3GPP TSG-RAN WG2 #113-e draft R2-2101968

Electronic Meeting, 25th Jan – 5th Feb 2021

Agenda Item: 6.8.2

Source: ZTE Corporation

Title: [AT113-e][222][DCCA] Serving cell measurement and EMR requirements (ZTE)

Document for: Discussion, Decision

# Introduction

This document is to kick off the following email discussion:

* **[AT113-e][222][DCCA] Serving cell measurements and EMR requirements (ZTE)**

Scope:

* + - Discuss corrections under 6.8.x marked for this discussion to see which CRs could be agreeable
    - Some (or even all) CRs may be merged together if seen needed

Intended outcome:

* + - Discussion summary in [R2-2101968](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101968.zip) (by email rapporteur).
    - Agreeable CRs (if any)

Deadline for providing comments, for rapporteur inputs, conclusions and CR finalization:

* + - Initial deadline (for companies' feedback): 1st week Thu, UTC 0900
    - Initial deadline (for rapporteur's summary): 1st week Fri, UTC 0900
    - Deadline for CR finalization: 2nd week Thu, UTC 1000

where following documents are to be treated:

**Email [222] (4+1)**

*RAN4 agreements in EMR requirements (RAN4):*

[R2-2100563](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100563.zip) Discussion on early measurement requirements ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100566](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100566.zip) Reply LS on MR-DC Idle mode CA measurements ZTE Corporation, Sanechips LS out Rel-16 LTE\_NR\_DC\_CA\_enh-Core To:RAN4

[R2-2101074](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101074.zip) CR on T331 value range Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.3.1 2383 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2100564](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100564.zip) CR to introduce new T331 timer value ZTE Corporation, Sanechips CR Rel-16 38.331 16.3.1 2338 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2100565](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100565.zip) CR to introduce new capability for T331 timer value ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0493 - F LTE\_NR\_DC\_CA\_enh-Core

**By Email [222] (5)**

*Serving cell reporting for EMR (postponed in RAN2#112e):*

[R2-2101090](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101090.zip) Serving cell reporting in early measurements Ericsson discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100567](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100567.zip) Discussion on serving cell reporting for early measurement ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2101073](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101073.zip) CR on serving cell reporting Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.3.1 2382 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2101693](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101693.zip) Clarification on deriving and reporting cell level and beam level serving cell results Huawei, HiSilicon discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2101692](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101692.zip) Clarification on beam measurement and reporting based on broadcasted EMR configuration Huawei, HiSilicon discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100127](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100127.zip) Discussion on serving cell early measurement reporting Qualcomm Incorporated discussion Rel-16 FS\_NR\_SL\_relay

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# Discussion

Companies are requested to add their comments for each of the treated CRs of this email discussion in the boxes below.

## About RAN4 EMR requirements

### About new T331 timer value

[R2-2100563](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100563.zip) Discussion on early measurement requirements ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2101074](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101074.zip) CR on T331 value range Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.3.1 2383 - F LTE\_NR\_DC\_CA\_enh-Core

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[R2-2100565](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100565.zip) CR to introduce new capability for T331 timer value ZTE Corporation, Sanechips CR Rel-16 38.306 16.3.0 0493 - F LTE\_NR\_DC\_CA\_enh-Core

The discussion is based on following information provided in RAN4’s LS (R2-2100059/R4-2017390):

|  |
| --- |
| During the discussions, RAN4 made following observations based on the above requirements and UE capability.   * UE may not be able to complete the idle mode CA measurements on all configured carriers while timer T331 is running in some configuration scenarios, from RAN4 minimum requirement point of view. For example, when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, (no matter if higher priority carrier(s) are configured), the time duration for UE to measure 7 inter-frequency carriers (UE capability, including both carriers configured for idle mode CA measurements and mobility carriers) can be up to 7\*60=420s. * If a UE supporting beam level reporting and beam level measurement is configured, the UE is allowed additional time duration for to perform the idle mode CA measurements according to the RAN4 minimum requirements. RAN4 is still working on the UE requirements for beam level measurement.   It is up to RAN2 whether and how to extend the maximum configurable value for T331. |

As indicated in the first bullet, when Srxlev > SnonintraSearchP and Squal > SnonintraSearchQ, the duration for UE to measure 7 frequencies can be up to 7\*60 = 420s (haven’t taken into account the delay of beam level reporting). So currently, the maximum value of T331 (i.e. 300s) is not enough for UE to complete the measurements on all frequencies. So proponents suggest to extend the T331 timer length.

