadcast. |
| Futurewei | The rapporteur suggested approach of new Rel-16 IE is OK. |
| Samsung | For LTE carriers, we prefer to extend the list in the normal way i.e. using ListExt rather than using a critical extension (replacement) |
| Nokia | No strong view |
| LG | New Rel-16 IE seems simple, but no strong view. |
| OPPO | Agree with rapporteur’s suggestion. |
| Vivo | New Rel-16 IE is OK. |
| Ericsson |  |
| Qualcomm | New Rel-16 IE is fine, but as MediaTek mentioned, we also think that a new UE capability is required. |

**Summary**: The majority view (except for one company) is to use a new rel-16 IE. However, there is a need to check the impact of this in the procedures. The rapporteur proposes to do this during phase 2.

1. To use a new rel-16 IE (in 36.331) to enable the reporting of up to 8 EUTRA carriers in early measurement results. Procedural impacts, if any, to be clarified during phase 2.

### Issue DCCA\_9 (*SCellToAddModList* in *RRCConnectionResume*)

It has been agreed to support the SCell addition/modification in RRCConnectionResume, as well as be able to set the SCell state. However, it was not clear on how to capture the SCell configuration from the way it was used in the *RRCConnectionReconfiguration* as there were several extensions of the *SCellToAddModList* IEs:

SCellToAddModList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10

SCellToAddModList-v10l0 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-v10l0

SCellToAddModList-v13c0 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-v13c0

SCellToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-r13

SCellToAddModListExt-v1370 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v1370

SCellToAddModListExt-v13c0 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddMod-v13c0

SCellToAddModListExt-v1430 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-v1430

SCellGroupToAddModList-r15 ::= SEQUENCE (SIZE (1..maxSCellGroups-r15)) OF SCellGroupToAddMod-r15

Most of these IEs are building on top of each other, as explained in the field description:

***sCellToAddModList, sCellToAddModListExt***

Indicates the SCell to be added or modified. E-UTRAN uses field *sCellToAddModList-r10* to add or modify SCells (with *sCellIndex-r10*) for a UE that does not support carrier aggregation with more than 5 component carriers. If E-UTRAN includes *sCellToAddModListExt-v1430* it includes the same number of entries, and listed in the same order, as in *sCellToAddModListExt-r13*. If E-UTRAN includes *sCellToAddModList-v10l0* it includes the same number of entries, and listed in the same order, as in *sCellToAddModList-r10*. If E-UTRAN includes *sCellToAddModListExt-v1370* it includes the same number of entries, and listed in the same order, as in *sCellToAddModListExt-r13*. If E-UTRAN includes *sCellToAddModListExt-v13c0* it includes the same number of entries, and listed in the same order, as in *sCellToAddModListExt-r13.*

In order to enable the proper SCell addition/modification during connection resume in LTE, several of the above IEs have to be included in the *RRCConnectionResume* message or a new IE has to be introduced that includes all the relevant rel-15 SCell configuration (including the SCell state).

**Question 11: What are companies views regarding the ASN.1 signalling for SCell addition/modification in *RRCConnectionResume* message?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | To make spec clean, we prefer to define a new sCellToAddModList field for RRCConnectionResume message. |
| MediaTek | We also prefer to add a new IE to include all the relevant rel-15 SCell configuration. |
| CATT | No strong view. Slightly prefer a new IE. |
| Samsung | We prefer to create a new IE SCellToAddMod-r16 in which all fields including previous extensions are merged (according to general principles) |
| Nokia | Just define new -r16 version |
| OPPO | Define new -R16 version IE. |
| Vivo | Non-critical extension would be preferred. |
| Ericsson | Define new -r16 version. |
| Qualcomm | Agree to add a new IE |

**Summary**: The majority view (except for one company) is to use a new rel-16 IE. The rapporteur proposes to do this during phase 2.

1. To use a new rel-16 IE *SCellToAddModList* IE (in 36.331) to be included in *RRCConnectionResume*. The details of the IE to be clarified during phase 2.

