95e-25-R18-NR-NTN-WI - Version 0.0.5
RAN

3GPP TSG RAN Meeting #95-e RP-221013

Electronic Meeting, March 17 - 23, 2022

Agenda Item: 9.3.2.7

Source: RAN Vice-Chair (AT&T)

Title: Moderator's summary for discussion [95e-25-R18-NR-NTN-WI]

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In this document, we will provide a summary for the email discussion [95e-25-R18-NR-NTN-WI] at RAN#95-e.

The focus will be to get to a consolidated revision of the WID for approval by the end of the email discussion period.

1 Topic #1: General corrections of NR_NTN_enh WID

1.1 Proposed Objectives

Topic #1 will capture the outcome of the discussions on the following documents:

1) RP-220137 [1]

2) RP-220138 [2]

The following covers the proposals listed in [2].

Proposal 1: Approve the corrections described in the previous clause of this TDOC are implemented in the WID in RP-220137

Proposal 2: RAN to decide whether to capture requirements related to User Equipment (UE) radio transmission and reception of this WID

- In a new TS 38.101-X "NR; User Equipment (UE) radio transmission and reception, part X: Satellite Access Radio Frequency and performance requirements in above 10 GHz" to be created
- In the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements

Proposal 3: RAN to decide whether to capture Coverage enhancements for NTN in a new TR

1.2 Initial Round

1.2.1 Open Issues

Concerning the set of proposals, the moderator has identified the following issues to resolve in the first round.

Issue 1.2-1: The following updates are proposed in the revised WID in [1].

- Modification to the WID title
- Unique identifier 941006 according to Rel-18 work plan
- Update of rapporteur for TS 38.101-X
- In clause 5, adding a new internal TR "NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz" and removing TR 38.863 from list of affected documents

Issue 1.2-2: Two options are proposed to capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in this WID as follows.

- Option 1: In a new TS 38.101-X "NR; User Equipment (UE) radio transmission and reception, part X: Satellite Access Radio Frequency and performance requirements in above 10 GHz" to be created
- Option 2: In the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements

Issue 1.2-3: RAN to decide whether to capture Coverage enhancements for NTN in a new internal TR.

1.2.2 Collection of company views

In all cases, if you disagree, please provide your concerns and any suggestions.

Issue 1.2-1: Are the proposed updates in the revised WID in [1] acceptable?

Feedback Form 1: Issue 1.2-1: Are the proposed updates in the revised WID in [1] acceptable?

1 – THALES Yes the proposed updates are acceptable
2 – Intelsat Yes the updates are acceptable

3 – HUGHES Network Systems Ltd

The proposed updates are acceptable

4 – Apple AB

The proposed updates look good to us.

5 – Lockheed Martin

The proposed updates are acceptable

6 – CATT

The proposed updates are acceptable.

7 – Beijing Xiaomi Mobile Software

We are fine with the update.

8 – Transsion Holdings

This updated proposal is ok.

9 – KT Corp.

The proposed updates are acceptable.

10 – Qualcomm Incorporated

The changes look OK. We would like to highlight one issue that may have been missed during the last minute changes and approval of the WID: we do not think it is necessary to create a new external TR for "Network verified UE location for NTN". RAN can conclude the work and update the WID accordingly.

11 – NTT DOCOMO INC.

We are fine with the proposed updates

12 – ZTE Corporation

We are fine with the proposed updates.

13 – Baicells Technologies Co. Ltd

The proposed updates are acceptable.

14 – HUAWEI TECHNOLOGIES Co. Ltd.

Partly agree.

Modification to the WID title

[Huawei] **Agree**

Unique identifier 941006 according to Rel-18 work plan

[Huawei] **Agree**

Update of rapporteur for TS 38.101-X

[Huawei] **Do not agree.** First, we do not think there is a need to have this new TS 38.101-x, as we shared our view in Issue 1.2-2. Second, as Huawei commented in RAN#94e, the normal practice is working group chair to designate spec editor, taking into account aspects like experience of editor candidate etc. RAN Plenary is not a suitable place to discuss spec editor issue.

In clause 5, adding a new internal TR "NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz" and removing TR 38.863 from list of affected documents

[Huawei] **Agree**

15 – Samsung Electronics Co.

Issue 1.2-1

The last bullet proposing a new co-existence TR in above 10GHz is not acceptable.

The co-existence apsect of NTN in above 10GHz should be kept within TR 38.863. It is a common approach to address the co-existence study of a specific RAT/feature/application in one single TR. And it is also a common approach to revise TRs in a release-by-release manner. A large portion of the study e.g. methodology, criteria, etc., is indentical for both below 6GHz and above 10GHz. Creating a new TR will cause duplication of such work which is not only unecessary but also time and effort consuming. Further more, deviding the TR in terms of bands above 10GHz is not in line with the definition of frequency ranges, saying FR1, FR2, in 3GPP.

Issue 1.2-2

We cannot agree with Option1. Seperating NTN UE RF and performance requirements into two TSs is inappropriate and will bring pragmatic issues .

1. A new UE TS for above 10GHz bands is not compatible with the frequency range deifition.

Unlike the logic of terrestial UE TSs, the proposed term of "bands above 10GHz" is not compatible with the current Frequency Range definition in 3GPP. Does it mean Ka band or include other bands as well in Release-18? Such proposal will lead to the confusion on potential NTN bands, e.g. Ku band, which are not within FR1 and FR2. And consequently this would lead to the forward compatible issue for its future development taking into account the consistency of 3GPP band definition.

2. The performance requirements should be within one single TS.

- The performance requirments of terrestial UE for FR1 and FR2 are defined in TS 38.101-4 as a single specification. If we follow the same procedure, the performance requirements for NTN UE should be defined in one TS. Further more, demod requirements are band agonistic (have dependency on frequency range). Then how to handle demod part in the proposed two seperated TSs?Will the NTN demod part still be within 101-5 and New specification only applied for RF requirements?

3. The draft TS38.101-5 is compatibile for all bands and UE types.

The current draft TS 38.101-5 is covering both RF and performance requirements with sections reserved for radiated parts which naturelly includes those requirements for UEs in above 10GHz bands. It will cost extra effort and time to maintain a new TS. The proposed new TS will also bring us back to further revisit the title and the scope of TS 38.101-5. Does this mean 101-5 is only dedicated for FR1? But how about the bands above 10GHz which cannot fit in FR2?

Again, the above10GHz bands do not fit within FR1 or FR2, with this approach, the consistency of 3GPP band definition will be confused. And we are in the position that the approach with single dedicated specification covering all the bands for NTN operation will simplify RAN4 drafting work in a future proof manner.

16 – Lenovo (Beijing) Ltd

Lenovo:

We are fine with the updates.

17 – MediaTek Inc.

Proposed updates are fine

18 – New H3C Technologies Co.

In principal□we are fine with FL proposal. Regarding issue 1.2-2, the motivation of option 1 isn't clear to us. We hope that the proponent explain why we need define new TS 38.101-X.

19 – Panasonic Corporation

We are fine with the proposed updates.

20 – vivo Mobile Communication Co.

we agree with samsung.

21 – Spreadtrum Communications

The proposed updates re fine to us.

22 – Samsung Electronics Co.

We also would like to support Huawei comments on working procedure. According to previous RAN plenary discussion, TS rapporteur has to be discussed with WG chair

23 – NOVAMINT

The proposed updates are acceptable for us.

24 – Omnispace

The updates are acceptable to us.

25 – Ericsson LM

The >10 GHz band should go to a separate UE specification (for radiated requirements), i.e. option 1. The WI update is OK.

26 – Intel Corporation SAS

The proposed updates are fine for us.

27 – ESA The updates are fine with us.
28 – Sateliot Proposed updates are fine
29 – Inmarsat We are ok with the update
30 – Nokia France Generally fine, except the procedural point about spec editor raised by several companies is valid.

Issue 1.2-2: Please indicate your preferred option to capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in this WID.

Feedback Form 2: Issue 1.2-2: Please indicate your preferred option to capture above 10GHz requirements

1 – THALES No strong views. However, we have some preference for option 1. Therefore it would result in one spec for below 6 GHz (38.101-5) and one spec for above 10 GHz. This would be in line with 2 specs for UE operating with terrestrial networks (TS 38.101-1 for FR1 and TS 38.101-2 for FR2)
2 – Intelsat We prefer option 1. Similar to TN UE spec separation of FR1 and FR2.
3 – HUGHES Network Systems Ltd Prefer Option 1: In a new TS 38.101-X "NR; User Equipment (UE) radio transmission and reception, part X: Satellite Access Radio Frequency and performance requirements in above 10 GHz"
4 – Lockheed Martin We prefer Option 1.
5 – CATT We also prefer the option 1, but another thing to be mentioned here for the objective "4.1.2 NR-NTN deployment in above 10 GHz bands", the proposal 5 in our contribution [12] is not covered in this email discussion. **Proposal 5: Support extended CP in more than 60 kHz subcarrier spacing in Rel-18, and update the WID accordingly.**

Based on the discussion in Rel-17, the time synchronization performance is quite challenaging both in FR1 and FR2. In view of unavoidable synchronization error, including GNSS error, ephermeris error or UE implementation error, extended CP is very necessary to guarantee the performance of UL synchronization.

Therefore, we propose to add one bullet in 4.1.2 to support extend CP in more than 60KHz subcarrier spacing in Rel-18. The proposed change could be found in the bold text below:

4.1.2 NR-NTN deployment in above 10 GHz bands

Base on the discussion above, the objective could be revised as below:

- Identify values for physical layer parameters chosen from the existing FR1 and FR2 sets. The following set of parameters to specify, but not necessarily limited to, are listed.as follows [RAN4]:
    - time relationship related enhancement (e.g. K_offset)
    - subcarrier spacing for different UL/DL signals/channels
    - PRACH configuration index for FDD above 10 GHz.
    - **Extended CP in more than 60 kHz subcarrier spacing**

6 – Transsion Holdings

No strong view, but we prefer option 1.

7 – Qualcomm Incorporated

We would prefer Option 2 (in general, we should avoid adding new specifications unless strictly needed).

8 – HUAWEI TECHNOLOGIES Co. Ltd.