This has been briefly discussed during Monday’s online session, based on companies’ comments, opponent mainly argued that this is a corner case, and network can reduce the number of configured EMR frequencies to avoid problems.

Regarding the comments, rapporteur (as proponent) thinks it is not a corner case, because:

1. Typically, IDLE and INACTIVE UEs will not stay at cell edge for long periods of time. So most of time, the condition “Srxlev > SnonintraSearchP and Squal > SnonintraSearchQ” will be satisfied.
2. Based on RAN4 requirement, UE can measure up to 7 inter-frequency carriers, this does not only include EMR frequencies, but also other frequencies that configured for cell reselection. Considering in NR, EMR can be configured for both DC and CA setup, so the number of potential DCCA frequencies will be more than LTE euCA case. Asking network to reduce the number of EMR frequencies is an unreasonable request.

In addition, some company also questioned why RAN4 defined EMR requirements associated with SnonintraSearchP and SnonintraSearchQ thresholds. Regarding the necessity of extending T331 timer length, companies are welcome to show your views.

**Q1.1: Do companies agree with the necessity of extending T331 value range?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Yes | The thresholds mentioned here are “SnonintraSearchP and SnonintraSearchQ”. Not “SintraSearchP and SintraSearchQ”. In real deployment, network usually configures quite low thresholds for SnonintraSearchP and SnonintraSearchQ.  So in most cases, the condition “Srxlev > SnonintraSearchP and Squal > SnonintraSearchQ” will be fulfilled, and EMR measurement will be performed as one frequency every 60s.  Since current SPEC allows network to configure up to 7 EMR frequencies, and RAN2/4 SPEC support UE to monitor up to 7 carriers for EMR (and high priority cell reselection), we should ensure such configuration could work in real deployment. Otherwise, such configuration is meaningless. |
| Qualcomm | No | We think it is not necessary to extend T331 at late stage of Rel-16 because the case mentioned by RAN4 LS (configured 7 EMR frequency and Srxlev > SnonintraSearchP and Squal > SnonintraSearchQ) is not a typical case. And it can be left to UE/gNB implementation:   1. Because UE measured S-values are not available to NW, we have concern that UE may be unnecessarily forced to perform EMR too long all the time assuming UE’s idle mode measurement interval is relaxed. As example, the UE may stay at cell edge during whole IDLE/INACTIVE duration and forced to perform useless EMR for a long time. 2. Spec doesn’t say UE shall not perform idle mode cell measurement for EMR purpose after T331 expiry. It’s up to UE implementation whether to continue it. In the example of the LS, UE is in cell center, hence, UE is allowed to relax measurement interval. But measurement relaxation doesn’t necessary mean UE shall not measure more frequently than the relaxed min requirement. Based on all configured parameters such as #layers, T331 length, S-threshold, etc and the measured S-value, UE can do something more if needed depending on its own criteria, e.g. power saving vs. benefits of fast SCell configuration. 3. It is late stage of Rel-16, extension of T331 will cause ASN1. Change and new capability. As we mentioned, we don’t think it is a typical case of EMR, and it is not worth spec change. |
| Ericsson | It depends | Before discussing extension of T331 we should discuss the relation between *SnonIntraSearchP*/*SnonIntraSearchQ* and early measurements that RAN4 have introduced. This relation, where early measurements would be performed more seldom if the serving cell is good enough, does not make sense. The thresholds *SnonIntraSearchP* and *SnonIntraSearchQ* are defined for cell reselection measurements, which then can be performed less often if the UE is e.g. located in the cell center. However, for early measurements there is no such relation since the measurement results then are to be used for setup of SCG and/or Scells (with the serving cell as PCell). This has also already been specified in 38.331 (in 5.7.8.2a), which is based on a corresponding note in LTE Rel-15 euCA:  NOTE 1: The fields *s-NonIntraSearchP* and *s-NonIntraSearchQ* in *SIB2* do not affect the idle/inactive UE measurement procedures. How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 38.133 [14] are met for measurement reporting.  The RAN4 requirements thus contradict the RAN2 specification and we should rather respond the LS to highlight this contradiction and question why this relaxation has been added?  We should also not forget that timer T331 is stopped at the first RRC setup/resume, when the early measurement results are reported. It can thus not be assumed that the early measurements will be performed for a longer time just because the T331 is set to an extended value. Extending the T331 value will therefore not necessarily mean that the reported measurement results will be improved. Instead the early measurements should be performed without any additional relaxations as long as T331 is running, as already specified in 38.331/36.331.  If the relaxation in early measurement requirements as indicated in the RAN4 LS remain, then an extension of the T331 timer may be required. |
