**3GPP TSG RAN WG3 Meeting # 115-e R3-222732**

**e-meeting, 21st February – 3rd March 2022**

**Title: CB: # 2001\_NTN\_General (3rd round)**

**Source: Thales (moderator)**

**Type: discussion**

**Document for: Agreement**

**Agenda Item: 20.1**

**Work Item: NR\_NTN\_solutions: Solutions for NR to support non-terrestrial networks (NTN)\**

# Introduction

This document aims at discussing and agree on BL CRs related to the Rel-17 WI NR\_NTN\_solutions.

Hereunder is recalled the description of the email discussion as defined by the RAN3 chair in its notes:

**CB: # 2001\_NTN\_General**

**- Endorse BL CRs if agreeable**

**- Check LSs from other groups and provide reply LS if needed**

**- CHO discussions:**

**- Should time-based triggered CHO be supported in RAN3?**

**- if yes, Should CHO time window and estimated serving cell stop time?**

**- Is it acceptable that no UE location information is reported during initial access?**

**- In light of discussions on location reporting, should the content of the BLCRs be modified (e.g. for TS38.300)?**

(Thales - moderator)

Summary of offline disc

The following TDOCs are considered as part of this discussion:

|  |  |  |
| --- | --- | --- |
| [R3-221508](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221508.zip) | Clarification of NAS Node Selection Function for NTN nodes providing access over multiple countries (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Huawei, Thales) | CR0029r7, TS 38.410 v16.4.0, Rel-17, Cat. C |
| [R3-221509](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221509.zip) | Introduction of NTN (Qualcomm Incorporated, Huawei, Thales, , Ericsson, Nokia, Nokia Shanghai Bell, CATT) | CR0488r8, TS 38.423 v16.8.0, Rel-17, Cat. B |
| [R3-221524](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221524.zip) | Introduction of NTN (Qualcomm Incorporated, Huawei, Thales, , Ericsson, Nokia, Nokia Shanghai Bell, CATT) | CR0490r9, TS 38.413 v16.8.0, Rel-17, Cat. B |
| [R3-221609](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221609.zip) | Support Non-Terrestrial Networks (Huawei, Thales, Ericsson, ZTE, Qualcomm Incorporated) | draftCR |
| [R3-221662](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221662.zip) | Reply LS on NTN specific User Consent (RAN2) | LS in |
| [R3-221742](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221742.zip) | (TP for TS 38.300 BL CR on NTN) Discussion of the RAN2 LS on absence of UE location information at RRC Setup (Qualcomm Incorporated) | other |
| [R3-221743](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221743.zip) | (TP for TS38.413 BL CR on NTN) LS Response Analysis: Handling TA reporting in ULI (Qualcomm Incorporated) | other |
| [R3-221786](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221786.zip) | UE Location Information and NTN (Ericsson LM) | discussion |
| [R3-221787](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221787.zip) | [DRAFT] Reply LS on UE location during initial access in NTN (Ericsson LM) | LS out To: RAN2, SA2 CC: SA2, CT1, SA3 |
| [R3-221921](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221921.zip) | UE location report during initial access (Huawei) | other |
| [R3-221922](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221922.zip) | [DRAFT] Relpy LS on UE location during initial access in NTN (Huawei) | LS out To: RAN2,SA2 CC: SA3,CT1 |
| [R3-221770](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221770.zip) | LS response on UE location during initial access in NTN (THALES) | LS out To: RAN2 CC: SA3, SA2  Move to 20.1 |
| [R3-221797](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221797.zip) | CHO for NTN - Possible RAN3 Impacts of Ongoing RAN2 Discussion (Ericsson LM, Thales) | discussion |
| [R3-221675](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221675.zip) | LS on UE location during initial access in NTN (RAN2) | LS in  withdrawn |
| *R3-221357* | *LS on UE location during initial access in NTN (RAN2)* | *LS in*  *Submitted at the RAN3#114bis-e meeting: (R2-2201881)* |
| *R3-222619* | *LS Response to LS on UE location during initial access in NTN* | *LS in*  *Submitted at the RAN3#115-e meeting: (S2-2201540)* |
| *R3-222620* | *LS on Reply LS on LS on TAC reporting in ULI and support of SAs and FAs for NR Satellite Access* | *LS in*  *Submitted at the RAN3#115-e meeting: (S2-2201542)* |
| *R3-222693* | *LS on Reply LS on UE location aspects in NTN* | *LS in*  *Submitted at the RAN3#115-e meeting: (S2-2201834)* |

The following documents can be noted

* R3-221797 “CHO for NTN - Possible RAN3 Impacts of Ongoing RAN2 Discussion” (Ericsson LM, Thales): since it is for information and RAN3 shall wait for RAN2 decision on the matter
* R3-221662 “Reply LS on NTN specific User Consent” (RAN2)
* R3-222619 “LS Response to LS on UE location during initial access in NTN” (SA2)
* R3-222693 “LS on Reply LS on UE location aspects in NTN” (SA2)

# For the Chairman’s Notes

Propose the following:

**The following are endorsed**

* **draft BL CR 38.300 in [R3-221609]**
* **draft BL CR 38.410 in [R3-221508]**
* **draft BL CR 38.413 in [R3-221524] is endorsed but subject to further edits**
* **draft BL CR 38.423 in [R3-221509] is endorsed**

**Agree Text proposal for stg2 BL CR:**

“*The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE, if available.”*

and

“*The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network*.