From our view it is better to reuse current 38.101-5 spec for NTN RF requirements above 10 GHz (not to create a spec unless it is really necessary). We share similar view with Qualcomm and prefer option 2.

9 – Baicells Technologies Co. Ltd

Prefer option 1.

10 – Samsung Electronics Co.

Option 2

11 – ZTE Corporation

Regarding the spec, option-2 is slightly preferred to reduce the load. For the scope, no additional content/bullet is preferred and we need to satisfy the requirement by proper configuration.

12 – Lenovo (Beijing) Ltd

Lenovo:

Option 1 is preferred.

13 – MediaTek Inc.

We have preference for option 2.

14 – New H3C Technologies Co.

We support option 2. The motivation of option 1 isn't clear to us. We hope that the proponent explain why we need define new TS 38.101-X.

15 – vivo Mobile Communication Co.

option2

16 – Spreadtrum Communications

We prefer Option 2 slightly.

17 – NOVAMINT

We prefer option 1.

18 – Ericsson LM

The >10 GHz band should go to a separate UE specification (for radiated requirements), so opt. 1 seems preferable.

19 – Intel Corporation SAS

We prefer new TS 38.101-X for the requirements in above 10GHz NTN.

20 – ESA

We prefer option 1

21 – Samsung Electronics Co.

It seems comments for 1.2.2 has been posted in 1.2.1. Let me copy the comments here again

We cannot agree with Option1. Seperating NTN UE RF and performance requirements into two TSs is inappropriate and will bring pragmatic issues .

1. A new UE TS for above 10GHz bands is not compatible with the frequency range deifition.

Unlike the logic of terrestial UE TSs, the proposed term of "bands above 10GHz" is not compatible with the current Frequency Range definition in 3GPP. Does it mean Ka band or include other bands as well in Release-18? Such proposal will lead to the confusion on potential NTN bands, e.g. Ku band, which are not within FR1 and FR2. And consequently this would lead to the forward compatible issue for its future development taking into account the consistency of 3GPP band definition.

2. The performance requirements should be within one single TS.

- The performance requirments of terrestial UE for FR1 and FR2 are defined in TS 38.101-4 as a single specification. If we follow the same procedure, the performance requirements for NTN UE should be defined in one TS. Further more, demod requirements are band agonistic (have dependency on frequency range). Then how to handle demod part in the proposed two seperated TSs?Will the NTN demod part still be within 101-5 and New specification only applied for RF requirements?

3. The draft TS38.101-5 is compatibile for all bands and UE types.

The current draft TS 38.101-5 is covering both RF and performance requirements with sections reserved for radiated parts which naturelly includes those requirements for UEs in above 10GHz bands. It will cost extra effort and time to maintain a new TS. The proposed new TS will also bring us back to further revisit the title and the scope of TS 38.101-5. Does this mean 101-5 is only dedicated for FR1? But how about the bands above 10GHz which cannot fit in FR2?

Again, the above10GHz bands do not fit within FR1 or FR2, with this approach, the consistency of 3GPP band definition will be confused. And we are in the position that the approach with single dedicated specification covering all the bands for NTN operation will simplify RAN4 drafting work in a future proof manner.

22 – Inmarsat

We don't have strong views either way.

In regards to CATT's comment. Given the LoS AWGN channel for NTN above 10 GHz (multipath basically doesn't apply) and the implications in terms of added overhead for having an extended CP, we suggest against considering extended CP for higher numerologies.

If anything, if a different CP is considered, we suggest considering a shorter CP.

23 – Intel Corporation (UK) Ltd

We would like to update our original comment (Intel Corporation SAS).

After further check of the existing TS 38.101-5 we understand that the structure may already be able to accommodate radiated requirements for > 10GHz requirements in terms of both RF and performance requirements. Therefore, we are fine to reuse the current specification. So, Option 2 is fine for us.

24 – Nokia France

We have a slight preference for option 1

Issue 1.2-3: Do you agree that Coverage enhancements for NTN should be captured in a new internal TR?

Feedback Form 3: Issue 1.2-3: Do you agree that Coverage enhancements for NTN should be captured in a new internal TR?

1 – THALES

No strong views but we are fine with this proposal.

2 – HUGHES Network Systems Ltd

We are fine with the proposal

3 – HUGHES Network Systems Ltd

We support the proposal

4 – Apple AB

Sounds good to us.

5 – Lockheed Martin

We are ok with the proposal.

6 – Transsion Holdings

Yes, good to have.

7 – Qualcomm Incorporated

We think we don't need to create a new TR for this purpose – this would create additional overhead in the WGs without any obvious benefit.

8 – NTT DOCOMO INC.

We don't have strong view, but the internal TR title should be modified if coverage enhancement is included. The current title is specific to above 10GHz study.

9 – HUAWEI TECHNOLOGIES Co. Ltd.

There are many RAN1 work items with study phase or study objectives. Usually there is no dedicated TR to capture the study outcome for such study phase/objectives. We do not see strong need to have a dedicated TR for NTN coverage enhancement.

10 – Baicells Technologies Co. Ltd

No strong views, but the requirments should be studied.

11 – Samsung Electronics Co.

No need to create new TR. We give the reason as in issue 1.2.1

12 – ZTE Corporation

Taking it as a study phase instead of SI, there is no need to have a dedicated TR.

13 – Lenovo (Beijing) Ltd

Lenovo:

We are OK to study this but wonder whether it is necessary to have a dedicated TR.

14 – MediaTek Inc.

No need to create a new TR

15 – Panasonic Corporation We are fine with the proposal.
16 – New H3C Technologies Co. We can study coverage enhancements for NTN but a dedicated TR on this isn't required.
17 – vivo Mobile Communication Co. no strong view.
18 – Spreadtrum Communications We support this proposal.
19 – NOVAMINT We are fine with the proposal.
20 – Omnispace We support the proposal
21 – Ericsson LM Given that the Rel-18 WID currently calls for a study phase, the only way to document that is in a dedicated TR. So we support this proposal, for proper documentation.
22 – Intel Corporation SAS In our view there is no strong need to have an internal TR. However, we are open to consider it.
23 – ESA We support current proposal
24 – Samsung Electronics Co. There is some misunderstanding about this issue. I thought this issue still related to RAN4 TR 38.863 but obviously I am totally wrong. I have to correct our comment. We are fine to have new internal TR for coverage enhancement for NTN

1.2.3 Summary and recommendation for further discussion

The following summarizes the discussion in the first round and the recommendations for further discussion.

Issue 1.2-1:

Concern was raised as to the update of the rapporteur without consultation with the RAN Chair. The moderator proposes that the update to the rapporteur be removed from the revised WID or the proponent of the revised WID should confirm the update with the RAN Chair prior to updating the rapporteur. Of course, 38.101-X may not be required depending on the outcome of the discussion on Issue 1.2-2.

vivo and Samsung could not agree to adding a new internal TR “NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz” and removing TR 38.863 from list of affected documents. Their preference would be to keep with RAN4 practice to address the co-existence study of a specific RAT/feature/application in one single TR even if it spans multiple releases and to minimize duplication of work. Although there seemed to be wide support for the proposed revision to create a new internal TR, the moderator would like to keep with the originally approved WID approach given the previous RAN agreement at RAN#94e to update TR 38.863 based on the outcome of the co-existence study. This follows the long-standing practice that there should be a very high bar to modify previous agreements and, in the end, the co-existence study will still be captured in accordance with the WID.

The moderator asks the proponent to remove the revisions to section 5 related to adding a new internal TR “NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz” and removing TR 38.863 from list of affected documents.

The remaining updates to the WID are acceptable. During the intermediate round, there will be no additional discussion on the revised WID concerning the items identified in Issue 1.2-1. Any updates concerning the rapporteur discussion can be communicated over email after conclusion of Issue 1.2-2 and consultation with the RAN Chair.

Issue 1.2-2:

The following two options were proposed to capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in this WID.

- Option 1: In a new TS 38.101-X “NR; User Equipment (UE) radio transmission and reception, part X: Satellite Access Radio Frequency and performance requirements in above 10 GHz” to be created
- Option 2: In the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements

The following summaries the company preferences.

Option 1: Thales, Intelsat, Hughes, Lockheed Martin, CATT, Transsion Holdings, Baicells, Lenovo, NOVAMINT, Ericsson, ESA, Nokia

Option 2: Qualcomm, Huawei, Samsung, ZTE, MediaTek, New H3C Technologies, vivo, Spreadtrum Communications, Intel

As shown, views are mixed as to which option to pursue even though Option 1 was implicitly endorsed in the approved WID at RAN#94e. Companies supporting Option 2 expressed concern with pursuing Option 1 given that the plan was to capture the performance requirements for all bands in TS 38.101-5 and given that the latest draft TS38.101-5 is compatible for all bands and UE types. In addition, Option 2 would simplify RAN4 drafting work and additional overhead of a new specification. The moderator observed that some companies that expressed a preference for Option 1 also indicated that they had no strong preference or did not specifically object to Option 2. Although adopting Option 2 will go against the original WID based on the agreement at RAN#94e, the moderator proposes to adopt Option 2 based on the fact that the existing TS

38.101-5 is already structured to accommodate radiated requirements for >10GHz requirements for both RF and performance requirements.

Concerning the comment from CATT that their proposal 5 in [12] is not covered in the email discussion, the moderator was following the RAN Chair's guidance that the email discussion would not include CP aspects as noted in the related documents for [95e-25-R18-NR-NTN-WI] as shown below.

"RP-220137, 0138, 0139, 0174, 0200, 0421, 0422, 0525, 0559, 0601, 0615, 0646, 0740 (excluding the CP part)"

The moderator has identified an additional issue to resolve in the intermediate round identified as Issue 1.3-1 in section 1.3.1.

Issue 1.2-3: RAN to decide whether to capture Coverage enhancements for NTN in a new internal TR.

There were mixed views on the need for a new internal TR to capture Coverage enhancements for NTN given that the study is part of a study phase in the work item. Company views seemed to be split. The moderator proposes to close discussion on this topic given the mixed views at this time. Further consideration of a new internal TR can be considered after discussions in the WGs have identified any need for a new internal TR.

1.3 Intermediate Round

In the intermediate round, the moderator proposes to consider the following open issue.