### Issue DCCA\_10 (BFD-RS for dormant BWP)

Another open issue is related to SCell dormancy (38.331):

*6.3.2 BWP-DownlinkDedicated* (*radioLinkMonitoringConfig*)

FFS: the implicit BFD-RS configuration for dormant BWP is supported or not.

This was raised in [10], and the reason cited there was:

RAN2 agreed that the *PDCCH-Config* IE will not be configured in the dormant DL BWP. So it is impossible to configure the BFD-RS for dormant BWP implicitly due to no TCI state configuration for PDCCH.

**Question 12: Which option is preferred regarding implicit configuration of BFD-RS for dormant BWP:**

1. ***Do not support the implicit configuration of BFD-RS for an SCell in dormancy.***
2. ***Revise the prior agreement so that the PDCCH-config IE can be configured for the dormant BWP in order to support the implicit BFD-RS configuration for dormant BWP***
   1. ***Only tci-StatesPDCCH-ToAddList is applied for the dormant BWP and other configurations in PDCCH-config are ignored (not applied).***
   2. ***No search space is configured in PDCCH-Config of dormant BWP, so that the UE does not monitor PDCCH in dormant BWP but can apply tci-StatesPDCCH-ToAddList included in ControlResourceSet.***
3. ***If MAC-CE is used to activate TCI of PDCCH in the associated non-dormant BWP (i.e. firstWithinActiveTimeBWP-Id configured in RRC), UE will use such TCI state to perform BFD in the dormant BWP*.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option** | **Comments** |
| ZTE | b-1 | We think it is more flexible to configure different tci-statesPDCCH-ToAddList configuration for dormant BWP, thus option c) seems too restrictive. |
| MediaTek | b-1 | We think that b-1 is more straightforward, wherein the BFD-RS will be the RS in the active TCI based on the *tci-StatesPDCCH-ToAddList*. Option c is looks confusing, it is strange to “activate” the TCI on a “non-active” BWP. We prefer not to use this option. |
| NEC | b-1 | Our preference is either b-1 or b-2. b-1 seems simpler.  By the way, RAN2 is asking the related question below to RAN1 (R2-2002381). Is there any impact by possible RAN1 response?  **Q 1: Are there any issues due to RAN2 agreements on TCI state configuration, i.e. *tci-StatesToAddModListat* in PDSCH-Config is configured for dormant BWP?** |
| CATT | a) | The RS for BFD needs to be configured for all BWPs at each beam for channel tracking and CSI measurements anyway. There is no additional overhead on RRC signalling for explicit RS configuration for BFD in the dormant BWP. |
| Futurewei | b-1 | The option “c)” may introduce delay in when action is needed right-way which is not desirable in activated state in RRCConnected. |
| Samsung | b-2 | We think b-2 seems the most reasonable approach that also avoids significant specification impact. Perhaps we could have a line in the field description of searchSpacesToAddModList in PDCCH-Config e.g. UE is not configured with Search Space for the dormant BWP |
| Nokia | not a) | One should understand that in most of situations TCI states configured would be exactly same as for non-dormant BWP.  c seems to be quite easy to achieve implicit configuration.  Regarding option b) – We consider that it would be easier to define new IE for this purpose than defining rules which parameters are not used i.e. just a IE with required parameter(s) and as said in most (probably all) of cases anyway one would be using same TCI states as for non-dormant BWP then it might be more reasonable to allow this kind of configuration as well |
| LG | a) | If necessary, it is sufficient for network to signal explicit resources for BFD. No other solution that introduces some hanging parameters is not needed. |
| OPPO | a | In last RAN2 meeting, RAN2 LS is sent out to RAN1 to confirm the issues for the dormant BWP, I think RAN1 will discuss it in next RAN1 meeting. |
| Vivo | a) | We prefer not revert *prior agreement, if such reverting is needed, we prefer to for the simplest way b2). Please note current specification does not prevent to config PDCCH-config without “searchSpacesToReleaseList”*. |
| Ericsson | b-1) | b1) is sufficient, i.e. just include PDCCH-config IE containing the tci-StatesPDCCH-ToAddList configuration. The agreement on PDCCH-config absence is anyway just a consequence of previous agreement that the UE does not monitor PDCCH in dormancy. But it is not meant, in our view, to prevent any configuration at all. |
| Qualcomm | a) is not acceptable, prefer b-2) | Explicit BFD-RS configuration bad one big issue (especially in FR2): when the UE is moving, NW has to frequently reconfigure BFR-RS via RRC to avoid unnecessary BFR trigger caused by coverage hole of the spatial BFD-RS even if UE is still in cell coverage. It may bring significant RRC signaling overhead and unnecessary BFR triggered if NW has no timely feedback from UE. To resolve the issue of explicit BFD-RS, implicit BFD-RS was introduced: UE can perform BFD based on the activated TCI-State for PDCCH, which can be changed via L2 signalling (i.e. CORESET TCI MAC-CE). We think it is important to still support implicit BFD-RS in dormant BWP.  With regarding to b-1) and b-2), we still prefer b-2):   * b-1) will introduce a new UE requirement. And it is not clear whether other TCI related IE needs to be ignored by the UE (e.g. *tci-PresentInDCI*) * b-2) will bring much less spec impact in RRC: we only need to clarify that *searchSpacesToAddModList* is absent in dormant BWP. |