*NOTE 2: A specific geographical location may be mapped to multiple Mapped Cell ID(s), and such Mapped Cell IDs may be configured to indicate differerent geographical areas (e.g. overlapping and/or with different dimensions). “*

Propose to capture the following:

**The document R3-221797 “CHO for NTN - Possible RAN3 Impacts of Ongoing RAN2 Discussion” (Ericsson LM, Thales) is noted. RAN2 decision on the matter is needed before discussion can take place.**

**The LS in R3-221662 “Reply LS on NTN specific User Consent” (RAN2) is noted**

**The LS in R3-222619 “LS Response to LS on UE location during initial access in NTN” (SA2) is noted**

**The LS in R3-222693 “LS on Reply LS on UE location aspects in NTN” (SA2) is noted**

# 1st round discussion

## BL CR to TS 38.300

The two below TDOCs: latest version BL CR for TS 38.300 as outcome of RAN3#114-bis-e and a text proposal:

|  |  |  |
| --- | --- | --- |
| [R3-221609](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221609.zip) | Support Non-Terrestrial Networks (Huawei, Thales, Ericsson, ZTE, Qualcomm Incorporated) | draftCR |

**Question 3.1.1: Is the draft BL CR 38.300 in [R3-221609] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment** |
| Thales | Agree |  |
| Nokia | Agree |  |
| Ericsson | Agree |  |
| Huawei | Agree |  |
| Qualcomm | Agree |  |
| ZTE | Agree |  |
| CATT | Agree |  |

**Moderator’s summary:**

* Draft BL CR 38.300 in [R3-221609] is endorsed

## BL CR to TS 38.410

The TDOC below, includes latest version BL CR for TS 38.410 as outcome of RAN3#114-bis-e.

|  |  |  |
| --- | --- | --- |
| [R3-221508](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221508.zip) | Clarification of NAS Node Selection Function for NTN nodes providing access over multiple countries (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Huawei, Thales) | CR0029r7, TS 38.410 v16.4.0, Rel-17, Cat. C |

**Question 3.2: Is the draft BL CR 38.410 in [R3-221508] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment** |
| Thales | Agree |  |
| Nokia | Agree |  |
| Ericsson | Agree |  |
| Huawei | Agree |  |
| Qualcomm | Agree |  |
| ZTE | Agree |  |
| CATT | Agree |  |

**Moderator’s summary:**

* draft BL CR 38.410 in [R3-221508] is endorsed

## BL CR to TS 38.413

The two below TDOCs: latest version BL CR for TS 38.300 as outcome of RAN3#114-bis-e and a text proposal:

|  |  |  |
| --- | --- | --- |
| [R3-221524](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221524.zip) | Introduction of NTN (Qualcomm Incorporated, Huawei, Thales, , Ericsson, Nokia, Nokia Shanghai Bell, CATT) | CR0490r9, TS 38.413 v16.8.0, Rel-17, Cat. B |
| [R3-221743](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221743.zip) | (TP for TS38.413 BL CR on NTN) LS Response Analysis: Handling TA reporting in ULI (Qualcomm Incorporated) | other |

**Question 3.3.1: Is the draft BL CR 38.413 in [R3-221524] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment** |
| Thales | Agree |  |
| Nokia | Agree |  |
| Ericsson | Agree |  |
| Huawei | Agree |  |
| Qualcomm | Not completely | We would like to recheck one of the issues discussed at the last meeting (TA information in ULI), particularly in view of any feedback from SA2. In any case we see a discrepancy between 23.501 and our own BL CR for 38.300 on one side, and the current BL for 38.413 on the other. Anyway for now we can accept the BL, just pointing out in our view some of it is not stable. |
| ZTE | Agree but | The concern by Qualcomm should be considered, we can wait for the reply from SA2. |
| CATT | Agree |  |

In [R3-221743] it is stated that:

* Observation 1: The agreed TP in [2], while reusing the legacy IE, is not optimal when interworking with both legacy and upgraded AMFs and does not align with TS38.300.
* Observation 2: In general, a better fit to the requirements and also stage 2 is provided by the structures that do not use the legacy *TAI* IE.
* Observation 3: If necessary, it is possible to define an alternative signalling structure which reuses the legacy *TAI* IE, while being fully compatible with stage 2.
* Proposal 1: RAN3 to consider the Text Proposal in the Annex for the support of the functionality agreed in SA2.