1.3.1 Open Issues

Issue 1.3-1: The moderator proposes to adopt Option 2 from Issue 1.2-2 and to capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements.

1.3.2 Collection of company views

Issue 1.3-1: Do you agree with the moderator way forward to adopt Option 2 from Issue 1.2-2?

Feedback Form 4: Issue 1.3-1: Do you agree with the moderator way forward to adopt Option 2 from Issue 1.2-2?

1 – THALES We are fine with Moderator's proposed way forward
2 – Lenovo (Beijing) Ltd We agree with Moderator's view and can adopt Option 2.
3 – Apple AB We also support Option 2.

4 – Qualcomm Incorporated

Yes

5 – ZTE Corporation

We are fine with the current proposal

6 – MediaTek Inc.

Support proposal from moderator

7 – Intel Corporation SAS

We support the WF proposed by moderator

8 – Transsion Holdings

We are fine with this WF.

9 – HUAWEI TECHNOLOGIES Co. Ltd.

Agree

Another comments not related issue 1.3-1, but related to topic 1. I cannot find other place to input, so I provide our response here. Regarding this summary from moderator: '*Huawei and Samsung could not agree to adding a new internal TR "NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz" and removing TR 38.863 from list of affected documents',* we would like to clarify that according to our response in the initial round, we are actually agree to add this TR.

10 – vivo Mobile Communication Co.

We support this WF

11 – CATT

Support Moderator's WF.

12 – NOVAMINT

We support the Way forward proposed by the moderator

13 – HUGHES Network Systems Ltd

We are OK with Moderator's proposed way forward

14 – Omnispace

we support the moderator way forward

15 – Inmarsat

We support the moderator's way forward

16 – Samsung Electronics Co. Yes, we agree with moderator suggested WF

1.3.3 Summary and recommendation for further discussion

The following summarizes the discussion in the intermediate round and the recommendations for further discussion.

Issue 1.3-1:

All companies supported the moderator proposal to adopt Option 2 from Issue 1.2-2 and to capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements.

The moderator notes the Huawei's comment concerning the initial round summary of Issue 1.3-1. The initial round summary has been updated in this latest revision of the summary document to correct this issue.

The following moderator way forward can be agreed. No further discussion is required in the final round.

Moderator Way Forward:

- Capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements.

2 Topic #2: Network verified UE location

2.1 Proposed Objectives

Topic #2 will capture the outcome of the discussions on the following documents:

RP-220139 [3]

RP-220174 [4]

RP-220200 [5]

RP-220421 [6]

RP-220525 [7]

RP-220559 [8]

RP-220615 [10]

RP-220646 [11]

2.2 Initial Round

2.2.1 Open Issues

Concerning the set of proposals, the moderator has identified the following issues to resolve in the first round.

Issue 2.2-1: When considering the following proposals:

- RP-220174/Proposal 2: RAN to have further discussion on the required accuracy for verifying the country of the UE location.
    - As a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms)
- RP-220421/Proposal 1: A common understanding of the targeted services and the corresponding requirement for the NTN based UE location verification should be reached, taking into account existing requirements for 3GPP terrestrial network and existing international or regional requirement.
- RP-220559/Proposal 2: Common understanding on the supported use cases and related requirement should be achieved in the first place.
- RP-220615/Proposal 1: NW utilizing UE location to provide specific services, e.g., emergency call, public warning, should be the main motivation of "network verified UE location".
- RP-220615/Proposal 3: Requirement should be defined targeting the motivation that NW can utilize UE location to provide specific services, e.g., emergency call, public warning. Regulatory requirements in Rel-16 NR positioning can be taken as baseline for the initial step.
- RP-220646/Proposal 2: Privacy, user consent, reliability constraints should be taken into account when defining enhancements of relevant 3GPP defined RAT independent/dependent UE positioning methods to support Network verified UE location specification support in Rel-18.
- RP-220646/Proposal 3

The following revision of the first bullet point in clause 4.1.3 of the WID is proposed as below.

"Study detailed regulatory requirement (e.g. accuracy, Privacy, user consent, reliability) for network-verified UE location targeted use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#9~~6~~7). Regulatory requirements in Rel-16 NR positioning can be taken as baseline if no NTN specific requirements are available. For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms).

Issue 2.2-2: When considering the proposal in [5] as follows:

- Network-based positioning is used in order to verify UE location information
    - Consider UE-assisted LMF-based and NG-RAN node assisted positioning methods
    - Accuracy should be comparable to terrestrial network cell sizes
- Study should evaluate these methods in NTN environment to determine if desired accuracy can be met

The following revision of the first sub-bullet point in clause 4.1.3 of the WID is proposed as below.

"Including further clarification on network verified UE location refers to a ~~and its relationship to~~ network-based positioning method used to verify UE location reported information. This includes UE-assisted LMF-based and NG-RAN node assisted positioning methods [RAN]"

Issue 2.2-3: When considering the following proposals:

- RP-220174/Proposal 1: For Rel-18, at least study, and evaluate if needed, solutions for network to verify the country of the UE location.
- RP-220174/Proposal 3: RAN1 and RAN2 to focus on adapting TN positioning techniques, such as DL-TDOA, UL-TDOA and RTT, for verification of the UE location using a single or multiple satellites.
- RP-220559/Proposal 3: NG-RAN verified UE location based on UE assistance information or based on UE location acquired by LCS procedure can be considered.
- RP-220615/Proposal 2: For network verified UE location, solutions for estimation of UE location at network side need to be studied.
- RP-220646/Proposal 1: The WI should consider existing 3GPP defined positioning methods for the NTN network verified UE location and identify, if any, through gap analysis.
- RP-220646/Proposal 3

The following revision of the second sub-bullet point in clause 4.1.3 of the WID is proposed as below.

"Study and evaluate, if needed, solutions for network to verify UE reported location information. In priority, the study will consider solutions based 3GPP defined RAT independent/dependent UE positioning methods (e.g. DL-TDOA, UL-TDOA and RTT) and methods based on UE assistance information or based on UE location acquired by LCS procedure. [RAN2,RAN1,RAN3]"

Issue 2.2-4: When considering the proposal in [8] as follows:

- Proposal 1: It is desirable to have normative work on the network verified solution in Rel-18.

The following revision of the last sentence in clause 4.1.3 of the WID is proposed as below.

"RAN to determine by RAN#98 whether the study has identified any need for Network verified UE location specification support in Rel-18 and, if so, define the scope of the related normative work to be done in Rel-18."

Issue 2.2-5: In accordance with Proposal 1 in [3], RAN to discuss/agree to the skeleton proposed for the TR "NR; Network verified UE location for NTN" in RP-220525.

Issue 2.2-6: In accordance with Proposal 2 in [3], RAN to discuss/agree to a possible text proposal for the TR "NR; Network verified UE location for NTN" based on the initial study/methodology reflected in the Clause 2 of [3].

2.2.2 Collection of company views

In all cases, if you disagree, please provide your concerns and any suggestions.

Issue 2.2-1: Do you agree to the proposed revision of the first bullet point in clause 4.1.3 of the WID?

Feedback Form 5: Issue 2.2-1: Do you agree to the proposed revision of the first bullet point in clause 4.1.3 of the WID?

1 – THALES

Ok with the proposal. Note that the text in bold (below) is actually part of the proposed updates:

"Study detailed regulatory requirement **(e.g. accuracy, Privacy**, user consent, reliability) for network-verified UE location targeted use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#9~~6~~7). Regulatory requirements in Rel-16 NR positioning can be taken as baseline if no NTN specific requirements are available. For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms).

2 – Guangdong OPPO Mobile Telecom.

We think the last two sentences are contradictory. According to TR 38.855, regulatory requirement for Rel-16 positioning is less than 50m instead of a few Kms.

Then we would like to clarify the timeline if changing RAN#96 to RAN#97. Does it mean that the second sub-bullet "Study and evaluate, if needed, solutions for network to verify UE reported location information [RAN2,RAN1,RAN3]" starts after RAN#97 and by RAN#98 as RAN#98 is supposed to conclude whether to have the specification support for Rel-18 ?

Meanwhile, we realize that an ongoing Rel-18 eLCS SID in SA2 is discussing the same topic, e.g. accuracy requirement for regulatory services in NTN. RANP may coordinate with SA2 and take SA2's conclusion into account during RANP's study.

3 – HUGHES Network Systems Ltd

We are fine with the proposal. Thanks

4 – Apple AB

We are mostly OK with this rewording. Re user consent, this has traditionally been handled by SA3 and not RAN groups, so we may need to coordinate with SA3 on this aspect.

Further, we also think the last two sentences in the proposal can be removed. Our understanding is that accuracy requirements for different use cases is different (e.g., between emergency services and lawful

intercept), so the last sentence is a bit misleading. What is considered baseline can wait for the study conclusion anyways.

We are unclear why the timeline for concluding this study has shifter from RAN#96 to RAN#97.

5 – Lockheed Martin

We suggest the following rewording: "Study detailed regulatory requirements, including accuracy, Privacy, user consent, reliability for network-verified UE location targeted use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing), e.g. accuracy requirement (at RAN plenary, from RAN#95 to RAN#967). Regulatory requirements in Rel-16 NR positioning can be consideredas baseline if no NTN specific requirements are available.

6 – CATT

We are almost ok with this update.

Share the view with Apple, it seems ok to remove the last 2 sentences.

7 – Beijing Xiaomi Mobile Software

We share the same concern with OPPO on the accuracy requirements.

meanwhile, the latency requirement is also meantioned in 3GPP TR 22.872. it is suggested to update as:

"Study detailed regulatory requirement (e.g. accuracy, Privacy, user consent, reliability, **latency**) for network-verified UE location targeted use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~,~~

8 – Qualcomm Incorporated

We think there is some confusion regarding the regulatory requirements. For instance, the FCC requirement for emergency calls can be met by a UE reporting the GNSS location – this is the same solution as widely deployed today in terrestrial networks.

Regarding other requirements, e.g. lawful intercept / network selection, indeed SA3-LI indicated in their previous LS to RAN2 that for this purpose it may not be reliable to rely on the UE reported location, and that the required accuracy is similar to a cell size. Thus, we think that the requirement for network verification should be in this order (few kms).