**Summary**: There was almost equal support for option a) and option b-1). The rapporteur proposes to select among these two during phase 2.

1. To discuss in phase 2, which option is preferred regarding implicit configuration of BFD-RS for dormant BWP:

* Option a) Do not support the implicit configuration of BFD-RS for an SCell in dormancy.
* Option b1) PDCCH-config IE can be configured for the dormant BWP in order to support the implicit BFD-RS configuration for dormant BWP, and only tci-StatesPDCCH-ToAddList is applied for the dormant BWP and other configurations in PDCCH-config are ignored (not applied).

## Other issues

Besides the issues discussed in previous sections, companies are invited to list other open issues related to the DCCA RRC CRs (including the additional aspects/agreements captured in the updated CRs).

**Question 13: Any other open issues related to the DCCA RRC CRs?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | For SCell Dormancy, we have define first non-dormant DL BWP while BWP is switching from dormant to dormant.  firstWithinActiveTimeBWP-Id-r16 BWP-Id OPTIONAL, -- Cond MultipleNonDormantBWP  firstOutsideActiveTimeBWP-Id-r16 BWP-Id OPTIONAL -- Cond MultipleNonDormantBWP-WUS  We think that similar define for first non-dormant UL BWP is required (for FDD case). Otherwise, there will be ambiguity for the current active UL BWP between UE and NW. Other companies’ view on this is welcome.  [Rapporteur] As all UL BWPs are non-dormant BWPs, the rapporteur’s understanding is that the UL BWP ID would not change whether the UE is in dormancy or not, and thus there is no ambiguity. |
| Nokia | As we commented during RAN2#109, the newly added instances of “the procedure ends” in 38.331 section “5.3.5.3 Reception of an RRCReconfiguration by the UE” erroneously prevent execution of the last level-1> bullet within that procedure: “if *reconfigurationWithSync* was included in *spCellConfig* of an MCG or SCG, and when MAC of an NR cell group successfully completes a Random Access procedure triggered above …”  This problem needs to be solved. And we provide a proposal in the CRs.  [Rapporteur]: Nokia has also provided further input in the CR at the corresponding procedure. Changes, if required (or else a comment explaining why not), will be made in the updated CR to be distributed soon. |
| OPPO | For RRC\_INACTIVE or RRC\_IDLE UE UE, the the idle measurement results are included in UEInformationResponse message.  If the idle measurement results are big enough and they cannot be included completely in the first report, then the UE can indicate the available measurement results in UEInformationResponse message.  However, there is no “idleMeasAvailable” in UEInformationResponse message.  We propose to add “idleMeasAvailable” in UEInformationResponse message.  [Rapporteur]: The rapporteur’s understanding is that no specific handling needs to be done in this case at the RRC level. The UE prepares the *UEInformationResponse*, and RRC PDU is sent to the lower layers, and it is up to the lower layers to make sure the packet is transmitted. The situation is the same for any information to be sent using *UEInformationResponse* (example, RLF-report), which could be considerably larger than the early measurements. |
| Ericsson | During RAN2-109e, it was agreed to have the *reconfigurationWithSync* for the PSCell will be included, even if the intention was just to restore the stored SCG. However, there were sub-agreements that were not captured, as they were supposed to be the same as legacy handling. Specifically, if any of the parameters of the *reconfigurationWithSync* for the PSCell should be part of the UE Inactive AS context.  During the final round of discussions in RAN2-109e before the CRs were endorsed, this was brought up, and there was a proposal to have update in the Release procedure :  3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, and all other parameters configured except for the ones within *ReconfigurationWithSync* of MCG and *servingCellConfigCommonSIB*;  where the assumption was that the *rach-ConfigDedicated,* being “OPTIONAL need N” is a one-shot parameter that is not stored, so no need to indicate that in the procedure. Also, T304 and PSCell C-RNTI can also be stored by the UE, and the SN can always provide a new value if it wants to update them.  In the review of the updated CR during phase 1, there was a comment from ZTE addressing the same aspect, and it was proposed to capture the required changes in the following way:    3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, the *servingCellConfigCommon* within *ReconfigurationWithSync* of the source PSCell, and all other parameters configured except for the ones within *ReconfigurationWithSync* of the source PCell and *servingCellComfigCommonSIB;*  It is not clear why the *servingCellConfigCommon* of the PSCell is stored as part of the UE context, but not the T304 and C-RNTI of the PSCell. Doing so will avoid the need to include the *reconfigurationWithSync* for the SCG, unless the network wants to change one of the stored parameters (i.e. T304, PSCell C-RNTI, *servingCellConfigCommon*) or it wants to apply CFRA by including the *rach-ConfigDedicated.*  The rapporteur proposes to clarify these aspects as part of the phase 2 discussion. |
|  |  |