| Apple | No | As stated online, our view is that the UE might not be able to measure all the frequencies if a lot of them are configured as part f EMR. EMR is useful under the premise that the need to get back to connected mode is greatest right after UE goes to IDLE/INACTIVE. If longer time passes, then the chances of needing to go to CONNECTED mode diminish.  Increasing the timer has two big issues:  - High power consumption at the UE when the chances of going to CONNECTED mode are lower, thereby wasting power.  -The measurement could be stale (as also pointed out by ZTE)  The EMR concept is best effort and the UE reports what it can measure, and it’s upto UE implementation on what to measure. So we can leave the T331 and leave the EMR activity to the UE after T331 expires.  We do not see the benefit of extending the timer more. |
| Nokia | Depends | We agree with Ericsson statement on early measurement being dependant on serving cell quality does not make sense. We should inform this to RAN4.  We are fine also not to increase timer value but if increased it should be infinite as we do not know performance requirements yet completely. |
| LG | Yes | For EMR-configured UE, we think enough time to measure all the EMR frequencies should be provided. If only part of EMR frequencies are measured and reported by the UE, the network does not know whether the not-reported frequencies were really not detectable.  Regarding the out-of-date results, RAN2 has discussed for a long time how to treat this, but it was concluded that it is up to network implementation how to treat the reported results. |
| Huawei | No | Increasing T331 just means that the UE will have measurement results obtained more than 300s ago, but they may not represent the curent quality, so there is no gain (and this a affect power consumption a lot if the UE is not at the cell centre)  RAN4 decision is to keep the power consumption benefit of SnonIntraSearch at the expense of less frequent measurements. We should not ask RAN4 to reconsider their decision at this late stage. |
| MediaTek | No | First the UE could still continue to perform EMR after T331 timeout, we see no problem in current specification. Secondary, RRM relaxation is not allowed while T331 is running, so longer T331 effectively make no power saving gain, which is not preferred. |
| Samsung | No | As others mentioned, UE is not required to stop EMR upon the expiry of T331. It can be up to UE implementation.  Just for clarification, it seems that RAN4 agreement is not consistent with NOTE in RAN2 specification:  NOTE 1:     The fields *s-NonIntraSearchP* and *s-NonIntraSearchQ* in *SIB2* do not affect the idle/inactive UE measurement procedures. How the UE performs idle/inactive measurements is up to UE implementation as long as the requirements in TS 38.133 [14] are met for measurement reporting. |
| vivo | No | To extend the T331, new capability needs to be introduced now. However, its benefit is not clear enough. First, EMR performed within 300s maybe enough for the UE to fast setup DC/CA. Second, the accuracy of results is doubtful if UE performs EMR with long T331 value, but the UE power consumption indeed will increase. Finally, without extension of T331, the mechanism of EMR anyway can work. For dedicated EMR configuration will be deleted after T331 expires, the NW can avoid such useless configuration, i.e., configure fewer carriers to the UE in EMR configuration. For the UE, after T331 expires, UE can decide whether to continue perform EMR according to the SIB. |

If answers “Yes” to Q1.1, the next question is how large the T331 timer can be extended. Based on contributions, there are two options:

* **Option 1: 480ms (8min).** Take into account the additional delay caused by beam level measurement;
* **Option 2: Infinity.** RAN4 indicated they have not defined exact time needed for measurements it is best to allow infinite reporting to handle whatever scenario.