We can discuss the details on WID update after RAN settles the exact scenario and requirements. Also, we think two plenary cycles should be enough to solve this issue (otherwise we would be delaying the start of the work in the WGs)

9 – Intelsat

We agree with the Thales comments

10 – Intelsat

We are ok with the proposal

11 – Baicells Technologies Co. Ltd

We share the same concerns with OPPO about the accuracy requirements.

Prefer to remove the last two sentences to avoid confusion.

12 – HUAWEI TECHNOLOGIES Co. Ltd.

We believe the most important thing for RAN plenary is to clarify the targeted services and its correspondig requiremements. Without clear understanding, it is too early to agree on "targeted" use case/services and update the WID. If companies really see the need to add some exmaple/potential user cases/services in the WID, it is acceptable to us. But we need to make it clear this is just "potential" services for investigation instead of agreed or targeted services.

None-Terrestrial Network has largely different location capability compared to Terrestrial Network due to e.g. much larger cell size, different channel bandwidth, SINR and high mobility. We do not think regulatory requirements for Rel-16 NR positioning (for Terrestrial Network) can be applied, as baseline, to NTN directly. So we suggest to remove the last two sentences.

Suggested revision as below:

"Study detailed regulatory requirement (e.g. accuracy, privacy, user consent, reliability) for network-verified UE location ~~targeted~~**potential** use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing) (at RAN plenary, from RAN#95 to RAN#97). ~~Regulatory requirements in Rel-16 NR positioning can be taken as baseline if no NTN specific requirements are available. For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms).~~

13 – ZTE Corporation

It should be noticed that the target for this study is for positioning verification and we need to focus on the corresponding requirements firstly. But **the scope seems to be extended by some of the proposed updates, e.g., more use cases and services**, which is not aligned with the previous intention. Meanwhile, we share the views of other companies and do not prefer to take the existing requirement as a baseline. BTW, since we are targeting location verification, which is based on the needs of regulation, the requirement of user consent for such action (i.e., verification) may not be needed.

For the position verification, the following updates is preferred:

- Study detailed regulatory requirement (e.g. accuracy, Privacy, ~~user consent~~, reliability, **Latency**) for network-verified UE location targeted use cases/services (i.e. ~~emergency call,~~ lawful intercept, ~~public warning,~~ charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96~~7~~). ~~Regulatory requirements in Rel-16 NR positioning can be taken as baseline if no NTN specific requirements are available. For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms)~~

14 – Lenovo (Beijing) Ltd

Lenovo:

OK with the revised version.

15 – Panasonic Corporation

We are fine with the update.

16 – New H3C Technologies Co.

We are fine with this proposal with HW and ZTE's modification.

17 – vivo Mobile Communication Co.

we suport to include the use consent, however we would like to remove the last two sentences.

18 – Transsion Holdings

We are ok with this proposal.

19 – MediaTek Inc.

We have preference to allow discussions in study phase first before defining requirements. It should be first discussed whether the regulatory requirements for Rel-16 NR positioning (for Terrestrial Network) are suitable for NTN use cases / services. Revisions of the WID based on the proposed updates by Huawei and ZTE would be helpful.

20 – Spreadtrum Communications

We support the suggestion of Apple.

21 – NTT DOCOMO INC.

We basically agree. From our perspective, the regulatory requirement should be defined targeting the use cases of e.g., emergency call, public warning, etc, where the motivation should be NW can utilize UE location to provide specific services. Meanwhile, as regulatory requirements in Rel-16 NR positioning can be taken as baseline for the initial step, the last sentence should be deleted as it is contradictory with Rel-16 positioning requirements. Meanwhile, we do not appreciate update RAN#96 to 97 due to more RAN plenary study would lead to difficulties on introducing TN-like positioning mechanism.

"Study detailed regulatory requirement (e.g. accuracy, Privacy, user consent, reliability) for network-verified UE location targeted use cases/services (i.e. emergency call, lawful intercept, public warning,charging/billing), ~~e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#9~~6~~7~~6~~). Regulatory requirements in Rel-16 NR positioning can be taken as baseline if no NTN specific requirements are available. ~~For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms).~~

22 – Omnispace

We agree with Thales Views

23 – Ericsson LM

In general, we see it as a contradiction that the UE-provided GNSS information is not considered reliable while all other UE-provided information (e.g. radio measurements, etc.) is. This is not to be intended as questioning the SA3 findings, but rather as an invitation to a "pragmatic" approach. No verification method will work without sensible deployment criteria, e.g. cell sizes should not be too big, etc.

Furthermore, from the proposed rewording it's not clear whether we will be addressing positioning or UE location verification (as other companies point out). Assuming the latter, we disagree with the proposed rewording. Assuming we go for a study phase for this item, we believe it will take no less than 6 months.

24 – Samsung R&D Institute UK

We have a similar view to OPPO on possible coordination with SA2 on ongoing Rel-18 eLCS SID.

No need to include the last sentence "For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms)." The accuracy can depend on use cases, regulatory requirements, etc.

25 – Intel Corporation SAS

We are OK with the change except the following.

- Last sentence is not needed. In our view it is not necessary to add example here.

- Latency can be added to the regulatory requirements list if we want to cover all possible aspects.

26 – ESA

The proposal is fine with us

27 – HUAWEI TECHNOLOGIES Co. Ltd.

We share similar view with Ericsson on this "In general, we see it as a contradiction that the UE-provided GNSS information is not considered reliable while all other UE-provided information (e.g. radio measurements, etc.) is. "

28 – Inmarsat

We agree with the proposal. Thales suggestion is also ok with us but maybe we don't need the last sentence "For example as a baseline, consider an accuracy comparable to the size of a terrestrial cell (e.g. a few kms)." as we are of the same view that accuracy can depend on the use cases.

However, it is also true that for regulatory purposes, which is the absolute minimum that needs to be addressed, 2 km position accuracy is enough.

29 – Sony Europe B.V.

The objective should focus on studying the detailed regulatory requirements for network-verified UE location rather than the regulatory requirements for UE positioning.

Our views are hence somewhat aligned with those of Qualcomm, ZTE and Ericsson.

Our understanding is that an accuracy of location verification of the order of a TN cell would be sufficient, but this accuracy requirement can be studied during the ongoing study.

30 – NOVAMINT

We are fine with the updated proposal. We agree with MediaTek's comment that we should allow discussions in study phase first before defining requirements. We are fine as well to considerer the proposed updates by Huawei or ZTE.

Issue 2.2-2: Do you agree to the proposed revision of the first sub-bullet point in clause 4.1.3 of the WID?

Feedback Form 6: Issue 2.2-2: Do you agree to the proposed revision of the first sub-bullet point in clause 4.1.3 of the WID?

1 – THALES

Ok with suggested small change in bold text here below. Moreover it shall be understood that NG-RAN node assisted positioning methods include RAT dependent positioning methods (e.g. DL-TDOA, UL-TDOA and RTT/multi-RTT)

"Including further clarification on network verified UE location **which**refers to a ~~and its relationship to~~ network-based positioning method used to verify UE location reported information. This includes UE-assisted LMF-based and NG-RAN node assisted positioning methods [RAN]"

2 – Guangdong OPPO Mobile Telecom.

Some wording comments:

remove "reported information" after "verify UE location" and add "LMF-based" after "NG-RAN node assisted"

3 – HUGHES Network Systems Ltd

Support the proposed revision and agreed with Thales to insert "which"

4 – Apple AB

We don't think any change is required but OK to add LMF-based and NG-RAN node assisted in brackets as follows:

"Including further clarification on network verified UE location and its relationship to network-based positioning (e.g., NG-RAN node assisted and UE assisted LMF based positioning methods)."

5 – CATT

We understand that the first phase is to study the detailed regulatory requirements, e.g. accuracy, Privacy, user consent, reliability for network-verified UE location. The method on how to verify the UE location information is the 2nd phase, maybe network based positioning method could be used, maybe the other methods.

Therefore, we propose to revise the texts with a simple sentence, as below:

"Including further clarification on **whether** the network-based positioning methods **could be used** to verify the UE location reported infortmation."

6 – Qualcomm Incorporated

We think there is some confusion regarding the regulatory requirements. For instance, the FCC requirement for emergency calls can be met by a UE reporting the GNSS location – this is the same solution as widely deployed today in terrestrial networks.

Regarding other requirements, e.g. lawful intercept / network selection, indeed SA3-LI indicated in their previous LS to RAN2 that for this purpose it may not be reliable to rely on the UE reported location, and that the required accuracy is similar to a cell size. Thus, we think that the requirement for network verification should be in this order (few kms).

We can discuss the details on WID update after RAN settles the exact scenario and requirements. Also, we think two plenary cycles should be enough to solve this issue (otherwise we would be delaying the start of the work in the WGs)

7 – Qualcomm Incorporated

The new proposed text is a bit verbose, we think just saying ”RAT-dependent positioning methods” would be enough.

8 – HUAWEI TECHNOLOGIES Co. Ltd.

Do not agree

As per WID “Including further clarification on network verified UE location and its relationship to network-based positioning [RAN]”, RAN is supposed to clarify the relationship of network verified UE location and network-based positioning. From our understanding network-verified UE location does not equal to network-based positioning method used to verify UE location reported information. **We prefer to keep the WID as it is**, and RAN to work on the clarification of the relationship according to targeting services and requirements.

9 – ZTE Corporation

Disagree.

Before we touch on the details of the solution, we should focus on the clarification of the scope and requirement first. As commented for **Issue 2.2-1,** it seems that we try to extend the scope to define the NTN-specific positioning mechanism to cover potential cases, which is not preferred.

Moreover, from a technical perspective, the network-based positioning **is only one of the approaches** to verify the reported GNSS content, but with a high workload.

Let’s clarify the intention and scope first.

10 – Lenovo (Beijing) Ltd

We share Hyuawei's view that "network verified UE location" is not equal to "network-based positioning", although verification with the help of positioning. Another issue needs to be solved is that UE location verification/determination in initial access.

So we prefer to keep the text as it is.

11 – Panasonic Corporation

We are fine with the update.

12 – vivo Mobile Communication Co.

No, we agree with huawei.

13 – Transsion Holdings

We are ok with this proposal.

14 – New H3C Technologies Co.