# Phase 2

In this section, the issues where there was no consensus or majority support will be discussed. Additionally, companies are more than welcome to bring open issues that they still find in the updated CRs.

## Issue DCCA\_7 (Beam results and cell quality derivation)

**Question 14: Do companies agree with the way the handling of the beam results and cell quality derivation is captured in the updated 36/38.331 CRs?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments** |
| Huawei, HiSilicon | Disagree | We should clarify the cell and beam quality derivation but without duplicating the existing text (with errors).  For 36.331, we can add at the beginning of 5.6.20.2 the sentence "When performing measurements on NR carriers.." from 5.5.3.1 (which refers to 5.5.3.3/4) and update 5.5.3.4 for the case of "measurements performed for idle/inactive reporting" (i.e. without filtering).  For 38.331, we can also add a similar sentence at the beginning of 5.7.x.3 and refer to 5.5.3.3/4 (but some update would be needed for both) or refer to 38.304 (no need for update then).  [Rapporteur]  During phase 1 comments were received (Huawei, MediaTek, Samsung) stating that the procedure was a bit confusing (the main comment was that beam measurements were performed after cell quality derivation, but beam measurement was used for cell quality derivation)  What I initially thought was to update the ordering of the procedures according to the proposals above. However, looking at it again, I think there was a misunderstanding in comparing how the connected mode measurements were done with the idle/inactive measurements. In the connected mode, we have procedures to perform the measurement and other sections for reporting measurements (when the trigger conditions are fulfilled), while for the idle/inactive measurements, the procedure combines both aspects as the measurements are stored immediately after being performed (although the reporting is done when the connection is resumed/established).  For connected mode, the performing of the measurements is captured as:  5>  if the *measObject* is associated to NR and the *rsType* is set to *ssb*:  6>  if *reportQuantityRS-Indexes* and *maxNrofRS-IndexesToReport* for the associated *reportConfig* are configured:  7> derive layer 3 beam measurements only based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-Indexes*, as described in 5.5.3.3a;  6>  derive cell measurement results based on SS/PBCH block for the trigger quantity and each measurement quantity indicated in *reportQuantityCell* using parameters from the associated *measObject*, as described in 5.5.3.3;  As you can see, if the beam reporting is not configured, the highlighted part is not executed, and only the cell quality derivation is performed, where in section 5.5.3.3 it is stated that:  1> for each cell measurement quantity to be derived based on SS/PBCH block:  2>  if *nrofSS-BlocksToAverage* in the associated *measObject* is not configured; or  2>  if *absThreshSS-BlocksConsolidation* in the associated *measObject* is not configured; or  2>  if the highest beam measurement quantity value is below or equal to *absThreshSS-BlocksConsolidation*:  3>  derive each cell measurement quantity based on SS/PBCH block as the highest beam measurement quantity value, where each beam measurement quantity is described in TS 38.215 [9];  2>  else:  3>  derive each cell measurement quantity based on SS/PBCH block as the linear power scale average of the highest beam measurement quantity values above *absThreshSS-BlocksConsolidation* where the total number of averaged beams shall not exceed *nrofSS-BlocksToAverage*;  This (what is stated in 5.5.3.3) is exactly how we captured the first part of the cell quality derivation (with the needed changes instead of using *measObject).