3GPP TSG-RAN WG2 #113bis-e R2-21xxxxx

Electronic Meeting, 12th – 20th April 2021

Agenda Item: 8.17

Source: ZTE Corporation

Title: Report of [AT113bis-e][025][NR17] R4 related I

Document for: Discussion, Decision

# Introduction

This document is to kick off the following email discussion:

* **[AT113bis-e][025][NR17] R4 related I (ZTE)**

Scope: Treat Handover with PSCell and 35MHz 45MHz Bandwidth R2-2102652, R2-2103032, R2-2103340, R2-2103862, R2-2103863, R2-2104133, R2-2104155, R2-2103033, R2-2103034, R2-2104156, R2-2104249, R2-2104250, R2-2104251

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs, LS out.

Intended outcome: Report and Agreed-in-principle CRs, Approved LS out, if applicable

Deadline: Schedule A

* Phase 1: collect companies’ view, by Wednesday April 14 1000 UTC

# Contact Information

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| --- | --- | --- |
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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.

## Handover with PSCell

*LS from RAN4:*

[R2-2102652](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2102652.zip) LS on handover with PSCell (R4-2103674; contact: Apple) RAN4 LS in Rel-17 NR\_RRM\_enh2-Core To:RAN2 Cc:-

*Discussion papers and LS including company views:*

[R2-2103032](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2103032.zip) Discussion on handover with PSCell ZTE Corporation, Sanechips discussion Rel-17 NR\_RRM\_enh2-Core

[R2-2103340](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2103340.zip) Response LS to RAN4 on HO with PSCell requirements Nokia, Nokia Shanghai Bell LS out Rel-17 NR\_RRM\_enh2-Core To:RAN4

[R2-2103862](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2103862.zip) Clarification on handover with PSCell Apple discussion Rel-17 NR\_RRM\_enh2-Core

[R2-2104133](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2104133.zip) Discussion on RAN4 LS on handover with PSCell Huawei, HiSilicon discussion Rel-17 NR\_RRM\_enh2

[R2-2104155](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2104155.zip) Discussion of LS on Handover with PSCell from RAN4 CATT discussion Rel-17 NR\_RRM\_enh2-Core

### RRC processing delay

RAN4 asks RAN2 about the RRC processing delay for several combined scenarios. In this section, we will discuss them one by one.

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| --- | --- | --- | --- | --- |
| Scenario | Source PCell | Target PCell | Target PSCell | RRC procedure delay for HO with PSCell |
| NR SA to EN-DC | NR (incl. FR1 and FR2) | LTE | NR (incl. FR1 and FR2) | ? |
| EN-DC to EN-DC | LTE | LTE | NR (incl. FR1 and FR2) | ? |
| NE-DC to NE-DC | NR FR1 | NR FR1 | LTE | ? |
| NR-DC to NR-DC | NR FR1 | NR FR1 | NR FR2 | ? |

*Case 1: NR SA to EN-DC*

Company proposals are summarized as below:

* Option 1: 50ms, same as for inter-RAT handover from NR to E-UTRAN. ----ZTE;
* Option 2: 70ms, “NR to LTE HO (50ms)” plus “NR PSCell addition (20ms)”. ---Apple;
* Option 3: 20ms, same as NR SCG establishment/modification/release. ---CATT;
* Option 4: 16ms, no need to differentiate those cases. ---Nokia;
* Option 5: up to RAN4 to decide. ---HW.

Note: RRC segmentation is not considered.

Different values of RRC processing delay are proposed. Based on current RAN4 spec, the RRC processing delay of inter-RAT handover (without adding PSCell) is defined by RAN4, so rapporteur agree this scenario can also be captured in RAN4 spec. However, based on RAN4’s LS, we can see RAN4 is uncertain about the processing delay for handover from NR SA to EN-DC, and they are expecting some inputs from RAN2. So from RAN2 point of view, rapporteur thinks we can provide some guidance instead of completely leave it to RAN4.

Considering RRC processing delay of inter-RAT handover from NR to E-UTRAN is 50ms. Rapporteur understands the delay of this procedure cannot be smaller than 50ms. But companies are invited to show your views.