It is better to keep the original description in WID and RAN need firstly clarify the relationship of network verified UE location and network-based positioning before updating the WID.

15 – MediaTek Inc.

We have preference to keep the existing wording in the WID. Methods for network verified UE location can be first discussed in study phase to align understanding of companies. We think it is too early to assume that network verified UE location are network-based positioning method used to verify UE location reported information. There should also be some clarifications on the requirements for NTN use cases and services.

16 – Spreadtrum Communications

Considering how to verify the UE location information is the 2nd phase, we support the comments from CATT.

17 – NTT DOCOMO INC.

It needs to be clarified network-based positioning methods are used for the NW to utilize UE location other than verify UE reported location information. It should be revised more simple and clear:

"Including further clarification on network verified UE location, which refers to a ~~and its relationship to~~ network-based positioning methods, ~~used to verify UE location reported information. This includes~~ including UE-assisted LMF-based and NG-RAN node assisted positioning methods [RAN]"

18 – Ericsson LM

Once again, we wonder why UE-provided GNSS info is not considered reliable yet other UE-provided assistance information to be used for network-based methods is.

We believe the discussion should not be restricted to a particular set of positioning methods at this point, hence we disagree with the proposed rewording.

19 – Samsung R&D Institute UK The proposed revision is fine.
20 – Intel Corporation SAS We support the proposed modification.
21 – ESA The revision is fine with us.
22 – Inmarsat No strong views at this point. The key is to support the use cases, particularly regulatory compliance related.
23 – NOVAMINT Support the proposed revision and agreed with Thales suggestion.

Issue 2.2-3: Do you agree to the proposed revision of the second sub-bullet point in clause 4.1.3 of the WID?

Feedback Form 7: Issue 2.2-3: Do you agree to the proposed revision of the second sub-bullet point in clause 4.1.3 of the WID?

1 – THALES We support as we understand that RTT method covers also multi-RTT method
2 – Guangdong OPPO Mobile Telecom. Suggest to remove ”and methods based on UE assistance information or based on UE location acquired by LCS procedure” as they are redundant.
3 – HUGHES Network Systems Ltd Agreed with Thales’s view.
4 – Apple AB The phrasing ”in priority” is unclear. Is the intent to prioritize network based positioning mechanisms over UE assistance based methods. Or just to prioritize the stated mechanisms over any other mechanism (e.g., use of TA)?
5 – CATT The solution for UE location verification is in the 2nd phase after the study on the requirement. The existing texts should be ok, we should not decide which method to be used/prioritized for UE location verification for now.

6 – Beijing Xiaomi Mobile Software

We are fine with the proposal

7 – Qualcomm Incorporated

The new proposed text is a bit verbose, we think just saying ”RAT-dependent positioning methods” would be enough.

8 – Qualcomm Incorporated

The current text seems OK, but it may be better to wait till the RAN study is completed to correctly update the WID.

9 – HUAWEI TECHNOLOGIES Co. Ltd.

We share similar view with Qualcomm that it is better to wait untill RAN study is finished, then WID can be updated accordingly. The proposed WID revision is not based on study outcome, and we suggest to keep the objective as in the WID for now.

10 – ZTE Corporation

As commented before, there are potential solutions (e.g., assistance information from UE) to achieve the verification of location but can be considered during the WG group discussion. We can focus on the study and clarification at RAN level first.

11 – Lenovo (Beijing) Ltd

Lenovo:

OK with the bullet.

12 – Panasonic Corporation

We are fine with the update.

13 – Baicells Technologies Co. Ltd

Agree with CATT’s view.

14 – vivo Mobile Communication Co.

we should study the requirement firstly and then discuss the methods or soluions later.

15 – Transsion Holdings

We are ok with this proposal.

16 – New H3C Technologies Co.

Firstly RAN completes study and then we discuss about this proposal again.

17 – MediaTek Inc.

As mentioned on issues 2.2-1 and 2.2-2, RAN can first wait for progress in discussions during study phase and not pre-empt potential outcome of the study at this early stage.

18 – Spreadtrum Communications

Agree with CATT, the exact method of location is the issue of next stage.

19 – NTT DOCOMO INC.

Agree with this proposal. The 3GPP defined RAT independent/dependent positioning methods needs to be firstly considered.

20 – Ericsson LM

We believe the discussion should not be restricted to a particular set of positioning methods at this point, hence we disagree with the proposed rewording. The only thing possibly worth clarifying, is that the study should also cover the GEO case (for which there is currently no solution). We would also have a preference to converge towards a single solution for all cases, including GEO.

21 – Samsung R&D Institute UK

The proposed revision is fine.

22 – Intel Corporation SAS

In our view this change is not needed if revision of the first sub-bullet point is agreed. Or, it can be reformulated as:

"Study and evaluate, if needed, solutions for network to verify UE reported location information. In priority, the study will consider UE-assisted LMF-based and NG-RAN node assisted positioning methods ~~solutions based 3GPP defined RAT independent/dependent UE positioning methods (e.g. DL-TDOA, UL-TDOA and RTT) and methods based on UE assistance information or based on UE location acquired by LCS procedure~~. [RAN1~~2~~,RAN2~~1~~,RAN3]"

23 – ESA

Proposed text is fine.

24 – Inmarsat

We agree with Ericsson's comment. We should clarify that GEO needs to be covered as well, and the solutions should be studied to make sure we can cover all orbit scenarios and all required use cases. Whether network-based positioning based on TDOA is required is debatable. It's interesting but right now it has limited applicability.

25 – NOVAMINT

Agreed with Thales's view.

Issue 2.2-4: Do you agree to the proposed revision of the last sentence in clause 4.1.3 of the WID?

Feedback Form 8: Issue 2.2-4: Do you agree to the proposed revision of the last sentence in clause 4.1.3 of the WID?

1 – THALES Ok for us
2 – Guangdong OPPO Mobile Telecom. We are fine with it.
3 – Apple AB No strong view.
4 – Lockheed Martin We are ok with the proposal.
5 – CATT Ok with the proposal.
6 – Beijing Xiaomi Mobile Software We are fine with the proposal.
7 – Qualcomm Incorporated The current text seems OK, but it may be better to wait till the RAN study is completed to correctly update the WID.
8 – Intelsat We agree with th proposal
9 – LG Electronics France We are fine with the proposal
10 – HUAWEI TECHNOLOGIES Co. Ltd. We prefer to keep the objective as it is for now. It is too early to agree on normative work without any study.
11 – Lenovo (Beijing) Ltd Lenovo: OK with it.
12 – ZTE Corporation It's fine to consider it in Rel-18 NTN, but can also be updated later once the study in RAN-level is mature.

13 – Panasonic Corporation We are fine with the update.
14 – Baicells Technologies Co. Ltd Fine with the proposal
15 – vivo Mobile Communication Co. OK.
16 – New H3C Technologies Co. We share the similar view with HW and ZTE
17 – MediaTek Inc. The existing text in the WID can be kept. Wait for outcome of study first
18 – Transsion Holdings We are ok with this proposal.
19 – Spreadtrum Communications We are fine with this proposal.
20 – Omnispace We support the proposal
21 – NTT DOCOMO INC. OK to us.
22 – Ericsson LM The revision is OK.
23 – Samsung R&D Institute UK The proposed revision is fine.
24 – Intel Corporation SAS We are OK with the proposed revision.
25 – ESA Ok
26 – Inmarsat Yes, we agree.

27 – NOVAMINT

We are fine with the proposal.

Issue 2.2-5: Do you agree to the skeleton proposed for the TR "NR; Network verified UE location for NTN" in RP-220525?

Feedback Form 9: Issue 2.2-5: Do you agree to the skeleton proposed for the TR "NR; Network verified UE location for NTN" in RP-220525?

1 – THALES

As proponent, we agree but welcome any suggestion to enhance it

2 – Guangdong OPPO Mobile Telecom.

We are fine with it.

3 – HUGHES Network Systems Ltd

We are OK with it. Thanks

4 – Apple AB

Looks good.

5 – CATT

Fine with us.

6 – Beijing Xiaomi Mobile Software

Fine to us.

7 – Qualcomm Incorporated

As pointed out in a previous comment, we don't think a TR is needed for this – a WID update with the outcome would suffice (and would make the process less cumbersome).

8 – LG Electronics France

We are somewhat wondering if we need a separate TR for network-verified UE location since it is a part of a work during the study phase of overall NTN WI. Would it be insufficient to make conclusions during the RAN study and reflect them in the NTN normative work if necessary?

9 – HUAWEI TECHNOLOGIES Co. Ltd.

We are fine if there is no dedicated TR, like many work items with study phase.

If there is a TR is really needed, we would suggest the following revision:

1. In the scope part, we suggest to have the following revision to make it clear this TR is for NTN: *The present document study detailed regulatory requirement for network-verified UE location* ***for NTN***

2. Before RAN starts working on new solutions, it would be good to understand the existing UE location solutions for NTN, for example the solution that is under discussion in RAN2/RAN3/SA2/SA3. So we suggest to add a section after current section 5 with title "*Existing UE location solutions for NTN"*

3. According to NTN WID RP-212690, it is not clear whether study and evaluation of new solutions is needed. We suggest to not include section 6 (Positioning methods for NTN) for the time being. This section can be added once there is a decision to do it.

10 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

11 – ZTE Corporation

No;

We are open to having a dedicated TR. But the content of the current version seems for NTN-based positioning instead verification. Updates on the section title are preferred, e.g.,

5 ~~UE Location performance~~ requirements of UE location verification

6 ~~Positioning m~~Methods for the verification of UE's location in NTN

12 – Panasonic Corporation

We are fine with the proposal.

13 – New H3C Technologies Co.

If the TR is necessary after study is completed, we are fine with it.

14 – Transsion Holdings

We are ok with that.

15 – MediaTek Inc.

A TR may not be needed, and outcome of study phase could be captured in a WID revision. In case a TR is needed, the revisions proposed by ZTE are helpful. The study should prioritize discussions on requirements for NTN use vases / services and methods for network-based verification.

16 – Spreadtrum Communications

We are fine with the TR.

17 – Omnispace

We are fine with the proposal

18 – NTT DOCOMO INC.

This skeleton is fine to us.

19 – Ericsson LM

The skeleton provided is not OK.