* Thus, there was no specific beam measurement handling needed, the above procedure already has lines that capture how the beams needed for the cell quality derivation is performed (for example, the reportQuantity that is defined for the cell level measurements is used) .  The second part of the procedure (what companies thought the beam measurement is being done which will be used for cell quality derivation) is actually triggered only if beam reporting (index or/and beam results) is configured, thus those beam measurements are not input for the cell quality derivation but for beam index/beam measurement reporting.  And since as I mentioned above, the performing and storing of the results happens at the same time in the case of idle/inactive measurements, the way it is captured now is the most logical way: get the cell measurements (cell quality derivation), and for each cell being reported, if beam reporting is configured, include the indexes or beam measurements according to the beam measurement configurations.  Considering the above, I think the way it is captured now is the correct way, and have refrained from making changes to that part. If companies still think something is not clear, my recommendation will be to raise a RIL that will be discussed in the RRC ASN.1 review. |
| Qualcomm |  | We agree with the principle raised by Huawei, i.e. refer to a similar text to avoid similar text. We think it is clearer and less error-prone.  Maybe Huawei can bring CR for discussion. |

## Issue DCCA\_8 (Support of the reporting of 8 EUTRA carriers in LTE early measurement results)

**Question 15: Do companies agree with the way the support of reporting of up to 8 EUTRA carriers is captured in the updated 36.331 CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments** |
| Huawei, HiSilicon | With what exactly are we supposed to agree or disagree? | In the proposed CR, the UE can report 8 E-UTRA carriers in RRCConnectionResumeComplete but only 3 in UEInformationResponse. Is that really what was agreed?  [Rapporteur]  Please refer to the updated CR now in the phase 2 folder. |
| Qualcomm | See comments | We are fine to introduce new Rel-16 IE for reporting up to 8 LTE carriers. But for inter-operation issues, we also think that a new UE capability is required for the UE supporting this new IE. |

## Issue DCCA\_9 (*SCellToAddModList* in *RRCConnectionResume*)

**Question 16: Do companies agree with the way the *SCellToAddModList* is captured in the *RRCConnectionResume* of updated 36.331 CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Comments** |
| Huawei, HiSilicon | Agree |  |
| Qualcomm | Agree |  |

## Issue DCCA\_10 (BFD-RS for dormant BWP)

**Question 17: Which option is preferred regarding implicit configuration of BFD-RS for dormant BWP:**

**a) Do not support the implicit configuration of BFD-RS for an SCell in dormancy.**

**b-1) the *PDCCH-config* IE can be configured for the dormant BWP in order to support the implicit BFD-RS configuration for dormant BWP. Only *tci-StatesPDCCH-ToAddList* is applied for the dormant BWP and other configurations in *PDCCH-config* are ignored (not applied).**