**Q1.2: Which option do companies prefer about the new value added to the T331?**

|  |  |  |
| --- | --- | --- |
| Company | Option 1 or Option 2 or other value? | Comments |
| ZTE | Option 1 | We assume the beam level measurements may not be quite time consuming(less than 60s), so 480ms could be sufficient. But we are ok to Option 2 if most companies like it. |
| Ericsson | Option 1 | We prefer a definite value. Infinity may lead to other issues like too much power consumption for the UE. Can discuss what the actual value should be. (Note that there is a typo in the question, it should be 480s, not ms). |
| Nokia | Option 2 if any | Like described above we have no definite performance requirements yet and we can consider that it might not be wise to configure many frequencies to early measurements. Anyway performance with many frequencies would be pretty mediocre. But if we want to support all signaling options then we see no other way than just put timer value infinite. |
| LG | Option 2 | As UE anyway stops T331 upon connecting to the network, infinity value seems adequate. |
| MediaTek | Option 1 | Infinity means there will be no RRM relaxation at all, this would not be acceptable to us. |
| Samsung | Option 1 | Infinity value can be considered as UE implementation since stopping EMR is not mandatory in the specification. |

### Concern on out-of-date EMR results

[R2-2100563](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100563.zip) Discussion on early measurement requirements ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100566](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100566.zip) Reply LS on MR-DC Idle mode CA measurements ZTE Corporation, Sanechips LS out Rel-16 LTE\_NR\_DC\_CA\_enh-Core To:RAN4

In R2-2100563, another issue is raised about the reporting of EMR results. Based on RAN4 defined requirements, when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE will measure EMR carrier every 60s, the measurement behaviour is illustrated in below figure.



For EMR, UE will store the measurement results and deliver the results when entering RRC\_Connected mode. So with such large measurement interval, it is unclear whether the UE will send out-of-date measurement results in EMR report, and whether the UE will send measurement results of only one frequency (e.g. the latest one) to network. So it is proposed to send LS to RAN4 for further clarification:

**Proposal 2: Send LS to RAN4, asks RAN4 to confirm even in case of “Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ”, the defined idle/inactive measurement requirements can ensure the UE won’t deliver out-of-date measurement results in EMR report, and the UE can report EMR results of multiple frequencies (not only one);**

**Q2.1: Do companies agree with the intention of Proposal 2? And to send LS to RAN4 for clarification?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Yes | Proponent.  At least based on current RAN2/4 SPECs, it is unclear how UE can ensure it can send not out-of-date measurement results of multiple EMR frequencies in EMR report. And we think “up to UE implementation” is not a reasonable explanation here. So we suggest to confirm with RAN4. |
| Qualcomm | No | According to our RAN4 colleague, this issue has been discussed in RAN4. Actually, this proposal is RAN4 business, which doesn’t need RAN2 guide. So, we can leave it to RAN4 discussion. |
| Ericsson | Yes | There were earlier discussions in RAN2 to prevent out-of-date measurement results. It was then commented that RAN4 requirements should prevent this and it was therefore not pursued in RAN2. We therefore think it would be good to have such clarification.  As commented for Q1.1, it should however not be related to that early measurements are performed with limitations while T331 is running. |
| Apple | No | Similar views as Qualcomm. This was discussed in RAN4 and they are aware of the consequences of their agreements, we do not need to ask them or point this out again. |
| Nokia | No | Similar view with Qualcomm. |
| LG | No | Similar view with Qualcomm. Measurement accuracy does not need to be informed to RAN4 from RAN2. |
| Huawei | No | We understand that this was discussed in RAN4 and they are aware of the consequences of their agreements, which are that in this case the results might be outdated. It is unfortunate but it is too late to reopen this. |
| MediaTek | No | Similar view as Qualcomm. If company has concern on the EMR requirement, they should raise this in RAN4.  Please also note that 60s requirement does not mean UE only do one shot measurement within 60s. It implies that UE has to report the measurement correctly within 60s. The UE may have to do multiple SSB measurement during 60s period. So the picture is misleading, we don’t think there is really serious out of date report here. (And this paragraph is actually should be discussed in RAN4). |
| Samsung | No | It’s RAN4 business. |
| vivo | Yes | Agree with ZTE and Ericsson. |

The content of draft LS is shown below:

[R2-2100566](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100566.zip) Reply LS on MR-DC Idle mode CA measurements ZTE Corporation, Sanechips LS out Rel-16 LTE\_NR\_DC\_CA\_enh-Core To:RAN4

|  |
| --- |
| **1. Overall Description:**  RAN2 thanks RAN4 for the LS on MR-DC Idle mode CA measurements.  Regarding the issues observed by RAN4, RAN2 discussed and agreed to introduce 480s timer value for T331.  In addition, RAN2 discussed the measurement requirements defined for the case when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ. Based on RAN2 spec, the UE stores the measurement results when since the UE will perform idle mode CA measurements with quite large period, i.e. (60 \* Nlayers) seconds. RAN2 would like to clarify whether the requirements can ensure the measurement results delivered to network are not out-of-date, and measurement results of multiple frequencies can be reported to network.  **2. Actions:**  **To RAN3**  **ACTION:**  RAN2 respectfully asks RAN4 to clarify whether the measurement requirements defined for the case “when Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ”, can ensure the measurement results delivered to network are not out-of-date, and measurement results of multiple frequencies can be reported. |

**Q2.2: If answers “Yes” to Q2.1, do you agree with the content of draft LS, any comments?**

(Please ignore the yellow part for now, it will be updated based on the outcome of Q1.1 & Q1.2)

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Yes | Proponent. |
| Ericsson |  | As commented above, the question is relevant even without limitations due to serving cell quality. |
| vivo | Yes |  |
|  |  |  |

## Serving cell reporting for EMR

There are several papers discussing the remaining issue of serving cell reporting for EMR.

[R2-2101090](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101090.zip) Serving cell reporting in early measurements Ericsson discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100567](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100567.zip) Discussion on serving cell reporting for early measurement ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2101073](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101073.zip) CR on serving cell reporting Nokia, Nokia Shanghai Bell CR Rel-16 38.331 16.3.1 2382 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2101693](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101693.zip) Clarification on deriving and reporting cell level and beam level serving cell results Huawei, HiSilicon discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2100127](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2100127.zip) Discussion on serving cell early measurement reporting Qualcomm Incorporated discussion Rel-16 FS\_NR\_SL\_relay

For better discussion, rapporteur has categorized the proposals into several aspects, so in this section, we will discuss them one by one.

* **Issue 1: Whether UE can report serving cell results even if serving frequency is not configured as part of EMR configuration?**

Based on the contributions, the corresponding proposals are given in below table.

|  |  |
| --- | --- |
| Contribution | Corresponding Proposals |
| Ericsson(2101090) | Proposal 3 The procedure in 36.331, 5.6.20.2 should be corrected so that serving cell measurements are derived and stored (and thus later reported) even if the early measurement report only includes NR neighbouring measurements for (NG)EN-DC configuration.  Proposal 4 The procedure in 38.331, 5.7.8.2a should be corrected so that serving cell measurements are derived and stored (and thus later reported) even if the early measurement report only includes E-UTRA neighbouring measurements for NE-DC configuration. |
| Nokia(2101073) | The corrections in the CR show that UE will derive and store serving cell RSRP/RSRQ irrespective of the EMR configuration. |
| ZTE (2100567) | Proposal 1: To allow the configuration that serving frequency is not part of EMR configuration (e.g. *measIdleCarrierListNR*), and this does not impact UE’s idle/inactive measurements on other inter-frequency, inter-RAT frequencies.  Proposal 4: Confirm UE will report serving cell results even if only E-UTRA frequencies are configured for EMR. |
| QC(2100127) | Proposal 2: If serving frequency is NOT included in frequency list for LTE/NR EMR:  …… |

In general, all companies agree that network is allowed to not include serving frequency in EMR configuration, and in this case, UE can report serving cell results even if only NR neighbour frequencies or E-UTRAN frequencies are configured for EMR. So rapporteur summarized the proposal as below:

**Rapp’s Proposal 1: UE can report serving cell results in EMR report, even if only NR inter frequencies or E-UTRAN frequencies are configured for EMR.**

**Q3.1: Do companies agree with above Rapp’s proposal 1?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Ericsson | Agree |  |
| Apple | Ok for serving cell measurments, but not beam specific. |  |
| Nokia | Agree | at least for other than beam measurements |
| LG | Agree |  |
| Huawei | Agree |  |
| MediaTek | Agree |  |
| Samsung | Agree |  |
| vivo | Agree |  |