**Q1.1: Which option do you support for the RRC processing delay for “NR to EN-DC”?**

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| --- | --- | --- |
| **Company** | **Option 1/2/3/4/5?** | **Comments** |
| ZTE | Option 1 (Proponent) | In LTE, the same RRC processing delay (20ms) is defined for “SN setup/change” and “intra-LTE mobility with SN setup/change”. So we think the same principle can also be applied here. E.g. to adopt the same RRC processing delay (50ms) for “inter-RAT handover from NR to E-UTRAN” and “NR to EN-DC”.  We can inform RAN4 this value, and asks RAN4 to capture it in TS 38.133. |
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*Case 2: EN-DC to EN-DC*

Company proposals are summarized as below:

* Option 1: 20ms. ----ZTE, Apple, HW, CATT;
* Option 2: 16ms. ---Nokia;

Note: RRC segmentation is not considered.

20ms and 16ms were proposed by companies. But in current TS 36.331, the following cases already defined. And the second case should already cover “EN-DC to EN-DC” mobility.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RRC connection reconfiguration (NR SCG establishment/ /modification/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |
| RRC connection re-configuration (intra-LTE mobility with NR SCG establishment/ /modification/release) | *RRCConnectionReconfiguration* | *RRCConnectionReconfigurationComplete* | 20 |  |

Companies are invited to show your views.

**Q1.2: Do companies agree the RRC processing delay for “EN-DC to EN-DC” is 20ms (as already defined in TS 36.331)?**

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| --- | --- | --- |
| **Company** | **Agree or Disagree** | **Comments** |
| ZTE | Agree | Proponent. |
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*Case 3: NE-DC to NE-DC, NR-DC to NR-DC*

Company proposals are summarized as below:

* Option 1: 16ms. ---ZTE, Nokia, Apple, CATT;
* Option 2: 20ms. ---HW.

Note: RRC segmentation is not considered.

16ms and 20ms were proposed by companies. In current TS 38.331, following case is defined. The proponent of 16ms is to apply the same value for intra-NR mobility together with SCG establishment/modification. While the proponent of 20ms thinks 16ms may not be sufficient, because UE needs to do additional handover.

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| RRC reconfiguration (SCG establishment/ modification/ release) | *RRCReconfiguration* | *RRCReconfigurationComplete* | 16 |  |

Based on LTE spec, the same RRC processing delay is defined no matter SCG establishment happens with or without intra-MN mobility. So rapporteur understands the same principle can be applied to NR spec. Companies are invited to show your views.

**Q1.3: Which option do you support for the RRC processing delay for “NE-DC to NE-DC” and “NR-DC to NR-DC”?**

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| --- | --- | --- |
| **Company** | **Option 1/2** | **Comments** |
| ZTE | Option 1 | Proponent. |
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In R2-2103862, for case 1&2, it suggests to inform RAN4 about the different RRC processing delay based on whether RRC segmentation is applied. See below table.

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| --- | --- | --- | --- | --- |
| Scenario | Source PCell | Target PCell | Target PSCell | RRC procedure delay for HO with PSCell |
| NR SA to EN-DC | NR (incl. FR1 and FR2) | LTE | NR (incl. FR1 and FR2) | 70ms |
| EN-DC to EN-DC | LTE | LTE | NR (incl. FR1 and FR2) | 20ms (in case of the HO command without segmentation transmission)  60ms(in case of the HO command with segmentation) |
| NE-DC to NE-DC | NR FR1 | NR FR1 | LTE | 16ms (in case of the HO command without segmentation transmission)  56ms (in case of the HO command with segmentation) |
| NR-DC to NR-DC | NR FR1 | NR FR1 | NR FR2 | 16ms (in case of the HO command without segmentation transmission)  56ms (in case of the HO command with segmentation) |

From rapporteur point of view, the RRC processing delay when RRC segmentation is defined in RAN2 spec.

*TS 36.331:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RRC connection re-configuration | *DLDedicatedMessageSegment* | *RRCConnectionReconfigurationComplete* | 20+( Nseg  -1)\*10 | Nseg  is number of RRC segments |

*TS 38.331:*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RRC reconfiguration | *DLDedicatedMessageSegment* | *RRCReconfigurationComplete* | 16+( Nseg  -1)\*10 | Nseg  is number of RRC segments |

And RRC segmentation is not supported for inter-RAT handover command (e.g. MobilityFromNRCommand). For case 2&3, RAN4 spec just refers to the values defined in RAN2 spec. So there seems no need to highlight this difference to RAN4. But companies are invited to show your views.