The heading for Clause 6 is "Positioning methods for NTN", but for Sub-clause 6.2 it is "Network based UE location solutions": this unnecessarily shifts the focus to positioning methods for NTN more generally, and to network-based positioning methods in particular. Changing the heading of Clause 6 to "Verification methods for UE location" would be more in line with the study objective and the TR title.

20 – Samsung R&D Institute UK

The proposed skeleton is fine.

21 – Intel Corporation SAS

The proposed skeleton is fine for us.

However, as some other companies commented it is not clear if TR is necessary.

22 – ESA

Skeleton is ok

23 – NOVAMINT

We agree to the skeleton proposed.

Issue 2.2-6: Do you agree to the proposed text for the TR "NR; Network verified UE location for NTN" clause 2 of [3]?

Feedback Form 10: Issue 2.2-6: Do you agree to the proposed text for the TR "NR; Network verified UE location for NTN" clause 2 of [3]?

1 – THALES

As proponent, we agree but welcome any suggestion to enhance it

2 – HUGHES Network Systems Ltd

We are fine with it.

3 – Apple AB

Looks good. But one use of UE location that was discussed in R17 was to assist AMF selection by NG-RAN (to ensure that national boundaries are respected). Shouldn't we also explicitly call this out in the TR?

4 – CATT

Looks good, just to clarify:

In Rel-17, the UE location could not be reported to NG-RAN during initial access. should we include the initial access case in Rel-18 network verified UE location work?

· **Initial access (e.g. for PLMN selection)** and connected mode at Access stratum level

5 – HUAWEI TECHNOLOGIES Co. Ltd.

The proposed text depends first on the TR skeleton as being discussed in issue 2.2-5. Some input may not be relevant if there is no corresponding section in the TR. And some content in the proposal may need further check. For example we are not sure this statement is correct "Given that the position determined and generated by the UE through its GNSS capability cannot be trusted by the network operators and hence, the network shall have the capability to determine or verify the UE position."

6 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

7 – ZTE Corporation

The update is related to the previous issue and updates can be considered later once the whole picture is clear.

8 – Panasonic Corporation

We are fine with the proposal.

9 – New H3C Technologies Co.

The comment is the same as issue 2.2-5.

10 – Transsion Holdings

We are ok with this proposal.

11 – Spreadtrum Communications

We are fine with proposal.

12 – MediaTek Inc.

The update is related to previous issue 2.2-5. This issue 2.2-5 can be discussed first.

13 – Omnispace

We are fine with the proposal

14 – NTT DOCOMO INC.

OK with it.

15 – Ericsson LM

Is the intention to investigate whether legacy network-based positioning methods work out of the box with moving cells? As previously commented, we believe the focus should be on UE location verification rather than positioning per se. Including network-based positioning in the scope may lead to discussion of enhancements of/changes to legacy positioning solutions, which in our view is not desirable. So, at this point, we should not add a lot of text before the study activity actually starts.

16 – Samsung R&D Institute UK

The proposed text is OK.

17 – Intel Corporation SAS

As some other companies commented it is not clear if TR is necessary.

We have the following comments for the text proposal.

- Not sure if network verification can be done for initial access, we prefer to make the following change for the last bullet in section 2.1

o ~~Initial access (e.g. for PLMN selection) and~~ At least connected mode at Access stratum level

- Also, the following bullet can be added to the last bullets in section 2.1

o Terrestrial and or non-terrestrial telemetry data to corroborate UE location, where applicable

- We would like to add the following bullets for section 2.3.1.

o Larger signal propagation latency (RTT)

o Limited time for satellite in view for NGSO

o Line-of-sight propagation conditions

- In our understanding the high accuracy requirements for the emergency calls use case are not necessarily applicable for network verification. Thus, a UE based GNSS location estimate may be used to achieve the necessary accuracy for this use case, and indeed the text proposal includes the sentence ”The European directive is based on an assumption of use of GNSS as positioning technology ” which demonstrates that for this use case GNSS is acceptable. It is acceptable to capture the emergency call accuracy requirements in the TR but we propose to add the following text for section 2.2.1.

o The high accuracy UE location performance requirements for emergency calls use case are not necessarily applicable for network verification.

18 – ESA

The text is ok.

19 – NOVAMINT

We are fine with the proposal.

20 – Inmarsat

We are ok in genera.

We think the initial access case should be studied.

We agree with adding the following bullets for section 2.3.1 as they add clarity:

o Larger signal propagation latency (RTT)

o Limited time for satellite in view for NGSO

o Line-of-sight propagation conditions

2.2.3 Summary and recommendation for further discussion

The following summarizes the discussion in the first round and the recommendations for further discussion.

Issue 2.2-1:

Many companies did not agree to add the last two sentences as the accuracy aspect would anyway be determined during the study. The moderator proposes to remove the last two sentences.

Huawei suggested to modify "targeted" to "potential" since the RAN study should clarify the targeted services and their regulatory requirements. The moderator's view is that this update can be accepted based on other company comments. The moderator also suggests a small editorial update to use "... location for potential ...".

Some companies expressed concern with modifying the meeting date for the conclusion of the RAN study which was set as 6 months (two meeting cycles) and delaying the start of the work in the WGs. The moderator proposes to keep the original timeline for the RAN study of two meeting cycles in order to give the full 6 months for the WG study to allow for a decision by RAN#98 as originally identified in the approved WID.

There was no consensus on adding "user consent" as this seems to be outside of RAN responsibility and may not be needed for regulatory requirements. Xiaomi suggested that "latency" is also mentioned in TR 22.872 and should be included. The moderator proposes to remove "user consent" and to add "latency" in the proposed revision.

Based on first round discussion, the moderator has identified an updated issue to resolve in the intermediate round identified as Issue 2.3-1 in section 2.3.1.

Issue 2.2-2:

Many companies indicated that a revision is not necessary and that we should keep the original description in the WID since RAN needs to firstly clarify the relationship of network verified UE location and network-based positioning before updating the WID. Given that this sub-bullet was discussed at great length prior to the approval of the WID at RAN#94e, the moderator proposes to keep the original text as it reflects the need for RAN to clarify the relationship as part of the study. No further discussion will be held on this issue in the intermediate round.

Issue 2.2-3:

As with the previous issue, many companies indicated that a revision is not necessary and that we should keep the original description in the WID and not deciding which method to be used and/or prioritized at this time. After the RAN study, any potential updates to the WID could be considered to further focus the RAN WGs study. Given that this sub-bullet was discussed at great length prior to the approval of the WID at RAN#94e, the moderator proposes to keep the original text. No further discussion will be held on this issue in the intermediate round.

Issue 2.2-4:

The vast majority of companies were OK with the proposed revision. Five companies shared the view that we should wait until the conclusion of the RAN study to update the WID. The moderator proposes that the WID revision be postponed until the conclusion of the RAN study part. The proposed text can be used as a starting point for future discussion since it was supported by the vast majority of companies.

The moderator proposes to keep the original text for now and postpone any possible revision until the conclusion of the RAN study part. No further discussion will be held on this issue in the intermediate round.

Issue 2.2-5:

The vast majority of the companies agreed that the proposed skeleton was acceptable.

Some companies questioned the need for a TR. In the moderator's view, the TR to capture the outcome of the study on Network-verified UE Location was agreed in the approved WID at RAN#94e. Given that the WI has a 6-month RAN study phase and a 6-month RAN WG study phase, it seems prudent to document the outcome of the study that was used as the baseline for the normative work since the study spans regulatory needs across multiple regions. Further discussion can be held at the conclusion of the study phase as to whether to present the TR for approval or remove it from the WID.

A few companies expressed concerns with the skeleton based on its focus on positioning methods for NTN as opposed to network verification of UE location. Based on the suggested updates provided, the moderator has provided an updated issue to resolve in the intermediate round identified as Issue 2.3-2 in section 2.3.1.

Issue 2.2-6:

In general, companies considered the possible text proposal as a good starting point. Some companies provided suggestions for improvement. The same set of companies expressing concern with the TR skeleton would prefer to agree on the TR skeleton first as discussed in Issue 2.2-5 before adding text proposals to the TR. The moderator proposes that we defer any decision on this issue until conclusion of the TR skeleton. The moderator encourages companies to work offline with the proponent during the intermediate round on suggestions for improvement of the possible text proposal, but any recommendations will be assessed after conclusion of the TR skeleton. The goal will be to return to this issue in the final round depending on progress.

2.3 Intermediate Round

In the intermediate round, the moderator proposes to consider the following open issues.

2.3.1 Open Issues

Issue 2.3-1: The following revision of the first bullet point in clause 4.1.3 of the WID is proposed as below.

"Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96)."

Issue 2.3-2: Based on the initial round discussion, the moderator proposes to agree to the skeleton proposed for the TR "NR; Network verified UE location for NTN" in RP-220525 with the following modifications.

5 ~~UE Location performance r~~Requirements for UE location verification

6 ~~Positioning m~~Verification methods for UE location

6.1 NTN specific constraints

~~6.2 Network based UE location solutions~~

6.2~~3~~ Candidate ~~positioning~~ methods assessment and gap analysis

2.3.2 Collection of company views

Issue 2.3-1: Do you agree to the proposed revision of the first bullet point in clause 4.1.3 of the WID?

Feedback Form 11: Issue 2.3-1: Do you agree to the proposed revision of the first bullet point in clause 4.1.3 of the WID?

1 – THALES We agree with the moderator's proposed revision of first bullet point in clause 4.1.3 of the WID
2 – CATT We agree with Moderator's proposal.
3 – Apple AB We are OK with the moderator's proposal.
4 – Lenovo (Beijing) Ltd We agree with Moderator's proposal.
5 – Guangdong OPPO Mobile Telecom. We agree.
6 – LG Electronics France We are not so much sure if listing up these potential use cases/services should be important at this stage since they are "potential" anyhow. However, we are fine with the proposal if other companies support it.
7 – Samsung Research America We agree with the proposed revision.
8 – Qualcomm Incorporated We would suggest the following modifications: "Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (e.g. network selection, emergency call, lawful intercept, public warning, charging/billing)(at RAN plenary, from RAN#95 to RAN#96)."
9 – ZTE Corporation We are fine with the current proposal
10 – THALES We agree with Qualcomm's additional suggestion
11 – MediaTek Inc. Support proposal from moderator

12 – Intel Corporation SAS The proposed wording is fine for us
13 – Transsion Holdings We are fine with this proposal.
14 – HUAWEI TECHNOLOGIES Co. Ltd. Agree
15 – vivo Mobile Communication Co. OK with this proposal.
16 – HUGHES Network Systems Ltd We support moderator's proposed revision of first bullet point in clause 4.1.3 of the WID
17 – Nokia France OK
18 – Inmarsat We are fine with the proposed way forward
19 – Omnispace Agree

Issue 2.3-2: Do you agree with the moderator proposal concerning the modifications to the TR skeleton proposal?