**b-2) the *PDCCH-config* IE can be configured for the dormant BWP, in this case it only includes controlResourceSetToAddMod/ReleaseList and as already specified, the UE performs BFD using the RS in tci-StatesPDCCH-ToAddList in each of the configured ControlResourceSet**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option (a, b-1, b-2)** | **Comments** |
| Huawei, HiSilicon | b | In b-1, we don't understand what is the use of adding a UE requirement to ignore something that the network could simply not configure (since it is optional).  We think option b as we describe does not even require any specification update (or as mentioned by Samsung).  Beside, is it correct understanding that c) is supported anyway as it has no specification impact? |
| Qualcomm | We still prefer b-2) | Option a) is not acceptable to us. Explicit BFD-RS configuration bad one big issue (especially in FR2):  In NR Rel-15, it was first agreed that up to 8 RS (in FR2) can be explictly configured for UE to perform BFD. However, up to 64 SSB (in FR2) can be configured, which is illurtrated below.   |  |  |  |  | | --- | --- | --- | --- | |  | f <3GHz | 3GH< f <6GHz | f>6GHz | | Max RS number explicitly configured for BFD | 2 | 4 | 8 | | Max number of SSB | 4 | 8 | 64 |   Thus, in each frequency range (i.e. sub3, sub3-sub6 and FR2), there is always a gap between maximum RS number explcitly configued for BFD and maximum number of SSB, and this gap is up to 56 SSB in FR2.  This big gap caused one issue (especially in FR2): when the UE is moving, NW has to frequently reconfigure BFR-RS via RRC to avoid unnecessary BFR trigger caused by beam mismatch of the spatial BFD-RS even if UE is still in cell coverage. It may bring significant RRC signaling overhead and unnecessary BFR triggered if NW has no timely feedback from UE. To resolve the issue of explicit BFD-RS, implicit BFD-RS was introduced: UE can perform BFD based on the activated TCI-State for PDCCH, which can be changed via L2 signalling (i.e. CORESET TCI MAC-CE). We think it is important to still support implicit BFD-RS in dormant BWP.  And in phase 1 discussion, we think:   * Samsung also prefer b-2), and Huawei showed supports in phase 2 * b-2) is acceptable to Nokia, NEC and vivo   Thus, we think b-2) should not be precluded for now.  With regarding to b-1) and b-2), we still prefer b-2):   * b-1):   + It will introduce a new UE requirement as mentioned by Huawei.   + It is not clear whether other TCI related IE needs to be ignored by the UE (e.g. *tci-PresentInDCI*). Note that these new MIMO related IEs are always coming in almost each release according to LTE specification experience. * b-2):   + It will bring much less spec impact in RRC: we only need to clarify that *searchSpacesToAddModList* is absent or NW only indicates *controlResourceSetToAddMod/ReleaseList* in dormant BWP. For example, the below change is enough:  |  | | --- | | ***searchSpacesToAddModList***  List of UE specifically configured Search Spaces. The network configures at most 10 Search Spaces per BWP per cell (including UE-specific and common Search Spaces). This field is absent in dormant BWP (or The NW doesn’t configure it in dormant BWP). |  * + NW can still configure TCI related (existing and future) IEs in its CORESET, which is forward combability. |

## Issue DCCA\_11 (PSCell’s *reconfigurationWithSync* in the UE context)

During RAN2-109e, it was agreed to have the *reconfigurationWithSync* for the PSCell will be included in the resume message, even if the intention was just to restore the stored SCG. However, there were sub-agreements that were not captured as they were supposed to be the same as legacy handling. Specifically, whether any of the parameters of the *reconfigurationWithSync* for the PSCell should be part of the UE Inactive AS context.

During the final round of discussions in RAN2-109e before the CRs were endorsed, this was brought up, and there was a proposal to have update in the Release procedure:

3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, and all other parameters configured except for the ones within *ReconfigurationWithSync* of MCG and *servingCellConfigCommonSIB*;

where the assumption was that the *rach-ConfigDedicated,* being “OPTIONAL need N” is a one-shot parameter that is not stored, so no need to indicate that in the procedure. Also, T304 and PSCell C-RNTI can also be stored by the UE, and the SN can always provide a new value if it wants to update them. This was not captured as there was not sufficient time to discuss it.