* **Issue 2: Which configuration is used for reporting serving cell measurement results?**

Based on the contributions, the corresponding proposals are given in below table.

|  |  |
| --- | --- |
| Contribution | Corresponding Proposals |
| Ericsson(2101090) | Proposal 2 The NR early measurement report should include both RSRP and RSRQ measurements for the serving cell. |
| ZTE (2100567) | Proposal 2: For serving cell, UE always report cell level RSRP and RSRQ results in EMR report; |
| Nokia(2101073) | The corrections in the CR show that UE will derive and store serving cell RSRP/RSRQ irrespective of the EMR configuration. |
| HW(2101693) | Proposal 2: For serving cell, the UE reports beam results whose quality is above the *absThreshSS-BlocksConsolidation* in SIB2 instead of the *absThreshSS-BlocksConsolidation* in early measurement configuration. |
| QC(2100127) | Proposal 1: If serving frequency is included in frequency list for LTE/NR EMR:   * *reportQuanties* configured in serving frequency is used for serving cell measurement derivation and sorting;   Proposal 2: If serving frequency is NOT included in frequency list for LTE/NR EMR:   * Cell level measurement of serving cell is performed with the configuration on cell (re)selection in SIB * *reportQuanties* configured in the last measured EMR frequency of same RAT is used for serving cell measurement derivation and sorting; |
|  |  |

In summary, there are 3 different views:

* View 1(Ericsson/ZTE/Nokia): UE always report RSRP and RSRQ of serving cell;
* View 2(HW): UE derives cell level serving cell measurement results based on the configuration in SIB2 (follows same behaviour as cell (re)selection).
* View 3(QC): Follow different behaviour when serving frequency is Or is not included in EMR frequency list.

Based on RAN4 spec, irrespective of EMR configuration, IDLE/INACTIVE UEs are mandate to perform serving cell RSRP and RSRQ measurements. Per rapporteur’s understanding, for EMR, it seems not necessary and complex to define a different rule for cell level serving cell measurement derivation.

Regarding the specification, rapporteur thinks there is no need to capture how UE derives the cell level measurement results for serving cell for EMR case. If UE has available serving cell RSRP/RSRQ results (obtained for idle mobility purpose), they can be included in EMR report as well. So rapporteur would propose:

**Rapp’s Proposal 2: Irrespective of *reportQuantities* configuration, UE reports both RSRP and RSRQ results of serving cell in EMR.**

**Rapp’s Proposal 3: No need to capture in SPEC how UE performs cell level serving cell measurement derivation for EMR case.**

**Q3.2: Do companies agree with above Rapp’s proposal 2 and proposal 3?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Agree |  |
| Qualcomm | Agree P3,  Disagree P2 | For the RAN4 spec requirement mentioned by Rapporteur, please note that only specified is what quantities to be **measured for serving cell**, but not specified what quantities to be **reported for serving cell.**  **===========TS 38.133=============** 4.2.2.2 Measurement and evaluation of serving cell The UE shall measure the SS-RSRP and SS-RSRQ level of the serving cell and evaluate the cell selection criterion S defined in [1] for the serving cell at least every DRX cycle.  **====================================**  Although we agree that it doesn’t have much extra UE efforts if the measurements are available, we have concern that P2 will cause misaligned behaviors between NR EMR (specified in 38.331) and LTE EMR (specified in 36.331). And because LTE EMR is specified in Rel-15, it will be NBC change for the UE (if agree CR from R2-2101090).  We believe serving frequency is most likely configured in EMR frequency list if the Network supports the feature. Meanwhile, the current spec can work (although it may not be efficient). Thus, because of above NBC concern, we prefer to keep the current spec unchanged. |
| Ericsson | Agree | Regarding Qualcomm’s comment on LTE EMR, in LTE (Rel-15 and Rel-16) the UE will always report both RSRP and RSRQ. This is since both are mandatory in *MeasResultIdle-r15*. The following was therefore included in the corresponding field description for *reportQuantities* in the idle measurement configuration „In this version of the specification, E-UTRAN always configures the value '*both*'“. To always report both RSRP and RSRQ (as the UE is anyway required to measure according to RAN4 requirements) therefore makes the behavior in NR aligned with the one in LTE. |
| Apple | P3 ok, P2 not ok | Same view as Qualcomm |
| Nokia | Agree |  |
| LG | Agree | We prefer to set default value for the serving cell. |
| Huawei | Agree P2 Confused about P3 | For inter-frequency measurement, the specification indicates that for frequencies in SIB2, the cell level measurements are derived according to SIB2, why isn't it the same for the serving cell?  Morever, this is what will allow the network to know that the reported measurements for other frequencies are possibly outdated, so it seems better that it is specified.  If it is not needed to specify this for the serving cell, why is it needed to specify it for the interfrequency neighbour cell? |
| MediaTek | Agree P2, to clarify P3 | Use simple rule for serving cell reporting (always RSRP and RSRQ) is okay.  On cell quality derivation, we assume that the UE only has to derive once for serving cell measurement result and it should be able to use for both cell reselection and EMR reporting purpose. So using the parameter in SIB2 seems more reasonable. |
| Samsung | Agree |  |
| vivo | Agree |  |