**Question 3.3.2: Is the Text Proposal for the draft BL CR 38.413 in [R3-221743] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment** |
| Thales | Agree |  |
| Nokia | Not now | As the contribution states:  **This document is written in the expectation that SA2 will send a reply before or during RAN3#115-e.**  So it is better to wait for SA2 reply. |
| Ericsson | Not agree | "The AMF cannot tell whether the TAI in the legacy TAI IE corresponds to the UE location or not": correct – indeed the SA2 requirements were not very clear on this point. And that’s exactly why RAN3 liaised SA2 at the last meeting. So now we should wait for SA2 to reply, and *then* fix things if needed. |
| Huawei | Agree but ok to postpone | We acknowledge this, and in fact we also think the better way is not reuse legacy IEs, but agree that we may wait for the reply first. |
| Qualcomm | Agree, but ok to wait | We propose this as a kind of compromise that fulfils the stage 2, and reuses the legacy IE. However, we still think that it is cleaner to avoid using the legacy TA IE as proposed last time. Anyway fine to wait for LS, but this point should not be closed as SA2 may reply soon. |
| ZTE | Not now | OK to wait for the reply from SA2. |
| CATT | Not agree for now | We understand the TA reporting mechanism defined the last meeting should be enough, no need to do the further enhancement, e.g. to indicate whether the TAI included in the legacy *TAI* IE is location based or not.  For Hard TAC case, at most two TAIs need to be reported to AMF:   * if the UE location is not known by the gNB, the broadcasted TAI could be included in the legacy *TAI* IE, no need to use the broadcast TAI list IE. * if the UE location based TAI equal to broadcasted TAI, only the legacy *TAI* IE is used. * if the UE location based TAI is not equal to the broadcasted TAI: * Only report the broadcast TAI via the legacy TAI is fine, or * Report both UE location based TAI, and broadcasted TAI is also fine. UE location based TAI could be reported via legacy TAI IE, and broadcast one could be included in the new TAI list. To be honest, AMF does not need to clearly knows which is the UE location based TAI, AMF just understand the UE is under the reported TAIs, and AMF should configure both of the TAIs in the RA of the UE.   For Soft TAC case:   * if the UE location based TAI could be obtained, use the legacy *TAI* IE to indicate it. No need to indicate all the broadcasted TAIs to AMF, which means the new additional TAI list does not need to be included in this case. * if the UE location based TAI could not be obtained, the legacy *TAI* IE and the Additional Broadcast TAC List IE should be used together to indicate the whole list of broadcast TAIs.   Above all, when the Broadcast TAI list is not exist, AMF should understand the UE is in the TAI as reported by the legacy TAI IE (no matter it’s UE location based or broadcasted TAI).  When the broadcast TAI list is included. AMF should understand the UE is located in the TAI list indicated by legacy TAI IE and the broadcast TAI list.  If SA2 replies our LS and provide additional requirements, we could come back to that. |

**Moderator’s summary:**

* draft BL CR 38.413 in [R3-221524] is endorsed but subject to further edits
* Text Proposal for the draft BL CR 38.413 in [R3-221743] will be further discussed (2nd round) once SA2 LS replay will be received

## BL CR to TS 38.423

The TDOC below includes latest version BL CR for TS 38.423 as outcome of RAN3#114-bis-e:

|  |  |  |
| --- | --- | --- |
| [R3-221509](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221509.zip) | Introduction of NTN (Qualcomm Incorporated, Huawei, Thales, , Ericsson, Nokia, Nokia Shanghai Bell, CATT) | CR0488r8, TS 38.423 v16.8.0, Rel-17, Cat. B |

**Question 3.4: Is the draft BL CR 38.423 in [R3-221509] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment** |
| Thales | Agree |  |
| Nokia | Agree |  |
| Ericsson | Agree |  |
| Huawei | Agree |  |
| Qualcomm | Agree |  |
| ZTE | Agree |  |
| CATT | Agree |  |

**Moderator’s summary:**

* draft BL CR 38.423 in [R3-221509] is endorsed

## UE location reporting during initial access

The below TDOCs relates to the same topic:

|  |  |  |
| --- | --- | --- |
| *R3-221357* | *LS on UE location during initial access in NTN (RAN2)* | *LS in*  *Submitted at the RAN3#114bis-e meeting: (R2-2201881)* |
| [R3-221786](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221786.zip) | UE Location Information and NTN (Ericsson LM) | discussion |
| [R3-221787](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221787.zip) | [DRAFT] Reply LS on UE location during initial access in NTN (Ericsson LM) | LS out To: RAN2, SA2 CC: SA2, CT1, SA3 |
| [R3-221921](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221921.zip) | UE location report during initial access (Huawei) | other |
| [R3-221922](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221922.zip) | [DRAFT] Relpy LS on UE location during initial access in NTN (Huawei) | LS out To: RAN2,SA2 CC: SA3,CT1 |
| [R3-221770](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221770.zip) | LS response on UE location during initial access in NTN (THALES) | LS out To: RAN2 CC: SA3, SA2  Move to 20.1 |
| [R3-221797](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221797.zip) | CHO for NTN - Possible RAN3 Impacts of Ongoing RAN2 Discussion (Ericsson LM, Thales) | discussion |
| [R3-221742](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221742.zip) | (TP for TS 38.300 BL CR on NTN) Discussion of the RAN2 LS on absence of UE location information at RRC Setup (Qualcomm Incorporated) | other |

