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

**Electronic, 20 April – 30 April 2020**

**Agenda Item:** 5.4.1.3 System information

**Source:** Huawei, Ericsson, Apple

**Title:** Summary on NR 15 system information and other

**WI code(s):** NR\_newRAT-Core, TEI15

**Document for:** Discussion and Decision

## 1 Introduction

In section 5.4.1.3 System information, there is an email discussion as below:

* [AT109bis-e][011][NR15] System Information & Other (Huawei, Ericsson, Apple)

Scope: Treat all docs under AI 5.4.1.3 and AI 5.4.1.5

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 23 0700 UTC

Part 2: For the parts that are agreeable, discussion will continue to agree on CRs.

The relevant papers are listed in [1] ~ [11]. This paper is to progress on topics under AI 5.4.1.3 and AI 5.4.1.5.

## 2 Discussion

### 2.1 Part 1 discussion

For Part 1 discussion, it is suggested to put some questions for each topic and then companies can provide comments if any.

**Topic 1: SIB discussion ([1], [2])**

*Question 1 for SIB discussion:*

Regarding which issues that need resolution, it is suggested to use the reason for change from [1] as the input:

In current RRC spec, *ServingCellConfigCommonSIB* and *uplinkConfigCommon* in ServingCellConfigCommonSIB is optional.

For NR SA Cell for UE camping, ServingCellConfigCommonSIB and uplinkConfigCommon in SIB1 should be provided.

Do you agree with the reason for change in [1]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| QCOM | Yes | We agree with the intention of the CR, however we prefer to have the change to be addressed differently, so instead of going into a specific scenario, we can simply reword the change e.g. "3> if the UE is unable to acquire the SIB1 or if SIB1 is misconfigured" |
| ZTE | Yes |  |
| Ericsson | Yes | But this is a clarification of the UE behavior, when the NW is not configured correctly. We do not see a need to specify the correct NW configuration, nor the UE behavior when the NW is not configured correctly. |
| Samsung | Yes | The intention of the reason for change is correct that the UE can camp on the cell but may not be able to perform initial access if the parameters are not provided by the network. |
| Lenovo | No | Presence of the optional fields ServingCellConfigCommonSIB and uplinkConfigCommon of ServingCellConfigCommonSIB is a NW configuration issue. In general, we should not specify misconfiguration cases in the specifications. |
| Huawei, HiSilicon | No | In our understanding, the fields are always included in the real deployment, so the problem does not really exist. If there’s still some concern, it can be captured in the minutes that RAN2 understanding is the network always includes *ServingCellConfigCommonSIB* and *uplinkConfigCommon*. The CR is not needed. |
| LGE | No | We think that ServingCellConfigCommonSIB and uplinkConfigCommon are always signalled in proper NW configuration, and we don’t need to specify anything for error configuraiton. |
| Apple | Yes | According to the procedural text, UE will camp on the NR SA cell but without the essential configuration for initial access which is optional provided in SIB1.  UE vendor is worried that NW will provide such unreasonable configuration. Therefore, we would like to clarify it in the spec. |
| Intel | No | These will be included by any good network implementation. We don’t think we should change UE behavior in this way. If at all a clarification is needed, it should be captured as a network requirement. |
| Nokia | Yes | The relevant question to discuss is Question 2. The reason for change in the CR states the obvious (that these fields are OPTIONAL, but it is required to be configured in UE for standalone operation). In EN-DC, SIB1 can be sent "partially" CGI reading purposes, which is why these fields are optional. Like others have stated, a proper network implementation shall include these fields in a standalone cell. |
| MediaTek | No | We have similar view as Intel. If something need to be done, we could capture that the network always includes *ServingCellConfigCommonSIB* and *uplinkConfigCommon* for a cell that is operated as PCell. However, we tend to think that no change is needed. |
| NTT DOCOMO | Yes | We understand the intention of the change. There could exist such a cell broadcasting SIB1 w/o ServingCellConfigCommonSIB or uplinkConfigCommon is missing in ServingCellConfigCommon. The former case is for ANR purpose in case of an NSA only cell. The latter case might be DL only cell, even though SIB1 is not needed for the DL only cell, except for ANR. Nevertheless, The solution is not only for the proposed change, but also the other approach can be considered. |
| vivo | No | The reason in the paper is true. But in actual network, a reasonable network implementation will avoid such case. Otherwise, we should also specify other configurations in SIB1 (we understand there may be many) in the procedure part. It can be clarified in the Chairman Note at most that these configurations should be provided by network. |