* **Issue 3: When to perform and report beam level measurement of serving cell?**

Based on the contributions, the corresponding proposals are given in below table.

|  |  |
| --- | --- |
| Contribution | Corresponding Proposals |
| Ericsson(2101090) | Proposal 5 The UE includes beam level reporting for the serving cell only if there is a configuration for the serving frequency, which includes *beamMeasConfigIdle*, in *measIdleCarrierListNR* in *VarMeasIdleConfig*. In that case the reporting is based on the corresponding configuration in *beamMeasConfigIdle*. |
| ZTE (2100567) | Proposal 3: UE reports beam level results of serving cell only if serving frequency is configured as part of EMR configuration and *beamMeasConfigIdle* is configured for the frequency. |
| HW(2101693) | Proposal 2: For serving cell, the UE reports beam results whose quality is above the *absThreshSS-BlocksConsolidation* in SIB2 instead of the *absThreshSS-BlocksConsolidation* in early measurement configuration. |
| QC(2100127) | Proposal 1: If serving frequency is included in frequency list for LTE/NR EMR:   * Beam level measurement of serving cell is performed if *beamMeasConfigIdle-r16* is configured   Proposal 2: If serving frequency is NOT included in frequency list for LTE/NR EMR:   * Beam level measurement of serving cell is not performed and reported. |

In summary, there are 2 different views:

* View 1(Ericsson/ZTE/QC): The UE includes beam level reporting for the serving cell only if there is a configuration for the serving frequency, which includes *beamMeasConfigIdle*, in *measIdleCarrierListNR* in *VarMeasIdleConfig*. In that case the reporting is based on the corresponding configuration in *beamMeasConfigIdle*;
* View 2(HW): UE reports beam results based on the configuration in SIB2, instead of EMR configuration.

There is slightly majority propose to follow the *beamMeasConfigIdle* configuration of serving frequency. So rapporteur would propose:

**Rapp’s Proposal 4: The UE includes beam level reporting for the serving cell only if there is a configuration for the serving frequency, which includes *beamMeasConfigIdle*, in *measIdleCarrierListNR* in *VarMeasIdleConfig*. In that case the reporting is based on the corresponding configuration in *beamMeasConfigIdle*.**

**Q3.3: Do companies agree with above Rapp’s proposal 4 (i.e. P1 from R2-2101090)?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Ericsson | Agree |  |
| Apple | Agree |  |
| Nokia | Flexible | We would be fine to always report beams for serving cell (if UE supports) without any relation to configuration. |
| LG | Agree |  |
| Huawei | Disagree | We prefer Nokia's suggestion, otherwise this increases the SIB4 size for no valid reason. |
| MediaTek | Both way seems fine | We slightly prefer to follow the *beamMeasConfigIdle-r16* for serving frequency. |
| Samsung | Agree |  |
| vivo | Agree |  |

**Discussion on CR**

Regarding the spec change, currently, 4 companies have provided CR or draft CR:

* CR-1: Annex of R2-2101090, including changes on both TS 36.331 and TS 38.331; (Ericsson)
* CR-2: Annex of R2-2100567; (ZTE)
* CR-3: R2-2101073.(Nokia)
* CR-4: Annex of R2-2101693 (HW)

Basically, the CR-1 is compatible with above Rapp’s proposal 1~4, and it involves the changes to both LTE and NR specs. CR-2 is similar to the NR part of CR-1. CR-3 does not capture Rapp’s proposal 4. While CR-4 is compatible with Rapp’s proposal 1~3, but not P4.