**Q1.4: Do companies think we need to inform RAN4 about the RRC processing delay when RRC segmentation is applied for Case 2&3?**

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| --- | --- | --- |
| **Company** | **Agree or Disagree** | **Comments** |
| ZTE | Prefer Disagree | We agree with the motivation, but we understand there is no difference in RAN4’s future work. RRC segmentation is not supported for inter-RAT HO case, so they don’t have to capture different values in TS 38.133. And for other cases, they are just referring to RAN2 spec. |
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In addition, to avoid misunderstanding, R2-2103032 suggests to update RAN2 spec to capture the RRC processing delay of missing scenarios.

**Proposal 3: Update TS 38.331 and TS 36. 331 to capture the RRC processing delay of missing scenarios, and the correction should be adopted since Rel-15. Agree CRs in [2][3].**

Since case 2&3 are supported since Rel-15, it is proposed to make update to both Rel-15 and Rel-16 specs.

Note: The correction to TS 36.331 may be quite simple, just add NR to below bullet, see example:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Inter RAT mobility** | | | | |
| Handover to E-UTRA | *RRCConnectionReconfiguration (sent by other RAT)* | *RRCConnectionReconfigurationComplete* | NA | The performance of this procedure is specified in TS 45.010 [50] in case of handover from GSM and TS 25.133 [29], TS 25.123 [30] in case of handover from UTRA and TS 38.133 [84] in case of handover from NR. |

**Q1.5: Do companies agree to capture the RRC processing delay of Case 1~3 to both Rel-15 and Rel-16 SPEC (e.g. TS 38.331)?**

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| --- | --- | --- |
| **Company** | **Agree or Disagree** | **Comments** |
| ZTE | Agree | Proponent.  It is better to make our SPEC clear, otherwise, people may ask similar questions in the future. |
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Following CRs are provided by companies.

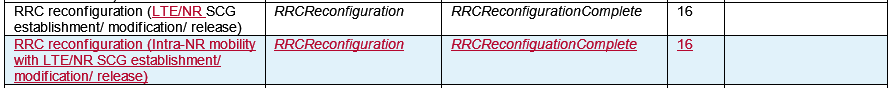
[R2-2103033](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2103033.zip) CR on RRC processing delay ZTE Corporation, Sanechips CR Rel-15 38.331 15.13.0 2495 - F NR\_newRAT-Core

[R2-2103034](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2103034.zip) CR on RRC processing delay ZTE Corporation, Sanechips CR Rel-16 38.331 16.4.1 2496 - F NR\_newRAT-Core

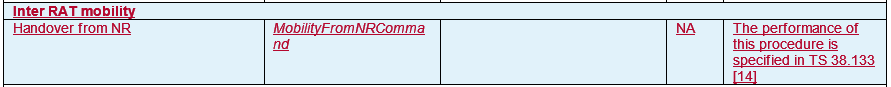
[R2-2104156](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_113bis-e\Docs\R2-2104156.zip) Correction on RRC Processing Delay for Handover from NR to E-UTRA CATT draftCR Rel-17 38.331 16.4.1 F NR\_RRM\_enh2-Core

In general, R2-2104156 is covered by R2-2103033/3034.

Change 1 (from R2-2103033/3034)



Change 2 (from R2-2103033/3034, R2-2104156)



If companies agree the SPEC can be updated, please provide your comments to the CRs.

**Q1.6: Do companies agree with above Change 1 and 2? Any other comments to the CRs?**

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| **Company** | **Comments** |
| ZTE | Proponent of R2-2103033/3034.  Agree with change 1 and 2. |
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*Reply LS will be updated based on the outcome of above questions.*

### Clarification of UE behaviour

RAN4’s LS also includes the following question:

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| * Question 2: Regarding HO with PSCell triggered by single RRC HO command, which of following options is in line with RAN2 definition when UE fails to synchronize to the expected PSCell?   + Option 1: UE performs conventional Rel-15 HO procedure and PSCell addition separately, i.e., UE can handover to the new PCell without PSCell addition   + Option 2: UE tries to synchronize another SCG which is the most likely to connect successfully (assumes that the target PCell configures multiple SCGs), i.e., UE can handover to the new PCell with a different PSCell addition   + Option 3: UE won’t handover to new PCell upon PSCell addition failure, i.e., UE will treat it as conventional Rel-15 HO failure   + Option 4: RAN2 is welcomed to share additional failure cases if any. |

Based on contributions, companies all agree the answer is Option 1. Which means

**Q1.7: Do companies agree to answer Option 1 to RAN4? (I.e. in case of handover with PSCell change, when UE fails to synchronize the target PSCell but succeeds in PCell handover. The UE will trigger SCG failure, and send SCG failure report to MN)**

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| **Company** | **Agree or Disagree** | **Comments** |
| ZTE | Agree |  |
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## 35MHz and 45MHz bandwidth