*Question 2 for SIB discussion:*

If your answer is Yes for Q1 for SIB discussion, do you agree with the changes made in [1]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| QCOM | NO | We agree with the intention of the CR, however we prefer to have the change to be addressed differently, so instead of going into a specific scenario, we can simply reword the change e.g. "3> if the UE is unable to acquire the SIB1 or if SIB1 is misconfigured" |
| ZTE | Yes |  |
| Ericsson | No | This is a clarification of the UE behavior, when the NW is not configured correctly. We do not see a need to specify the correct NW configuration, nor the UE behavior when the NW is not configured correctly. In exception cases, e.g. when wrong NW configuration has been observed in the field, or when a NW configuration is not complex and not obvious, then potentially NW configuration issues should be specified. But we do not think that is the case here. We do not think that this CR classifies as an “essential” REL-15 correction. |
| Samsung | No | The proposed change become NBC. We prefer to avoid new requirement on the UE. For R15 it may be considered to add a NOTE stating that NW provides the ServingCellConfigCommonSIB.  For R16, there are two options:   1. The NOTE added for R15 applies for R16 2. The field is made mandatory   We prefer NOTE. |
| Apple | Yes | We are fine with the change as suggested by QC or add the Note as suggested by Samsung.  For QC’s suggestion, we would like to add the words marked in yellow to explain the “misconfigured”.  3> if the UE is unable to acquire the SIB1 or if SIB1 is misconfigured and cannot provide the essential configuration for initial access"  For Samsung’s suggestion, we can add the NOTE as follows:  Note: The UE is not required to camp on the cell where the configuration for initial access is not provided in the SIB1. |
| Intel | No | If at all a clarification is needed, it should be captured as a network requirement to provide these fields. We should not introduce a new UE normative requirement for this. |
| Nokia | No | We have the same view as Ericsson. No new UE behavior needs to be specified for improper network configuration, but a network behavior clarification is not needed either since this is basic configuration for standalone operation. This is not an essential correction for Rel-15. |
| NTT DOCOMO | No | In LTE, such a common configuration is mandatory present in SIB. The reason of optional presence in NR was to support the ANR scenario in case of NSA. So, we also think the similar approach as Samsung is proposing as Option 2. We think it is defined by using conditional presence such that ServingCellConfigCommonSIB and uplinkConfigCommon in ServingCellConfigCommonSIB are mandatory present for standalone. Otherwise, it is optional and Need R. Although it might be though as NBC apparently, we don’t think it is NBC, since anyway, it is the intended NW setting for standalone operations. |
|  |  |  |

[Summary… Please Apple add a summary for **Topic 1: SIB discussion**]

**Summary:**

13 companies provided their feedback during the offline discussion.

It is common understanding that NW shall provide the correct NW configuration for the PCell where UE will camp on. But not all companies think the spec change is necessary and it’s up to good NW implementation.

Based on companies input, following proposal are proposed to be agreed.

**Proposal 1: Capture the RAN2 common understanding in the chairman notes or as a NOTE in RRC spec that NW shall provide the configuration for initial access in SIB1 on the serving cell for UE camping on.**

**Topic 2: PWS and MG ([3], [4], [5])**

*Question 1 for PWS and MG:*

Regarding which issues that need resolution, it is suggested to use the following two observations from [3] as the input.

**Observation 1**: It is complex and in some cases impossible for the network to avoid for every UE any overlap between measurement gaps and *SIB6/SIB7/SIB8* scheduling.

**Observation 2**: Measurement gaps and *SIB6/SIB7/SIB8* scheduling do not overlap persistently, i.e. there are typically many consecutive measurement gaps that do not overlap.