So, rapporteur would suggest to take CR-1 as a baseline for further discussion and modification.

**Q3.4: Do companies have any comments on the draft TS 38.331, TS 36.331 CRs provided in the Annex of R2-2101090?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| ZTE | Agree |  |
| Ericsson | Agree |  |
| Huawei | No | R2-2101090 goes far beyond what is discussed here, it also includes new UE requirements to use parameters in SIB4 in order to select and sort beams for the serving cell.  This is very complicated for no gain. The best it to let the UE report the beams used for cell-level quality derivation and the sorting does not matter. |
| MediaTek | Maybe | Further updated may be needed based on previous discussion. But maybe could anyway find a baseline to start.  In 36.331 CR, we should delete the original text on serving cell result stored if follow the proposals. Note that this would be an NBC change. |

## Clarification on beam measurement and reporting

[R2-2101692](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113-e/Docs/R2-2101692.zip) Clarification on beam measurement and reporting based on broadcasted EMR configuration Huawei, HiSilicon discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

In this document, it is proposed to clarify the UE includes beam level measurement results only when it supports the beam level idle/inactive measurement and reporting capability. And two alternatives are provided:

**Proposal 1: RAN2 to discuss which alternative to be adopted in order to clarify that the UE only includes beam level measurement results when it supports the beam level idle/inactive measurement and reporting capability.**

* **Alternative 1: clarification on UE storing/replacing early measurement configuration from SIB, i.e. only store beam reporting configuration when UE supports beam measurement on the target frequency range in 5.7.8.1a**
* **Alternative 2: clarification on UE performing early measurement, i.e. only store beam measurement results when UE supports beam measurement on the target frequency range in 5.7.8.2a**

Companies are invited to show your views on the necessity of this clarification and preferred solution.

**Q4.1: Do companies agree with the necessity of clarification and which option do you prefer?**

|  |  |  |  |
| --- | --- | --- | --- |
| Company | Agree with the necessity of clarification? | Preferred solution? | Comments |
| ZTE | Not really | Alt 2 | We actually think even without clarification, no one will misinterpret it. Because it is obvious that UE can only do what it supports.  But if most companies are fine with clarification, we slightly prefer alt 2 for simplicity. |
| Qualcomm | Not really | Alt 2 | Same view as ZTE |
| Ericsson | No | Alt 2 | As commented by ZTE there is no need to explicitly say that the UE reports beam level measurements if it supports it. We should avoid to include the UE capabilities in the procedure text unless it is needed. |
| Apple | No | Alt 2 |  |
| Nokia | No | Alt-2 |  |
| LG | No | Alt 2 | We understand the intention of this CR, but it is true that UE can report beam level measurement if the frequency is supported as commented by ZTE. So we do not think explicit change is needed for this. |
| Huawei | Yes | Alt 2 | Normally, the network will not configure the UE to do something that the UE does not support, based on the reported UE capability. This is why we don't mention UE capabiities.  However, if SIB configuration is used, there is no possibility to distinguish what the UE supports.  Effectively, this means that it is not possible to configure eam reporting in SIB4. |
| MediaTek | No strong need, but ok to clarify | Alt 2 |  |
| Samsung | No strong view | Alt2 |  |
| vivo | No | Alt 2 |  |

**Q4.2: Do companies agree with the CR provided in Annex of R2-2101692?**

|  |  |  |
| --- | --- | --- |
| Company | Agree  (Yes or No) | Comments |
| ZTE | Yes |  |
| Qualcomm | Yes |  |
| Ericsson | No | As commented to Q4.1 we do not consider this an essential change. |
| Apple | Yes |  |
| Nokia | No | Similar view with Ericsson. We have lots of capabilities which are not reflected in procedural text. No need to do it for this one as this is pretty self explanatory based on xx.306. |
| LG | No | Same view with Ericsson. |
| Huawei | Yes | We explain above why Nokia's reasoning is correct in general but not here. We think our point was missed. |
| MediaTek | Yes |  |
| vivo | Yes |  |

# Conclusion

TBD

# References

[1]