In the review of the updated CR during phase 1, there was a comment from ZTE addressing the same aspect, and it was proposed to capture the required changes in the following way:

3> store in the UE Inactive AS Context the current KgNB and KRRCint keys, the ROHC state, the stored QoS flow to DRB mapping rules, the C-RNTI used in the source PCell, the *cellIdentity* and the physical cell identity of the source PCell, the *servingCellConfigCommon* within *ReconfigurationWithSync* of the source PSCell, and all other parameters configured except for the ones within *ReconfigurationWithSync* of the source PCell and *servingCellComfigCommonSIB;*

It is not clear why the *servingCellConfigCommon* of the PSCell is stored as part of the UE context, but not the T304 and C-RNTI of the PSCell. Doing so will avoid the need to include the *reconfigurationWithSync* for the SCG, unless the network wants to change one of the stored parameters (i.e. T304, PSCell C-RNTI, *servingCellConfigCommon*) or it wants to apply CFRA by including the *rach-ConfigDedicated.*

The rapporteur proposes to clarify these aspects as part of the phase 2 discussion.

**Question 18: Which parameters of the *reconfigurationWithSync* of the PSCell are stored as part of the UE context during the transition to INACTIVE state in LTE/NR and IDLE with suspended in LTE:**

**a) None (i.e. the resume message shall include *reconfigurationWithSync* for the PScell, with T304, PSCell C-RNTI, *servingCellCommonConfig,* and optionally, if CFRA is desired, the *rach*-*ConfigDedicated*)**

**b) *spCellCommonConfig* (i.e. the resume message shall include *reconfigurationWithSync* for the PScell, with T304, PSCell C-RNTI, and optionally the *sPCellCommonConfig,* if SIB update is required, and optionally the *rach*-ConfigDedicated, if CFRA is desired)**

**c) all except *rach-ConfigDedicated* (i.e. the resume message may include the *reconfigurationWithSync* for the PScell, if an update of any of the following is required:T304, PSCell C-RNTI, *spCellCommonConfig*, *rach-ConfigDedicated* if CFRA is desired)**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred option (a, b, c)** | **Comments** |
| Huawei, HiSilicon | b | Only Need M fields should be stored (the only need M field in ReconfigurationWithSync is spCellConfigCo |
| Qualcomm | b | We think this clarification for UE behaviour is needed, and the key points are:   * ***rach-ConfigDedicated*** is not required to be stored * ***SMTC*** is not required to be stored   Thus, we prefer b |

## Other open issues

**Question 19: Any other open issues related to the DCCA RRC CRs that companies would like to raise in phase 2?**

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| --- | --- |
| **Company** | **Comments** |
|  | [Rapporteur]  We have lines above that already clarifying that  4> if the *reportQuantities* is set to *rsrq*:  5> consider RSRQ as the sorting quantity;  4> else:  5> consider RSRP as the sorting quantity;  ……  5> consider the serving cell and up to *maxCellMeasIdle* strongest identified cells, according to the sorting quantity, to be applicable for idle/inactive measurement reporting; |
|  | [Rapporteur]  As mentioned in the updated CR for 38.331, splitting part of the procedure in field descriptions is confusing (unless it is something simple like “if this is absent, use value x instead”). |
| Huawei, HiSilicon | In 36.331 section 5.3.10.0 should be modified so that 5.3.10.7 is invoked if rlf-TimersAndConstantsMCG-Failure is received.  [Rapporteur] This comment is not clear, please clarify |
| Huawei, HiSilicon | In 36.331 section 5.3.10.7, the actions "consider fast MCG link recovery is (not) available" should be replaced by stop and release of t316, and configuration of t316.  [Rapporteur]  Already updated (based on similar comments received for 38.331) |
| Huawei, HiSilicon | In 36.331 section 5.6.20.2, for beam results, shouldn't reportQuantityRS-IndexNR be used instead of reportQuantity?  [Rapporteur] For the beam results, that is indeed what is used:  5> if *beamMeasConfigIdle* is included in the associated entry in *measIdleCarrierListNR*, for each cell in the measurement results:  6> derive beam measurements based on SS/PBCH block for each measurement quantity indicated in *reportQuantityRS-IndexesNR*, as described in TS 38.215[89].  6> if the *reportQuantityRS*-*IndexNR* is set to *rsrq*:  7> consider RSRQ as the sorting quantity;  6> else:  7> consider RSRP as the sorting quantity;  6> set *resultRS-IndexList* to include up to *maxReportRS-Index* SS/PBCH block indexes in order of decreasing sorting quantity as follows:  7> include the index associated to the best beam for the sorting quantity and if *threshRS-Index* is included, the remaining beams whose sorting quantity is above *threshRS-Index*;  7> if the *reportRS-IndexResultsNR* is set to *true*:  8> include the beam measurement results as indicated by *reportQuantityRS*-*IndexNR*;  The *reportQuantities* is used for the cell quality derivation |
| Huawei, HiSilicon | In 36.331 section 6.3.5 for MeasIdleConfig, there are many fields without description.  [Rapporteur] as I mentioned in the mail I sent out on Monday April 6th, there are also several field descriptions missing for 38 as well. We can keep this open, I will try to fix most in the mean time. |