Do you agree with both observation 1 and 2 in [3]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| QCOM | Yes | Agree with the issue raised by the discussion paper |
| ZTE | Yes |  |
| Ericsson | Yes |  |
| Samsung | Yes to Observation 2 | In most cases it should be possible to avoid overlap, however, for UEs where it is not possible to avoid overlap between measurement gaps and *SIB6/SIB7/SIB8* scheduling, the NW can consider releasing the measurement gap for such UEs |
| Lenovo | Yes |  |
| Huawei, HiSilicon | Yes | SIB6/7/8 are cell-specific, whereas measurement gap configuration is UE-specific. |
| LGE | Yes | Agree with the observations. |
| Apple | Yes |  |
| Intel | Yes |  |
| Nokia | Yes | Agree with the observations. |
| MediaTek | Yes to Observation 2 | For observation 1, we think that it is possible that the NW just release the measurement gap for some UE. It is also possible that the NW could send the PWS via dedicated message. |
| NTT DOCOMO | Yes | Definitely, it is one of the headaches of network operations learned from LTE. |
| vivo | Yes |  |

*Question 2 for PWS and MG:*

In [3], there is a proposal as below:

**Proposal**: The UE should try to acquire the first *SIB6/7/8* SIB after reception of *etwsAndCmasIndication* even when it overlaps with a measurement gap.

If your answer is Yes for Q1 for PWS and MG, do you agree with the proposal in [3]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| QCOM | Yes | We agree with the approach used to try to resolve the issue, i.e. adding note that asks UE to do its best to acquire PWS SIBs once PWS indication is received in case of overlap with measurement gap. |
| ZTE | / | We think it can be left to UE implementation to acquire warning message or perform measurements when they are overlapped. |
| Ericsson | Yes | In the discussion document more background info is provided on previous LTE discussions and the problem for the NW to avoid all overlap ([R2-2003283](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs/R2-2003283.zip)).  To the UE vendors that are skeptical about any clarification:   * We have tried to keep it as simple as possible and relaxed/changed our previous proposal, i.e. the proposed clarification is reduced to a NOTE with a recommendation, i.e. not a strict UE requirement. * We would like UE vendors to consider that it is really difficult for the NW to avoid overlap **in all cases**, i.e. in some cases there will be overlap. But in case there is overlap between SIB and measurement gaps, there will always be many consecutive measurement gaps following, i.e. the measurement impact is limited. |
| Samsung |  | Assuming the proposal is not a requirement but a guidance for UE implementation. If yes, then better to change ‘should’ to ‘may’ or simply stating that it is left to UE implementation to prioritize acquisition of warning message in case of overlap. |
| Lenovo | No | Same as in LTE we can leave it to UE implementation when the overlap case may happen. |
| Huawei | No | The proposed change is inconsistent with the current R15 UE behavior. We prefer not to add new UE behavior at this stage. If the UE wants to guarantee SIB6/7/8 can be received in time, UE implementation can prioritize the SIB, no need to capture it in the spec. |
| LGE | No | Leave it UE implementation as in LTE. |
| Apple | No | It can be up to UE implementation. |
| Intel | No | Network should minimize this happening and it can be left to UE implementation if it does. |
| Nokia | Yes | In LTE, when UE behavior for handling collision between measurement gaps and SIB reception is not specified, the burden was on the network to avoid such collision when PWS SIBs were involved as these are for public safety use case. In NR, since it is challenging for NW to avoid collision, we need to at least have a NOTE with a soft recommendation for UE to prioritize the PWS SIB reception. |
| MediaTek | No | We prefer leave to UE implementation. We could accept a NOTE with the wording change suggested by Samsung (i.e. change “should” to “may”) |
| NTT DOCOMO | Yes | No matter if it is requirement or up to UE implementation, it has to be guaranteed that all PWS capable UEs behave like the proposal. Otherwise, i.e. if not all of the UEs follow the proposal, NW has to avoid the overlapping between SIB and measurement gap for such a UE, which would make it useless even though it is captured in the spec. |
| Vivo | No | My understanding is that a reasonable network implementation/ configuration will avoid such situation, since the network side knows the capability of UE. If it happened, it can be handled by UE implementation, as this is a small group of UEs.  Besides, this issue also exists in LTE system. But we did not solve this problem. Thus, we think this problem is not so critical in NR. |

**Summary:**

Most companies agree with the observations, that it is complex for the NW to avoid overlap between measurement gaps and *SIB6/SIB7/SIB8* scheduling, and that in case of overlap there are typically many consecutive measurement gaps that do not overlap.