Feedback Form 12: Issue 2.3-2: Do you agree with the moderator proposal concerning the modifications to the TR skeleton proposal?

1 – THALES We agree with the moderator's proposal concerning the modifications to the TR skeleton proposal
2 – CATT We are fine with moderator's proposed changes to the TR skeleton.
3 – Apple AB We are OK with the moderator's proposal.

4 – Lenovo (Beijing) Ltd

We agree with Moderator's proposal.

5 – Guangdong OPPO Mobile Telecom.

We agree.

6 – LG Electronics France

We respect the decision on NTN WI in RAN#94-e and we are fine with the TR skeleton proposal.

7 – Samsung Research America

We are fine with the revised skeleton.

8 – Qualcomm Incorporated

We still think there is no need for a TR, but if we want to go that way, the proposed revision is OK.

9 – ZTE Corporation

The proposed update is fine.

10 – MediaTek Inc.

Support proposal from moderator

11 – Intel Corporation SAS

In our view the following subbullet of the objectives is not covered by the new version of the TR skeleton: "o Including further clarification on network verified UE location and its relationship to network-based positioning [RAN]".

So, we suggest the following change to cover it.

5 ~~UE Location performance r~~Requirements for UE location verification

6 ~~Positioning m~~Verification methods for UE location

6.1 NTN specific constraints

6.2 Network verified UE location and its relationship to network-based positioning

~~6.2 Network based UE location solutions~~

6.**3** Candidate ~~positioning~~ methods assessment and gap analysis

Or, at least it shall be explicitly clarified where to consider this issue in the TR.

12 – Transsion Holdings

We are ok with this proposal.

13 – HUAWEI TECHNOLOGIES Co. Ltd. 1. As we commented in the initial round, in the scope part, we suggest to have the following revision to make it clear this TR is for NTN: *The present document study detailed regulatory requirement for network-verified UE location **for NTN*** *2.* Regarding the revision from moderator, we do not have big issue about its content, but we do have concerns on the time to agree on Section 6. According to WID, the main objective says RAN to study requirement from RAN#95 to RAN#96. Our understanding is that WG studies on solutions (if any) will start only after requirement from RAN study is concluded and is clear. If we already agree on the TR skeleton for the solution/method part, does it mean RAN already agree that study and evaluation are needed in working groups, and working groups can start the study right way in parallel with RAN study? From our view, **parallel study of RAN-level and WG level should be avoided, and we suggest to agree on Section 6 in later meetings.**
14 – HUGHES Network Systems Ltd We are fine with moderator's proposed changes to the TR skeleton.
15 – Inmarsat We are ok with the proposed way forward
16 – Omnispace We Agree
17 – Sony Europe B.V. We agree with this view (from Huawei): **parallel study of RAN-level and WG level should be avoided, and we suggest to agree on Section 6 in later meetings.**

2.3.3 Summary and recommendation for further discussion

The following summarizes the discussion in the intermediate round and the recommendations for further discussion.

Issue 2.3-1:

The moderator proposed revision of the first bullet point in clause 4.1.3 of the WID was acceptable by all companies. Qualcomm suggested to add "network selection" to the set of potential use cases/services which was supported by Thales. The moderator proposes to address the Qualcomm proposal in the final round as an open issue in order to collect company views prior to updating the bullet point further.

Issue 2.3-2:

The vast majority of the companies agreed with the moderator proposed updates to the TR skeleton.

Huawei indicated that the scope part should be revised to make it clear that this TR is for NTN. In the moderator's view, we are trying to agree to the TR skeleton and not the document text at this time.

Intel proposed to add a sub-clause after NTN specific constraints to capture the outcome of the RAN study on the sub-bullet of the objectives to further clarify network verified UE location and its relationship to network-based positioning. In the moderator's view, it seems that this addition seems reasonable given the scope of the RAN study as listed in the WID.

Huawei and Sony indicated that there is no need to confirm section 6 in the TR skeleton yet and it should be confirmed after the conclusion of the RAN study. In the moderator's view, section 6 may also contain some aspects of the RAN study if the Intel suggestion is confirmed. In addition, it seems reasonable to have the TR skeleton account for the list of objectives covered in the WID to include the RAN WG topics. If the RAN study eventually determines that the RAN WG items are no longer required, the corresponding clauses can be voided. It is the moderator's understanding that the RAN WG studies on solutions (if any) will start only after RAN study is concluded based on the WID which proposed 6-month RAN study and 6-month RAN WG study phase. There is no implicit agreement that the RAN WG study can happen in parallel with the RAN study if we agree on the TR skeleton.

The moderator proposes to keep the section 6 content in the TR skeleton as it is aligned with the objectives of the WID and to address the Intel proposal in the final round as an open issue in order to collect company views prior to updating the TR skeleton further.

2.4 Final Round

In the final round, the moderator proposes to consider the following open issues.

2.4.1 Open Issues

Issue 2.4-1: Do you agree to add "network selection" to the set of potential use cases/services in the first bullet point in clause 4.1.3 of the WID as identified in italics below?

"Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (i.e. *network selection,* emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96)."

Issue 2.4-2: Do you agree to add an additional sub-clause (6.2) to capture the outcome of the RAN study on the objective to further clarify network verified UE location and its relationship to network-based positioning as identified in italics below?

5 ~~UE Location performance r~~Requirements for UE location verification

6 ~~Positioning m~~Verification methods for UE location

6.1 NTN specific constraints

6.2 ~~Network based UE location solutions~~*Network verified UE location and its relationship to network-based positioning*

6.3 Candidate ~~positioning~~ methods assessment and gap analysis

2.4.2 Collection of company views

Issue 2.4-1: Do you agree to add "network selection" to the set of potential use cases/services in the first bullet point in clause 4.1.3 of the WID as identified in italics below?

"Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (i.e. *network selection,* emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96)."

Feedback Form 13: Issue 2.4-1

1 – Apple AB

We think the use case of network selection is quite different from the other use cases in that network selection occurs before AS security is established. But we understand this objective is to study the regulatory requirements, not to develop solutions, so we are OK with the proposed addition.

2 – ZTE Corporation

Regarding the scenario "network selection", based on RAN2's decision, it can be done based on the reported coarse location after AS security establishment with the accuracy of around 2km □**X most Significant Bits of its GNSS coordinates with accuracy around 2km level**), there is no need to further discuss the requirement for this scenario.

3 – Qualcomm Incorporated

Regarding ZTE's comment, although this can be discussed in a later phase, the point of verification (in line with the LS from SA3-LI) is that the newtork may not want to rely on the UE reported information, and may want to verify the UE location by other means. We suggest to keep network selection as a potential example, with details to be discussed in the next RAN meeting.

4 – Intel Corporation SAS

We are fine with the proposed changes.

5 – NTT DOCOMO INC.

Seems no need to add more use cases/services in WID. And we agree with ZTE's comments on 'Network selection' .

6 – CATT

We are fine with the proposed changes.

7 – Lenovo (Beijing) Ltd

We agree to add the "network selection" case. We think the study on NW-verified UE location may also provide a potential solution to this case, considering that reporting coarse location needs to be performed after established security and SA3LI also indates that UE reported location may not be reliable. Besides we also think network selection based on NW-verified UE location is necessary for some regulation requirements e.g., deny UE access in exclusive areas as described in TR22.926.

8 – THALES We agree with the addition of the network selection case
9 – MediaTek Inc. We are fine with the proposed revision
10 – HUAWEI TECHNOLOGIES Co. Ltd. As commented by ZTE, the requirement of network selection has been discussed in Rel-17 and it has been made clear, i.e. accuracy of around 2 km. From that perspective, we do not see clear need to further discuss the requirement of network selection.

Issue 2.4-2: Do you agree to add an additional sub-clause (6.2) to capture the outcome of the RAN study on the objective to further clarify network verified UE location and its relationship to network-based positioning as identified in italics below?

5 ~~UE Location performance r~~Requirements for UE location verification

6 ~~Positioning m~~Verification methods for UE location

6.1 NTN specific constraints

6.2 ~~Network based UE location solutions~~*Network verified UE location and its relationship to network-based positioning*

6.3 Candidate ~~positioning~~ methods assessment and gap analysis

Feedback Form 14: Issue 2.4-2

1 – Apple AB The proposal sounds reasonable to us.
2 – ZTE Corporation We are generally fine with the current version but slightly prefer to remove 6.2 since once the discussion on the candidate methods is done, the relationship will be clear, and in our view defining the network-based positioning method for NTN is only one of the methods that enable the network verification on the UE's location.
3 – Intel Corporation SAS We support the updated version
4 – NTT DOCOMO INC. We agree. It's important to clarify network verified UE location and its relationship to network-based positioning due to diverse views and the outcome needs to be captured. Actually we think there should be more discussions on relationship between NW verified UE location and NW-based positioning in order to conclude this issue on next meeting.

5 – CATT

Similar view with ZTE, we should study the requirements, then the methods to satisfy the requirements. Network based solutions is just one of the possible methods which may be used for UE location verification.

6 – Lenovo (Beijing) Ltd

We think NW-based positioning methods are options to implement NW-based verification. So we agree with ZTE's view that requirements and candidate methods can be studied first, and then we may see if NW-based positioning needs to be enhanced or not.

7 – THALES

We are fine with the proposal

8 – MediaTek Inc.

We are mainly fine with the proposal. On 6.2, it is redundant since candidate methods also discussed in 6.3, and this will clarify potential relationship to NTN-based positioning. 6.2 can just mention "*Network verified UE location*" and leave out the rest of the sentence.

9 – HUAWEI TECHNOLOGIES Co. Ltd.