|  |  |  |
| --- | --- | --- |
| *R3-221357* | *LS on UE location during initial access in NTN (RAN2)* | *RAN2 had decided (see R2-2109216) that the UE may report to the NG-RAN its coarse GNSS coordinates during initial access (before AS security is activated).The reporting would be under network control (i.e. it could be disabled if/when needed).*  *Following liaisons from SA2, SA3 and RAN3 (see R2-2200145/S2-2109337, R2-2200149/S3-214360, R2-2202542/S3i200056) on this, RAN2 is discussing how to progress and requires the views of SA2 and RAN3 to take its decision.*  *Due to possible privacy issues indicated by SA3, RAN2 is likely to decide that UE does not report to the NG-RAN its coarse GNSS coordinates during initial access (before AS security is activated), for example, for service request and registration area update procedures. RAN2 assumes UE location information can be reported after AS security is activated and network has NTN specific user consent. RAN2 has asked SA3 to work on the NTN specific user consent in Rel-17. RAN2 also understands that, if needed, NG-RAN can reselect an AMF serving a PLMN corresponding to the available UE's current location. This location can be determined by the AMF by invoking UE location procedure (LCS) in connected mode(once AS security is activated) and provided to the NG-RAN.*  *RAN2 would then like to ask SA2/RAN3 if it's acceptable that no UE location information is reported at the NG-RAN in a NTN network during initial access.* |
| [R3-221786](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221786.zip) | UE Location Information and NTN (Ericsson LM) | Observation 1: The UE-provided location is not the only piece of information used to drive NNSF, so the gNB should be able to select the appropriate AMF in most cases.  Observation 2: If we limit ourselves to serving cell information, AMF selection will be more accurate for smaller cell sizes.  Observation 3: In NTN scenarios, if very large cells are deployed, there might be cases (e.g. close to country borders, presence of significant overlap between adjacent cells) where AMF selection may not be unique based on the same serving cell information.  Observation 4: Wrong AMF selection will lead to a dropped connection, but the gNB can understand the reason and select the appropriate AMF, refining its selection criteria; the risk for a dropped connection is present only for the first UE and significantly decreases over time as other UEs are served from the same location.  Proposal 1: For the reasons above, the lack of location information at UE network attach is acceptable.  Proposal 2: Reply to RAN2 and SA2 according to the above; agree the reply LS [see R3-221787]. |
| [R3-221787](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221787.zip) | [DRAFT] Reply LS on UE location during initial access in NTN (Ericsson LM) | RAN3 would like to thank RAN2 about the status update on UE location reporting during initial access, and would like to provide the following information.  The location information provided by the UE is used by the NG-RAN node, together with other information, as input for the NNSF for selecting the appropriate AMF at UE attach (Sec. 5.7 of TS 38.410 and the endorsed BL CR, R3-220010). However, UE location is not the only information used by NNSF, so in its absence the gNB should still be able to select the appropriate AMF in most cases. RAN3 confirms RAN2’s understanding that the NG-RAN can reselect an AMF serving a PLMN corresponding to the available UE's current location, determined by other means (including e.g. looking at the serving cell for the UE).  In conclusion, the absence of UE location information at network attach seems acceptable. This might lead to incorrect AMF selection in rare cases, but if this happens the NG-RAN will be able to reselect the correct AMF for the same UE. |
| [R3-221921](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221921.zip) | UE location report during initial access (Huawei) | Proposal 1: It's acceptable that no UE location information is reported during initial access.  Proposal 2: The relevant stage2 content in 38.300 should be modified as follow:  *The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE, if available.* |
| [R3-221922](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221922.zip) | [DRAFT] Relpy LS on UE location during initial access in NTN (Huawei) | RAN3 thanks to RAN2 for the LS on UE location during initial access in NTN. RAN3’s view regarding the questions is as follows:  RAN3 thinks no coarse location report at initial access may increase the probability of selecting incorrect AMF, which anyway can be refined after the activation of AS security. Thus, it's acceptable for RAN3 that no UE location information is reported at the NG-RAN in a NTN network during initial access. |
| [R3-221770](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221770.zip) | LS response on UE location during initial access in NTN (THALES) | RAN3 thanks RAN2 for its liaison statement and take note that RAN2   * is likely to decide that UE does not report to the NG-RAN its coarse GNSS coordinates during initial access (before AS security is activated), for example, for service request and registration area update procedures. * and therefore asks whether it's acceptable that no UE location information is reported at the NG-RAN in a NTN network during initial access.   RAN3 would like to recall its agreements reflected in its stg2 BL CR (see R3-221609)  The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network.  “*The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE. The mapping may be pre-configured (e.g., up to operator’s policy) or up to implementation.*  *NOTE: As described in TS 23.501 [3], the User Location Information may enable the AMF to determine whether the UE is allowed to operate at its present location. Pre-configuration of special mapped cell identifiers may be used to indicate areas outside the serving PLMN’s country.*  *The gNB reports the broadcasted TAC(s) of the selected PLMN to the AMF as part of ULI. In case the gNB knows the UE’s location information, the gNB may determine the TAI the UE is currently located in and provide that TAI to the AMF as part of ULI*.”  On the basis of the above, the gNB will not be able to determine during the initial access, the Mapped Cell ID and the TAI in which the UE is located, hence enabling the AMF to determine whether the UE is allowed to operate at its present location. |
| [R3-221742](file:///D:\会议硬盘\TSGR3_115-e\Docs\R3-221742.zip) | (TP for TS 38.300 BL CR on NTN) Discussion of the RAN2 LS on absence of UE location information at RRC Setup (Qualcomm Incorporated) | Proposal 1: Current baseline text in TS 38.410 does not need to be changed.  Proposal 2: Add a note in TS 38.300 to reflect the fact that the Mapped Cell ID may have differing granularities, as a consequence of the potential lack of UE location information and agree the TP in this document.  Proposal 3: No other changes are needed in stage 2 as a result of not obtaining the UE location before AS security is set up.  Proposal 4: RAN3 responds to RAN2 stating: “RAN3 understands from previous correspondence with SA2 that, at initial access, it is unnecessary for the geographic area represented by the CGI to be comparable to a TN cell coverage area as long this can be supported in a ULI provided subsequently. In addition, there are no significant impacts in RAN3 specifications”. |