[R2-2104249](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104249.zip) Further Clarification on the 35M/45M supporting ZTE Corporation, Sanechips discussion Rel-17 NR\_FR1\_35MHz\_45MHz\_BW-Core

[R2-2104250](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104250.zip) CR on the 35M/45M supporting-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.13.0 0567 - F NR\_FR1\_35MHz\_45MHz\_BW-Core

[R2-2104251](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104251.zip) CR on the 35M/45M supporting-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.4.0 0568 - A NR\_FR1\_35MHz\_45MHz\_BW-Core

In the current spec, the 35M/45M bandwidth has been introduced to the *channelBW\_UL/DL.* However, the 35M/45M bandwidth hasn’t been included in the current Asn.1 coding of the SupportedBandwidth, thus, to indicate supporting of 35M/45M, the UE has to report a *supportedBandwidthDL/UL*that larger than 35M/45M.

Furthermore, for some bands that support 35M/45M, the 35M/45M would be the widest band in Table 5.3.5-1 of TS 38.101-1, e.g. for the band 8/71, the widest bandwidth is 35M, for the band 3/25/66, the widest bandwidth is 45M.To report a wider band than 35M/45M also means that the UE shall be allowed to report a bandwidth that not included in the Table 5.3.5-1 of TS 38.101-1.

However, in the current spec, it has been clearly said that the *supportedBandwidthDL/UL* shall be defined in Table 5.3.5-1 in TS 38.101-1 for FR1 and Table 5.3.5-1 in TS 38.101-2 for FR2.

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| --- |
| ***supportedBandwidthDL***  Indicates maximum DL channel bandwidth supported for a given SCS that UE supports within a single CC (and in case of intra-frequency DAPS handover for the source and target cells), which is defined in Table 5.3.5-1 in TS 38.101-1 [2] for FR1 and Table 5.3.5-1 in TS 38.101-2 [3] for FR2.  For FR1, all the bandwidths listed in TS38.101-1 Table 5.3.5-1 for each band shall be mandatory with a single CC unless indicated optional. For FR2, the set of mandatory CBW is 50, 100, 200 MHz. When this field is included in a band combination with a single band entry and a single CC entry (i.e. non-CA band combination), the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3]. |

To solve this problem, two options were discussed in [11],

* Option 1: Have some clarifications to the current field description of supportedBandwidthDL

E.g. (May only for the BC with a band that supports 35M/45M bandwidth) Allow the UE to indicate a bandwidth in the supportedBandwidthDL/UL wider than channelBW\_UL/DL, this supportedBandwidthDL/UL may even not be included in the Table 5.3.5-1 of TS 38.101-1/TS 38.101-2 for the corresponding band.

* Option 2: Add new FeatureSetUplinkPerCC-v15xy to indicate newly added 35M/45M, e.g. add FeatureSetUplinkPerCC-v15xy to the lateNonCriticalExtension of UE-NR-Capability

However considering the complexity to the option 2, the option 1 was selected and further discussed in [11], if companies have comments/preference on the option 2, please add the comments to the question Q2.3.

**Q2.1: Which option do companies prefer?**

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| --- | --- | --- |
| **Company** | **Option 1 or 2** | **Comments** |
| ZTE | Option 1 | We think the option 1 is simple, we don’t want to introduce additional capability elements. |
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For the option 1, the proponent hope to confirm RAN2’s understanding on the proposal 1 in [11] as below first:

**Q2.2: With the current spec, whether the UE is allowed to indicate a bandwidth in the *supportedBandwidthDL/UL* wider than *channelBW\_UL/DL*, this *supportedBandwidthDL/UL* may even not be included in the Table 5.3.5-1 of TS 38.101-1/TS 38.101-2 for the corresponding band?**

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| --- | --- | --- |
| **Company** | **Agree**  **(Allowed or Not allowed)** | **Comments** |
| ZTE | Not allowed | For that in the current field description, it has been clearly said that the supportedBandwidthDL/UL shall be defined in Table 5.3.5-1 in TS 38.101-1 for FR1 and Table 5.3.5-1 in TS 38.101-2 for FR2. Especially for the single carrier case, it said “ the UE shall indicate the maximum channel bandwidth for the band according to TS 38.101-1 [2] and TS 38.101-2 [3].” |
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For the Q2.2, if the answer is allowed, please go to the question Q2.2.a, otherwise, please go to the question Q2.2.b.