# Summary

Based on the inputs received from companies regards the open issues regarding the DCCA RRC CRs, it has been agreed (in phase 1):

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:
2. 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*)
3. The *idleModeMeasurements* in SIB (SIB2 in LTE, SIB1 in NR) indicates what measurements the network wants to be reported
4. Two IEs: *idleModeMeasurementsNR* and *idleModeMeasurementsEUTRA* to be used in NR SIB1 to indicate whether the UE performs EUTRA and NR early measurements.
5. 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*.
6. A maximum of 8 cells per carrier can be reported for early measurements in LTE/NR rel-16.
7. 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*.
8. The need codes for the following IEs inside *ssb-MeasConfig* of *MeasIdleCarrierListNR* to be discussed in NR RRC ASN.1 review: *nrofSS-BlocksToAverage, absThreshSS-BlocksConsolidation, smtc,* and *ssb-ToMeasure.*
9. Confirm that the early measurement configuration procedure will be captured in a subclause different from the early measurement performance procedure, in both LTE and NR. The section number for the LTE measurement configuration to be renamed to 1a.
10. To agree in principle to the beam results and cell quality derivation handling in the latest CRs. Updates to be made during phase 2 to clarify the procedures further.
11. To use a new rel-16 IE (in 36.331) to enable the reporting of up to 8 EUTRA carriers in early measurement results. Procedural impacts, if any, to be clarified during phase 2.
12. To use a new rel-16 IE *SCellToAddModList* IE (in 36.331) to be included in RRCConnectionResume. The details of the IE to be clarified during phase 2.
13. To discuss in phase 2, which option is preferred regarding implicit configuration of BFD-RS for dormant BWP:

*Option a)* Do not support the implicit configuration of BFD-RS for an SCell in dormancy.

*Option b1)* PDCCH-config IE can be configured for the dormant BWP in order to support the implicit BFD-RS configuration for dormant BWP, and only tci-StatesPDCCH-ToAddList is applied for the dormant BWP and other configurations in PDCCH-config are ignored (not applied).

# References

1. R2-2002392, CR for 38.331 for CA\_DC\_enhancements, Ericsson (Rapporteur), RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
2. R2-2002391, CR for 36.331 for CA\_DC\_enhancements, Ericsson (Rapporteur), RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
3. R2-2001252**,** Report on Email Discussion [108#54][DCCA] Early measurements Ericsson, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
4. R2-2002131, Report on offline discussion [AT109e][045][DCCA] Early measurement reporting – Phase 1, Ericsson, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
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6. R2-2001251, Granular reporting of early measurement results, Ericsson, MediaTek Inc., ZTE Corporation, LG Electronics Inc., RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
7. R2-2000298,Granularity of early measurement and reporting, vivo, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
8. R2-2001124, Early measurement indication in NR SIB1, ZTE Corporation, Sanechips, Ericsson, MediaTek Inc, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
9. R2-2000252, Remaining issues for SSB measurement configuration, CATT, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020
10. R2-2002224, Email discussion [AT109e#46][DCCA] Scell Dormancy Open Issues, OPPO, RAN2#109-e, Electronic Meeting, Feb 24th – March 6th 2020