**Question 3.5.1: What impact “no coarse location report at initial access” may have on NG-RAN ?**

|  |  |
| --- | --- |
| **Company** | **Comment** |
| Thales | the gNB will not be able to determine during the initial access, the Mapped Cell ID and the TAI in which the UE is located, hence enabling the AMF to determine whether the UE is allowed to operate at its present location. |
| Nokia | The gNB may select an incorrect AMF, and the gNB may not be able to determine a right mapped cell ID before AS security is activated. |
| Ericsson | As stated in our paper, the gNB may have less information driving its NNSF, but this should not cause problems except possibly in extreme cases (very large cells). But even in that extreme case, the UE will get disconnected by the AMF with the NGAP cause value we recently introduced, so the RAN will know the reason for the disconnection. Then, on any subsequent network attach attempt by the same UE, the RAN will be able to pick the right AMF. |
| Huawei | It increases the possibility of selecting an incorrect AMF at initial access, but just during initial access. After AS security, it can be refined, so should not cause big problems |
| Qualcomm | Agree with Thales and Nokia that there is an impact in terms of ULI in the initial UL message, and also in terms of NNSF in some scenarios. In terms of our specifications, we see that the only impact might be quite minor (at stage 2 level as discussed in R3-221742). |
| ZTE | Agree with Ericsson and Huawei, there is no significant impact on RAN3, as eNB could get the fine location information after AS security. |
| CATT | On the CGI mapping, during initial access, RAN could not provide the mapped CGI in Initial UE Message. The legacy CGI(real CGI) could be included in that message, no extra impact to RAN3.  Without the UE location info during initial access, the selection of AMF could be relied on the legacy NNSF. After security is activated, AMF could get the UE location info via LCS service and do corresponding fallback in case the wrong AMF is selected. No further impact to RAN3. |

**Moderator’s summary:**

“no coarse location report at initial access” will impact NG-RAN as follow:

* *Without knowledge of the UE location during the initial access, the gNB may not be able to determine the corresponding country and therefore it may select an incorrect AMF.*
* *If this happens, the UE will get disconnected by the incorrect AMF which will inform NG-RAN with the NGAP cause value. However, on subsequent network attach attempt by the same UE, the NG-RAN may be able to select the right AMF.*
* *This translates into a risk of extended connection set-up only in extreme cases of large radio cell covering multiple countries.*

**Question 3.5.2: Is “no coarse location reported during initial access” acceptable from RAN3 point of view and why ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Thales | No | This may have impact the call set-up delay in case of large radio cells possibly covering multiple countries and therefore not acceptable especially for emergency call where safety of life is at stake.  Therefore a solution at RAN level is needed enabling NG-RAN to determine in which country the UE is located in order to select the appropriate AMF to prevent unacceptable delay for the connection set-up especially for NTN with large radio cells that may cover several countries (see observation 1 of R2-220235) |
| Nokia | See comments | As commented in 3.5.1,   * in case a wrong AMF is selected, the AMF may ask the UE to de-register then re-register. This may add delay. It is SA2 to answer whether this acceptable. * In case no mapped cell ID before AS security, SA2 already replied no issue if a correct mapped cell ID is sent later, e.g. after AS security.   But it is mainly the AMF to de-register/re-register the UE, and consume the mapped cell ID, so SA2 is the right group to answer whether it is acceptable. |
| Ericsson | Yes | As explained above, as far as RAN3 is concerned, in reasonable deployments (i.e. reasonably-sized cells) this will not cause trouble for NNSF. And for extreme cases, it will lead to at most one failed UE attach. |
| Huawei | Yes | It should be acceptable, SA2 has said it is fine if we can refine this after AS security. |
| Qualcomm | Yes | It would of course be much cleaner to have this information.  However, from previous discussion in RAN3 and LSs with SA2, this very scenario was already considered and accepted, as there are fallbacks. |
| ZTE | Yes | Similar as the above question, it is acceptable for RAN3. |
| CATT | Yes | As been discussed in the above question, it’s acceptable for RAN3. |

**Moderator’s summary:**

* The acceptability of “no coarse location report at initial access” is to be clarified by SA2

**Question 3.5.3: - In light of discussions on location reporting, should the content of the BLCRs be modified (e.g. for TS38.300 etc.) ? and if yes how ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Thales | No |  |
| Nokia | No | Current Stage-2 text is  The gNB is responsible for constructing the Mapped Cell ID **based on the UE location info received from the UE**.  gNB will not ask UE to report the UE location before AS security is activated. So no UE location received from the UE before AS security. Current text is still valid, since it is **based on the UE location info received from the UE** |
| Ericsson | Yes | A note as proposed by 1742 might be beneficial, possibly further adding that deploying very large cells in NTN may make it difficult for the gNB to construct the mapped cell ID based on the initial UE-provided location information.  Also adding “if available”, as proposed by 1921, seems beneficial. |
| Huawei | Yes | It is needed to add “if available” there, since we are not able to get UE location all the time now. The gNB basically construct the mapped cell ID based on the UE location from the UE as Nokia also mentioned. In cases where gNB can’t get the UE location, the mapped cell is no more constructed based on the UE location from UE. |
| Qualcomm | Yes, in a minor way | Overall there is no “direct impact”, but since ULI is mandatory in the Initial UE Message, it seems reasonable to have a stage 2 note hinting that different granularities may be used for mapped cells (NB: TA reporting is not affected if we assume that location-based TA is simply not provided). See R3-221742. |
| ZTE | Yes | OK with the clarification in 1742 and 1921. |
| CATT | Yes, but | No harm to have 1921.  For 1742, we understand it’s correct, but it may cause some confusion, as only one cell ID (no matter it’s mapped Cell ID or not) is included in the N2 message, with this note, readers may understand that multiple mapped CGIs could/should be reported to 5GC in case UE a specific geographical location may be mapped to multiple Mapped Cell ID(s).  NOTE 2: A specific geographical location may be mapped to multiple Mapped Cell ID(s), and such Mapped Cell IDs may be configured to indicate differerent geographical areas (e.g. overlapping and/or with different dimensions). |