But not all companies agreed with the proposed guidance in the NOTE (4 out of 13), i.e. most companies think that this can be left to UE implementation (9 out of 13).

We would like to ask companies if it is agreeable to capture this in the following way in a NOTE:

NOTE:      In case *SIB6*, *SIB7*, or *SIB8* overlap with a measurement gap it is left to UE implementation how to acquire *SIB6*, *SIB7*, or *SIB8* immediately.

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Nokia | Yes | We will go with majority, but we still think the best solution is to ensure that UEs prioritizes the reception of PWS SIB when there is a collision with measurement gaps. This is because the problem is not affecting 1 or 2 UEs when such collision between PWS SIB scheduling and measurement gaps happen.  If the gaps were configured for NR inter-frequency measurements, then each UE that is configured with gaps has the same gapOffset, since the gap needs to cover the neighbour frequencies’ SMTCs. What this means is that all UEs configured with gaps will face this condition; this, again, is very different from LTE where the gapOffset can be randomly drawn (with the exclusion of certain values) and where only a much smaller number of “unlucky” UEs will be concerned. The consequence is also that solutions such as reconfiguring the gaps or providing the SIBs via dedicated signalling are very unpractical: **we are not dealing with a few UEs, we are dealing with all UEs that have been configured with gap**. |
| NTT DOCOMO | Yes | As Nokia pointed out, even for LTE, not all of the values of gapOffset cannot be used to avoid the conflict between the gap and PWS SIBs. It is cumbersome for NW to configure the measurement gap, so that all UEs can receive ETWS SIBs, if broadcast. We can accept to leave it to UE implementation. Nevertheless, no matter how this can be done by UE implementation, it has to be guaranteed that UE receives PWS SIBs even over the gap occasion. |
| MediaTek | Yes | We are OK with the new proposed NOTE. |
| LG | Yes | We are also OK with the new proposed NOTE. |
| Qcom | Yes | We’re ok with the new updated note. |
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**Topic 3: Need code for CMAS ([6], [7], [8], [9], [10])**

*Question 1 for Need code for CMAS:*

Regarding which issues that need resolution, it is suggested to use the following two observations from [6] as the input.

**Observation 1: For UE behaviors upon handling warningAreaCoordinatesSegment-r15, the procedural text and ASN1 part are not aligned. This issue exists for both LTE (SIB12) and NR (SIB8).**

**Observation 2: For ASN1 part of warningAreaCoordinatesSegment-r15, i.e. Need OR, it may lead to the release of previously received information so that the UE may fail to assemble the geographical area coordinates. In contrast, the procedural text is reasonable.**