**Q2.2.a: If the answer to Q2.2 is “allowed”, to make the spec clear, do you agree that a note shall be added for the field description of *supportedBandwidthDL/supportedBandwidthUL* e.g.**

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| NOTE1: The UE may report a supportedBandwidthDL wider than channelBW\_UL/DL, and this supportedBandwidthDL may not be included in the Table 5.3.5-1 of TS 38.101-1/TS 38.101-2 |

Please notice that this modification is not only for the BC that including band with 35M/45M bandwidth, but also for the other BCs (e.g. BC that doesn’t include band with 35M/45M bandwidth). .

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| **Company** | **Agree** | **Comments** |
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**Q2.2.b: If the answer to Q2.2 is “not allowed”, to support 35M/45M feature, do you agree to add a note as below to the field description of *supportedBandwidthDL/supportedBandwidthUL* and thus agree with the CR [12][1**3**].**

|  |
| --- |
| NOTE1: For the BC with a band that supports 35M/45M bandwidth, the UE may report a supportedBandwidthDL/UL wider than channelBW\_UL/DL, and this supportedBandwidthDL/UL may not be included in the Table 5.3.5-1 of TS 38.101-1/TS 38.101-2 |

Please notice that compare with the Q2.2.a, the difference that the modification is only for the BC that including the Band with 35M/45M bandwidth.

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| **Company** | **Agree** | **Comments** |
| ZTE | Agree (proponent) | To support 35M/45M bandwidth, this clarification was needed, otherwise, the UE can’t report a wider bandwidth in the supportedBandwidthDL/UL and thus the 35M/45M bandwidth feature can be supported indeed. |
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**Q2.3: For the companies prefer the option 2, considering the related draft CRs were not provided, do you agree to finish the related CR in the next meeting if all of the companies agree to go to the option 2 in this meeting?**

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| **Company** | **Agree** | **Comments** |
| ZTE |  | We think the option1 is simple, anyway, if the option 2 was selected by most of companies, the CRs for the option 2 can be provided and concluded in the next meeting. |
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# Conclusion

TBD

# References

1. R2-2102652 LS on handover with PSCell (R4-2103674; contact: Apple) RAN4 LS in Rel-17 NR\_RRM\_enh2-Core To:RAN2 Cc:-
2. R2-2103032 Discussion on handover with PSCell ZTE Corporation, Sanechips discussion Rel-17 NR\_RRM\_enh2-Core
3. R2-2103340 Response LS to RAN4 on HO with PSCell requirements Nokia, Nokia Shanghai Bell LS out Rel-17 NR\_RRM\_enh2-Core To:RAN4
4. R2-2103862 Clarification on handover with PSCell Apple discussion Rel-17 NR\_RRM\_enh2-Core
5. R2-2103863 Draft LS Reply to RAN4 on handover with PSCell Apple LS out Rel-17 NR\_RRM\_enh2-Core To:RAN4
6. R2-2104133 Discussion on RAN4 LS on handover with PSCell Huawei, HiSilicon discussion Rel-17 NR\_RRM\_enh2
7. R2-2104155 Discussion of LS on Handover with PSCell from RAN4 CATT discussion Rel-17 NR\_RRM\_enh2-Core
8. R2-2103033 CR on RRC processing delay ZTE Corporation, Sanechips CR Rel-15 38.331 15.13.0 2495 - F NR\_newRAT-Core
9. R2-2103034 CR on RRC processing delay ZTE Corporation, Sanechips CR Rel-16 38.331 16.4.1 2496 - F NR\_newRAT-Core
10. R2-2104156 Correction on RRC Processing Delay for Handover from NR to E-UTRA CATT draftCR Rel-17 38.331 16.4.1 F NR\_RRM\_enh2-Core
11. [R2-2104249](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104249.zip) Further Clarification on the 35M/45M supporting ZTE Corporation, Sanechips discussion Rel-17 NR\_FR1\_35MHz\_45MHz\_BW-Core
12. [R2-2104250](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104250.zip) CR on the 35M/45M supporting-R15 ZTE Corporation, Sanechips CR Rel-15 38.306 15.13.0 0567 - F NR\_FR1\_35MHz\_45MHz\_BW-Core
13. [R2-2104251](file://D://__会议\2021\202104_RAN2\TSGR2_113bis-e\Docs\R2-2104251.zip) CR on the 35M/45M supporting-R16 ZTE Corporation, Sanechips CR Rel-16 38.306 16.4.0 0568 - A NR\_FR1\_35MHz\_45MHz\_BW-Core