**Moderator’s summary:**

As suggested by several companies, moderator proposes to modify the stg2 BL CR as follow:

“*The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE, if available.”*

and

“*The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network*.

*NOTE 2: A specific geographical location may be mapped to multiple Mapped Cell ID(s), and such Mapped Cell IDs may be configured to indicate differerent geographical areas (e.g. overlapping and/or with different dimensions). “*

**Question 3.5.4: Does companies agree to respond to the incoming LS in [R3-221357]. If yes what main message should be conveyed ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Thales | Yes | the gNB will not be able to determine during the initial access, the Mapped Cell ID and the TAI in which the UE is located, hence enabling the AMF to determine whether the UE is allowed to operate at its present location. |
| Nokia | Yes | RAN3 does not have any issue, but it is AMF to take the action when an incorrect AMF is selected, or use the mapped cell ID, so SA2 feedback is more important. |
| Ericsson | Yes | The absence of UE location information at network attach seems acceptable. This might lead to incorrect AMF selection in rare cases, but if this happens the NG-RAN will be able to reselect the correct AMF for the same UE. |
| Huawei | Yes | We only need to respond that we acknowledge it may increase the probability of selecting incorrect AMF, but it is acceptable since anyway it can be refined after the activation of AS security. |
| Qualcomm | Yes | As stated in our paper, we could say that “RAN3 understands from previous correspondence with SA2 that, at initial access, it is unnecessary for the geographic area represented by the CGI to be comparable to a TN cell coverage area as long this can be supported in a ULI provided subsequently. In addition, there are no significant impacts in RAN3 specifications.”  We are fine with being specific on the fact that NNSF is impacted at country borders, and that the mapped cell of the ULI may not be useful; but the conclusion should be around the above. |
| ZTE | Yes | The stage 2 correction due to the coarse UE location could be included in the reply LS. |
| CATT | Yes | We just need to say it’s acceptable from RAN3 point of view. With that, gNB will not provide mapped CGI during initial access. Without the UE location info, gNB could proceed core network selection base on legacy NNSF, and that might lead to incorrect AMF selection. |

**Moderator’s summary:**

Companies agree to draft an LS response to RAN2

Based on the inputs, moderator proposes following content for the LS response:

*“Without knowledge of the UE location during the initial access, the gNB is not able to determine the corresponding country and therefore it may select an incorrect AMF. This may apply in case of large radio cell covering multiple countries.*

*If this happens, the UE will get disconnected by the AMF and inform NG-RAN with the NGAP cause value. However, on any subsequent network attach attempt by the same UE, the NG-RAN will be able to select the right AMF.*

*This translates into a risk of extended connection set-up*

*However, there are no significant impacts in RAN3 specifications.”*

# 2nd round discussion

## TP for stg2 BL CR: UE location reporting during initial access

Proposal: Text proposal for stg2 BL CR:

“*The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE, if available.”*

and

“*The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network*.

*NOTE 2: A specific geographical location may be mapped to multiple Mapped Cell ID(s), and such Mapped Cell IDs may be configured to indicate differerent geographical areas (e.g. overlapping and/or with different dimensions). “*

**Question 4.1: Does companies agree to the above Text Proposal for stg2 BL CR ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Thales | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes with possible addition | We would propose to also add a sentence at the end of NOTE 2: “…with different dimensions). Maintaining such mapping may become complex in case very large cells are deployed.” |
| Huawei | Yes |  |
| Qualcomm | Yes | Would prefer not to add a complexity comment, and keep it simple as per original. |

**Moderator’s summary:**

The below Text proposal for stg2 BL CR seems agreeable:

“*The gNB is responsible for constructing the Mapped Cell ID based on the UE location info received from the UE, if available.”*

and

“*The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network*.

*NOTE 2: A specific geographical location may be mapped to multiple Mapped Cell ID(s), and such Mapped Cell IDs may be configured to indicate differerent geographical areas (e.g. overlapping and/or with different dimensions). “*

## LS reply to RAN2: UE location reporting during initial access

Proposed text for LS reply to RAN2 LS in R3-221357 “LS on UE location during initial access in NTN”:

*“Without knowledge of the UE location during the initial access, the gNB may not be able to determine the corresponding country and therefore it may select an incorrect AMF.*

*If this happens, the UE will get disconnected by the incorrect AMF which will inform NG-RAN with the NGAP cause value. However, on subsequent network attach attempt by the same UE, the NG-RAN may be able to select the right AMF.*

*This translates into a risk of extended connection set-up only in extreme cases of large radio cell covering multiple countries.*