Do you agree with both observation 1 and 2 in [6]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| QCOM | NO | the CR is not needed, but if insisted, the Need OR could simply be changed to Need OP if there is any confusion. |
| ZTE | No | We do not think this CR is needed, either.  As captured in 6.1.2 in 38.331 and 6.1 in 36.331:  *Any field with Need M or Need N in system information shall be interpreted as Need R.*  *Any field with Need ON in system information shall be interpreted as Need OR.*  Changing the need code into Need N or Need ON does not help while the description in the procedure part is quite clear. |
| Ericsson | No | We think the procedure text is clear how the UE shall re-assemble the coordinates. We think it would be a strange/bad UE implementation that stops re-assembling when no coordinates are received in the SIB, and lastsegment has not been received either.  We have discussed coordinates reassembly in several RAN2 meetings, and clarifications in chairman notes were agreed:  RAN2#107:  *Samsung would like to avoid further confusion and capture – if the segment is marked as last segment in the SIB the UE assumes all the message segment and warning Area coordinates segments are received. Companies confirm.*  RAN2#108:  *Observation 1: Regarding SIB12 in LTE and SIB8 in NR, if warning area coordinates are provided for the warning message, the total number of warning area coordinates segments is less than or equal to the total number of warning message segments.*  Given the previous discussions and clarifications, we do not think it is reasonable to say that UE implementation will fail due to the Need code.  Yes, we had similar observation as ZTE, that the proposed correction would conflict with existing requirements that SI Need M/ON shall be treated as Need R/OR. |
| Samsung | No | On one hand we understand the intention behind the reason for change but on another hand we share ZTE view that changing the need code does not help. So we assume UE implementation is according to the procedural text which does not have any problem. |
| Lenovo | No | We agree with ZTE that changing the need codes in ASN.1 doesn’t help. Per default Need OR/R is used since delta signaling is not supported for system information.  In general, procedural description takes precedence over ASN.1. |
| Huawei, HiSilicon | Yes | We think both observations have clearly described the issue.  Based on the comments from companies, a common understanding is that the procedural text is clear, and we fully agree. However, the specification should make sure that the procedural text should be aligned with ASN1 definition, isn’t it correct?  It seems to us that companies tend to agree that “procedural description takes precedence over ASN.1”. If it is ture, can we understand that for this field **warningAreaCoordinatesSegment-r15**, the need code will not used at all for the UE (or the UE will not take the need code into account)? |
| LGE | No | The procedural text is clear and changing the need code doesn’t help. |
| Apple | No | We share Ericsson’s view. Specifically, UE implementation should take into account if all segments till *lastSegment* has been received to ensure that a consistent set of warning area coordinates are received. |
| Intel | No | The procedural text is clear and there is no risk of misunderstanding. The Need codes for SIBs are not really important (we even discussed not to have them in Rel-8). |
| Nokia | No | We agree with ZTE as to how the Need M for system information is handled and so changing it to Need M is not going to help. So, we do not agree with observation 1. Ericsson is also right that we discussed different implementation options and, in the end, captured how the UE relies on the *lastSegment* indication to know when all segments have been received. The implication of this is that the UE does not throw away the other segments just because the *warningAreaCoordinatesSegment* is missing in the SIB. So, we do not agree with observation 2 also. |
| MediaTek | No | We think the procedure text is clear and there is almost impossible to have wrong UE implementation. |
| NTT DOCOMO | No opinion |  |
| vivo | No | We agree with ZTE. The procedure part is clear as the description captured in 6.1.2 in 38.331 and 6.1 in 36.331. |

*Question 2 for Need code for CMAS:*

In [6], there is a proposal as below:

**Proposal 1: It is proposed RAN2 to confirm that the procedural text of warningAreaCoordinatesSegment-r15 is correct and make clarifications to Need code in ASN1.**

If your answer is Yes for Q1 for Need code for CMAS, do you agree with proposal 1 in [6]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
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**Summary:**

Almost all companies agree that the procedural text is clear and there is almost impossible to have wrong UE implementation.

**Topic 4: child presence condition ([11])**

The paper [11] provides 4 proposals as below. The key point is the understanding described in section 2.1. It is proposed to first check whether all companies have the same understanding on P1, for which one example is in section 2.1. Then, if companies agree with the understanding, whether companies agree with the recommendations proposed in P2 and P3. As for P4, this may take more time for companies to check.

**Proposal 1: Confirm the following understandings:**

**- Mandatory presence of an optional child field does not imply the presence of (all) its parent field(s);**

**- A statement such as "the network always provides this field (and all its parent fields) when …" implies the presence of (all) its parent field(s);**

**Proposal 2: As part of Rel-16 ASN.1 review, recommend to specify explicitly cases where a field must always be provided, either in the presence condition or in the field description, as suitable in accordance with the understandings in proposal 1.**

**Proposal 3: For Rel-15, explicit statements can be added when a risk of inter-operability failure is identified.**

**Proposal 4: Confirm the 8 conclusions on the listed cases and adopt corresponding modifications, where relevant.**

*Question 1 on whether the condition of a child field can imply the presence of its parent fields:*