*However, there are no significant impacts in RAN3 specifications.”*

Note that such response to RAN2 would be somehow aligned with R3-222619 “LS Response to LS on UE location during initial access in NTN” (SA2) “… *SA2 would thus say that the lack of accurate location information for initial access is acceptable in Release 17 and that the RAN should then provide its best estimate of the UE location in the NGAP Initial UE Message. …*”

**Question 4.2: Does companies agree to the above Text Proposal for LS reply to RAN2 (R3-221357) ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comment** |
| Thales | Yes |  |
| CATT | Yes |  |
| Ericsson | Yes |  |
| Huawei | Yes with comments | The current text proposal is correct, but in our understanding, the most essential reason of no significant impacts is we can get accurate UE location after AS security and hence refine the AMF selection. |
| Qualcomm | Not entirely | Fine with the spirit, but we have never discussed the contents of the second paragraph and the fact that the NG-RAN could learn. The basis of this use case is that the NG-RAN does not have the location so how can it learn? It is better to keep this as simple as possible e.g. removing the 2nd sentence of the 2nd paragraph. Anyway we can discuss the draft. |

**Moderator’s summary:**

It is suggested to revise the proposed text for LS reply to RAN2 LS in R3-221357 “LS on UE location during initial access in NTN” as follow:

*“Without knowledge of the UE location during the initial access, the gNB may not be able to determine the corresponding country and therefore it may select an incorrect AMF.*

*If this happens, the UE will get disconnected by the incorrect AMF which will inform NG-RAN with a specific ~~the~~ NGAP cause value. ~~However, o~~On subsequent network ~~attach~~ access attempt by the same UE, the NG-RAN may be able to select the right AMF if needed provided that UE location is reported after AS security is activated.*

*This translates into a risk of extended connection set-up only in extreme cases of large radio cell covering multiple countries.*

*However, there are no significant impacts in RAN3 specifications.”*

## Handling of TA reporting in ULI

In RAN3 LS “LS on TAC reporting in ULI and support of SAs and FAs for NR Satellite Access” in R3-221370, the following issue was stated:

*Regarding SA2's requirement to report the TAI where the UE is located, if known, RAN3 would like SA2 to clarify whether the AMF needs to be aware that the signalled TAI corresponds to the UE location, or whether it would be acceptable to assume that the RAN always provides a TAI on a “best effort” basis (regardless of knowledge of UE location).*

SA2 provided feedback in its response “LS on Reply LS on LS on TAC reporting in ULI and support of SAs and FAs for NR Satellite Access” in R3-222620/S2-2201542:

*In SA2#148E meeting, SA2 agreed that AMF may take the TAI where the UE is geographically located into account to generate a suitable Registration Area for the UE.*

*In order to reduce paging load by minimising the number of TAIs in the TAI List, it is very useful if the NG-RAN can inform the AMF whether the signalled TAI definitely corresponds to the UE location.*

Qualcomm in [R3-221743] stated that:

* Observation 1: The agreed TP in [2], while reusing the legacy IE, is not optimal when interworking with both legacy and upgraded AMFs and does not align with TS38.300.
* Observation 2: In general, a better fit to the requirements and also stage 2 is provided by the structures that do not use the legacy *TAI* IE.
* Observation 3: If necessary, it is possible to define an alternative signalling structure which reuses the legacy *TAI* IE, while being fully compatible with stage 2.
* Proposal 1: RAN3 to consider the Text Proposal in the Annex for the support of the functionality agreed in SA2.

**Question 4.3: Is the Text Proposal for the draft BL CR 38.413 in [R3-221743] agreeable ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/not agree** | **Comment/suggestions** |
| Thales | Agree |  |
| CATT | No | To satisfy the requirement of SA2, we still understand no need to add additional IE to indicate the TAI reported is UE location based or not.  As we understand we could report TAI(s) in ULI as following:   1. When the new added *Broadcast TAI list* is not exist, AMF should understand the UE is in the TAI as reported by the legacy *TAI* IE, no matter the UE location is known or not in the gNB. Which could be used for the cases:  * Hard TAC without UE location; * Hard TAC with UE location == broadcast TAI; * Soft TAC with UE location;   **Note:** in above cases, the legacy *TAI* IE indicates the only one TAI the UE is currently located.   1. When the*Broadcast TAI list* is included in ULI. AMF should understand the UE is located within the TAI list indicated by legacy *TAI* IE and the *Broadcast TAI list*. Which could be used for cases:  * Hard TAC case, where UE is located in the TAI different with the broadcasted TAI. * Soft TAC without UE location.   Furthermore, in case of hard TAC case, reporting of TAI could be optimized to let the AMF make better configure of the Registration Area for the UE, to avoid frequent TAU for the TA boarder UEs.  For the UEs around the boarders of multiple TACs, gNB could reported the potential TAI list to the 5GC, e.g. an earth moving cell is broadcasting TAI #1 for now, and which will be changed to TAI#2 several seconds later. And a UE in this cell is located in TAI#1, but near the border of TAI#2. Now, the UE location based TAI ==broadcast TAI, i.e. TAI#2.  In this case, the gNB with good implementation may decide to report TAI#1 and #2 to the 5GC, and 5GC could configure TAI #1 and #2 in the RA of the UE (which location is near the border of the TAIs). This could avoid the frequent TAI update in hard TAC case.  Anyway, this is just a kind of implementation, we do not need to specify something in our specification. The stage 3 TP agreed in the last meeting should be sufficient, we could use it flexible. |
| Ericsson | Agree with slight change | We propose to leave the semantics for the existing TAI IE as it is in the BL CR. With the addition proposed by 1743 it would read: “For NTN, contains the TAI where the UE is located, if known by the NG-RAN node and broadcast in SIB1, or an appropriate broadcast TAI otherwise.” This could be erroneously interpreted like a condition on the actual broadcasting in the SIB: “the IE contains the TAI only if broadcasted in SIB1”. |
| Huawei | Yes and no | The reply from SA2 clearly states that “I*n order to reduce paging load by minimising the number of TAIs in the TAI List, it is very useful if the NG-RAN can inform the AMF whether the signalled TAI definitely corresponds to the UE location.*” So we understand current IE structure need to be modified. With current method, we are unable to clearly indicate whether the signaled TAI corresponds to the UE location or not… So we acknowledge the change in 1743. However, it looks complicated. A better way is to introduce new IE to indicate the TAI that corresponds to the UE location, in which way, the IE structure is simple and fully satisfy SA2’s requirements. |
| Qualcomm | Yes and no | 1743 was offered as a possible compromise, if there was a strong wish to reuse the legacy TAI IE. However we think it is better to recover the proposals from last meeting (as Huawei points out they are a lot clearer), and this is mentioned in 1743. It is unfortunate that these proposals were not adopted at the last meeting as it would saved a lot of work…  So the first question is whether there is a good technical reason to reuse the legacy IE. Then once we decide that, we can work on the detail. Our preference is not to use the legacy IE. |