Regarding issues and solutions in P1 in [11], what are your comments?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | No | We have discussed this before. The inclusion of the word “condition” there is not correct and that is what needs correction. The way we use conditions in RRC is more for guidance on network implementation and when to use it is quite subjective. And there is no contradiction. If necessary, we can continue this discussion separately in until next meeting. |
| Nokia |  | This issue of child presence condition in R2-2003696 is best discussed in the ASN.1 review session. |
| MediaTek | See Comment | When a parent field is optional and a child field has a mandatory presence condition (e.g. "this field is mandatory present in case of handover"), the condition on the child could be misinterpreted to mean that the **parent** field becomes mandatory, which generally isn't true. So the underlying principle is reasonable and the question is whether there is any practical risk of misinterpretation that would affect IOT.  In general, we should probably minimise the proposed changes where a condition on a child field back-propagates to affect the requirement to include the parent field, because it's hard to read. It's OK to make this change where really needed for clarity, but in most cases it might be better to change the description/conditions of the parent field itself. |
| NTT DOCOMO | No | Agree on Intel’s view. Also agree with Nokia that this topic should be discussed in the ASN1. review session. |
| vivo | No | We share the same view as Intel. But we are open to further discuss this. |
| Ericsson | No | We share the same view as Intel. |
| LG | No | Agree on Intel’s view. |
|  |  |  |

*Question 2 for required actions, based on understanding in P1:*

If your answer is Yes for Q1 for child presence condition, do you agree with proposals P2/P3 in [11]?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| MediaTek | See Comment | We suggest to have more time to discuss. |
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If companies agree with P3, it is recommended to check the cases in section 2.2 in [11]. This action can be taken after the meeting so that companies have sufficient time to check.

**Summary:**

Not many comments have been received, and some companies prefer to move it to ASN1 review session.

**Proposal X: It is proposed to move** **R2-2003696 to ASN1 review session (for 38.331).**

## 3 Conclusions

[To be updated]

## 4 References

Contributions under 5.4.1.3 System information:

**SIB1**

[1] R2-2002818 Clarification on the essential fields in SIB1 Apple CR Rel-15 38.331 15.9.0 1525 - F NR\_newRAT-Core

[2] R2-2002819 Clarification on the essential fields in SIB1 Apple CR Rel-16 38.331 16.0.0 1526 - F NR\_newRAT-Core

**PWS and MG**

[3] [R2-2003283](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_109bis-e/Docs/R2-2003283.zip) ETWS and CMAS acquisition during measurement gaps Ericsson, Qualcomm, NTT DOCOMO INC, Nokia, InterDigital discussion Rel-15 NR\_newRAT-Core

[4] R2-2003282 Clarification for SIB6, SIB7 and SIB8 acquisition during a measurement gap Ericsson, Qualcomm, NTT DOCOMO INC, Nokia, InterDigital CR Rel-15 38.331 15.9.0 1551 - F NR\_newRAT-Core

[5] R2-2003527 Clarification for SIB6, SIB7 and SIB8 acquisition during a measurement gap Ericsson, Qualcomm, NTT DOCOMO INC, Nokia, InterDigital CR Rel-16 38.331 16.0.0 1566 - A NR\_newRAT-Core

5 tdocs moved here from 4.5:

[6] R2-2003569 Discussion on Need code for CMAS Huawei, HiSilicon discussion Rel-15 TEI15

[7] R2-2003570 Correction on Need code for CMAS Huawei, HiSilicon draftCR Rel-15 36.331 15.9.0 F TEI15

[8] R2-2003571 Correction on Need code for CMAS Huawei, HiSilicon draftCR Rel-16 36.331 16.0.0 A TEI15

[9] R2-2003572 Correction on Need code for CMAS Huawei, HiSilicon draftCR Rel-15 38.331 15.9.0 F TEI15

[10] R2-2003573 Correction on Need code for CMAS Huawei, HiSilicon draftCR Rel-16 38.331 16.0.0 A TEI15

Contributions under 5.4.1.5 System information:

[11] R2-2003696 Mandatory presence of a need M field due to a child presence condition Huawei, HiSilicon discussion Rel-15 NR\_newRAT-Core