**Moderator’s summary:**

Majority agrees to make AMF aware whether a signalled TAI corresponds to where the UE is located or not (as per SA2 LS request)

2 options are identified: Re-use legacy TAI IE but adding an indicator (and possibly a new TAI IE for cases where the  location TAI is not in SIB1) as per R3-221743 versus create a new “TAI” IE to represent TAI where UE is located (if available), see R3-220283/R3-220466/R3-220895 from last meeting

Moderator concludes that a change is needed in the baseline CR and new IE(s)  are needed. The detail of the new IE(s) requires further discussion as per above.

# 3rd round discussion

## LS reply to RAN2: UE location reporting during initial access

From 2nd round, proposed text for LS reply to RAN2 LS in R3-221357 “LS on UE location during initial access in NTN” is revised as follow and reflected in, the draft LS in the corresponding folder:

*“Without knowledge of the UE location during the initial access, the gNB may not be able to determine the corresponding country and therefore it may select an incorrect AMF.*

*If this happens, the UE will get disconnected by the incorrect AMF which will inform NG-RAN with a specific NGAP cause value. On subsequent network access attempt by the same UE, the NG-RAN may be able to select the right AMF if needed provided that UE location is reported after AS security is activated.*

*This translates into a risk of extended connection set-up only in extreme cases of large radio cell covering multiple countries.*

*However, there are no significant impacts in RAN3 specifications.”*

**Question 5.1: Does companies agree with the draft LS reply to RAN2 ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments/suggestions** |
| Thales | Yes |  |
| Qualcomm | Yes in general | I have made some changes to try to make it clearer, also include the mention of the impact on mapped cell reporting, and have an answer to the question at the end. |
| Ericsson | Yes with slight changes | We should maintain the sentence that says that on subsequent attempts it may be possible to select the right AMF. Adding “if needed” does make sense: of course proper selection is needed. With respect to reporting of mapped cells, how it performs highly depends on the deployment and on cell size, so we should change “cannot provide” to “may not be able to provide”. Please see the proposed changes in the draft LS. |
| Huawei | Yes | Agree with QC and Ericsson’s change. |
| Nokia | Yes with comments | Not sure for “*the UE will get disconnected by the incorrect AMF which will inform NG-RAN with a specific NGAP cause value*”. According to SA2, AMF de-register the UE and ask the UE to re-register again. I doubt that there is a specific NGAP cause value to inform NG-RAN.  Also, what does it mean by “select the right AMF especially if the UE location is reported after AS security”? The AMF is selected before AS security. The UE report the information received in previous de-registeration request, in order for the NG-RAN to correctly select the AMF. |

## Handling of TA reporting in ULI

2 options are identified to make AMF aware whether a signalled TAI corresponds to where the UE is located or not (as per SA2 LS request)

* Option 1: Re-use legacy TAI IE but adding an indicator (and possibly a new TAI IE for cases where the  location TAI is not in SIB1) as per R3-221743
* Option 2: Create a new “TAI” IE to represent TAI where UE is located (if available), see R3-220283/R3-220466/R3-220895 from last meeting

**Question 5.2.1: Which options companies prefer ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1 or 2** | **Comments/suggestions** |
| Qualcomm | Option 2 | Overall we feel it is cleaner simply to have another (optional) IE, possibly merging together with the multi-TAI list as per 220283.  We can live with the approach in 1743 of course, but would like to understand whether reuse of the legacy IE is really needed in NTN. If not, then option 2 is the cleanest. |
| Ericsson | Option 2 | Given that SA2 indeed wants the AMF to know whether the signaled TAI corresponds to the UE location, indeed option 2 seems to be a cleaner approach. |
| Huawei | Option 2 | Agree QC and Ericsson. As we stated in the second round, introduce new IE is the better way. |
| Nokia | Option 2 |  |

***END***