First I would agree with moderator's understanding summarized as "RAN WG studies on solutions (if any) will start only after RAN study is concluded based on the WID which proposed 6-month RAN study and 6-month RAN WG study phase". But this is not crystal clear from the WID (at least from our view). We are worried that once the TR skeleton is agreed, there may be different understanding from different companies. In order avoid misunderstanding, we suggest to add moderator summary as a note in the WID, as below:?

- Study detailed regulatory requirement for network-verified UE location, e.g. accuracy requirement (at RAN plenary, from RAN#95 to RAN#96). [RAN]
    - Including further clarification on network verified UE location and its relationship to network-based positioning [RAN]
    - Study and evaluate, if needed, solutions for network to verify UE reported location information [RAN2,RAN1,RAN3]

Note: RAN WG studies on solutions (if any) will start only after RAN study is concluded

Regarding "network verified UE location and its relationship to network-based positioning". As ZTE and other companies pointed out, once the discussion of candidate solutions is done, the relationship is clear, so adding "relationship" in the TR does not seem necessary. The WID provides guidelines regarding how to do the work, which does not mean the wording from WID should be explicitly captured in the TR.

10 – Nokia France

We are Ok with the moderator's proposal, including the new section 6.2. We are also OK with the proposed Note by Huawei.

2.4.3 Summary and final recommendations

The following summarizes the discussion in the final round and the recommendations for the extended email discussion.

Issue 2.4-1:

Of ten companies commenting, ZTE, NTT DOCOMO, and Huawei did not agree with adding "network selection" to the set of potential use cases/services in the first bullet point in clause 4.1.3 of the WID. Given that there was not overwhelming support to add this at this late stage, the moderator suggests keeping with the text agreed in the intermediate round. The possible addition of adding "network selection" to the set of potential use cases/services in the first bullet point in clause 4.1.3 of the WID can be discussed at the next RAN meeting. Based on the outcome of the intermediate round discussion, the following revision of the first bullet point in clause 4.1.3 of the WID can be agreed. No further discussion is required. The rapporteur is asked to revise the following bullet in clause 4.1.3 of the revised WID as below accordingly in [13].

"Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96)."

Issue 2.4-2:

Huawei suggested to add a note below the objectives in clause 4.1.3 as shown below to clarify the timing of the RAN WG studies in relationship to the RAN study.

"Note: RAN WG studies on solutions (if any) will start only after RAN study is concluded"

The additional clarifying text seems reasonable. The moderator requests that the rapporteur revise clause 4.1.3 of the revised WID in [13] to add the note below the objectives as shown above.

ZTE, CATT, Lenovo, MediaTek, and Huawei expressed concerns with identifying the specific methods that could be used for UE location verification in the additional sub-clause to capture the outcome of the RAN study on the objective to further clarify network verified UE location and its relationship to network-based positioning. Huawei suggested to use "Network verified UE location" as the heading. This heading may be too generic and also overlapping with clause 5. The moderator suggests modifying the heading for 6.2 to remove "network-based" in order to resolve the overall concern. In this case, the sub-clause can capture the outcome of the RAN study per the objectives of the WID and the sub-clause title remains flexible enough to accommodate other methods.

Based on the final round discussion, the moderator proposes the following text for clause 6.2 as a way forward. This way forward will be further discussed in the extended round over email.

5 ~~UE Location performance rR~~equirements for UE location verification

6 ~~Positioning m~~Verification methods for UE location

6.1 NTN specific constraints

6.2 ~~Network based UE location solutions~~*Network verified UE location and its relationship to positioning*

6.3 Candidate ~~positioning~~ methods assessment and gap analysis

23 March Update after Extended Round and Wednesday GTW:

The following captures the outcome of the extended round feedback concerning the proposed update to the heading for clause 6.2 in the TR skeleton as below.

"Network verified UE location and its relationship to positioning"

The company views are listed as follows.

- Agree: Nokia, OPPO, QC, vivo, Samsung, CATT, Apple, Xiaomi, LGE, Huawei, Intel, Thales, FGI, H3C, Ericsson, ZTE, NTT DOCOMO, Lenovo
- Not Agree: None

Based on the outcome, the proposed update to the heading for clause 6.2 in the TR skeleton can be agreed.

3 Topic #3: NTN-TN and NTN-NTN mobility and service continuity enhancements

3.1 Proposed Objectives

Topic #3 will capture the outcome of the discussions on the following documents:

1) RP-220422 [15]

2) RP-220559 [8]

3) RP-220601 [9]

4) RP-220740 [12]

3.2 Initial Round

3.2.1 Open Issues

Concerning the set of proposals, the moderator has identified the following issues to resolve in the first round.

Issue 3.2-1: When considering the proposal in [8] as follows:

- Proposal 4: Cell reselection enhancements for earth moving cell can be considered, and the timing based and location based cell reselection for quasi earth fixed cell in Rel-17 can be considered as start point.

It is proposed to add the following sub-bullet in clause 4.1.4 of the WID as below.

"For NTN-NTN mobility, specify cell reselection enhancements for earth moving cell, the timing based and location-based cell reselection for quasi-earth fixed cell in Rel-17 can be considered as the starting point. [RAN2, RAN3, RAN4]"

Issue 3.2-2: When considering the following proposals:

- RP-220422/Proposal 2: Study and specify the NTN-NTN mobility enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell to reduce the signaling and maintenance overhead
- RP-220559/Proposal 5: Handover signalling overhead reduction can be considered for feeder link switch and service link switch in earth fixed cell.

It is proposed to add the following sub-bullet in clause 4.1.4 of the WID as below.

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) to reduce the signalling and maintenance overhead. [RAN2, RAN3]"

Issue 3.2-3: When considering the following proposals:

- RP-220422/Proposal 1: Study and specify the NTN-TN mobility enhancement for RRC_IDLE/INACTIVE UEs to reduce the UE's power consumption
- RP-220559/Proposal 6: The UE power saving should be considered in NTN-TN mobility, especially for cell reselection between NTN and TN.

It is proposed to add the following sub-bullet in clause 4.1.4 of the WID as below.

"Specify cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Issue 3.2-4: When considering the following proposals:

- RP-220740/Proposal 1: In in Rel-18, signalling based solution should be considered for (de-centralized) feeder link switch-over, e.g. to exchange necessary info over Xn/NG.
- RP-220740/Proposal 2: In Rel-18, Xn/NG enhancements should be considered to support the CHO mechanisms as specified in Rel-17.

- RP-220740/Proposal 3: In Rel-18, Xn/NG enhancements should be considered to exchange necessary information between gNBs for TN-NTN co-ordination.
- RP-220740/Proposal 4: Support necessary enhancements to Xn/NG for feeder link switch-over, CHO and TN-NTN coordination in Rel-18, and update the WID accordingly.

It is proposed to add the following sub-bullet in clause 4.1.4 of the WID as below.

"Enhancement to Xn/NG signallings to support feeder link switch-over, CHO, TN-NTN coordination, e.g. exchange of necessary information between gNBs. [RAN3]"

Issue 3.2-5: When considering the following proposals:

- RP-220601/Proposal 1: Support DAPS for NTN-TN and NTN-NTN mobility by taking the legacy TN DAPS as the baseline and aiming at the minimized standard impacts.
- RP-220601/Proposal 2: Add a Note in the Rel-18 NTN WID to indicate that "Following Rel-16, simultaneous configuration of DAPS and CHO is not considered in this work".
- RP-220601/Proposal 3: NTN specific mobility enhancement in idle/inactive is not within the scope of Rel-18 NTN WI.

It is proposed to add the following sub-bullet in clause 4.1.4 of the WID as below.

"Specify DAPS for NTN-TN and NTN-NTN mobility and service continuity enhancements, aiming at the minimized standard impacts and taking the DAPS of Rel-16 as the baseline. [RAN2, RAN3, RAN4]

NOTE: Following Rel-16, simultaneous configuration of DAPS and CHO is not considered in this work."

Issue 3.2-6: When considering the following proposals:

- RP-220559/Proposal 7
- RP-220422/Proposal 3

It is proposed to remove the existing note in clause 4.1.4 of the WID as shown below:

"~~NOTE: The objective on mobility and service continuity enhancements will be clarified at RAN#95-e.~~"

3.2.2 Collection of company views

In all cases, if you disagree, please provide your concerns and any suggestions.

Issue 3.2-1: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

Feedback Form 15: Issue 3.2-1: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

1 – THALES

We agree

2 – Guangdong OPPO Mobile Telecom.

No. This has been discussed in Rel-17 but the conclusion is that enhancements are only applied to earth fixed cells. We don't think the situation would be different in Rel-18 and thus we don't support to add this.

3 – HUGHES Network Systems Ltd

We agree with the addition of the sub-bullet addressing earth moving cell.

4 – Apple AB

We are OK to adding this.

5 – Lockheed Martin

We agree.

6 – Beijing Xiaomi Mobile Software

Fine to us.

7 – LG Electronics France

We are fine with this.

8 – KT Corp.

We are OK with this.

9 – Qualcomm Incorporated

For moving cell, the understanding was time based and location based enhancement can be done by UE implementation given information is provided to UE. We are open to discuss on how to specify this for moving cell.

10 – HUAWEI TECHNOLOGIES Co. Ltd.

We understand this scenario exists, but on the other hand it was agreed not to be supported in R17 due to the complexity. We can go with the majority.

11 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

12 – Panasonic Corporation We are fine with the proposal.
13 – ZTE Corporation We are fine with it.
14 – vivo Mobile Communication Co. NO, We do not see the motivation to enhance idle state for NTN futher. And it has been discussed in R17 and we do not agree it already.
15 – Spreadtrum Communications We agree this proposal.
16 – Transsion Holdings Maybe agreed. For R17 Idle/Inactive□we didn't focus on discussing moving cell scenario, but Connect Mode did. We can consider re-ues R17 Connect mode's design, i.e. Location based CHO, for R18 Idle/Inactive location based cell reselection.
17 – MediaTek Inc. We are fine with the proposal
18 – Ericsson LM We are OK with discussing the scenario of Earth-moving cells as long as the scope is kept limited.
19 – Samsung R&D Institute UK We are open to further consider cell reselection enhancements for earth moving cell in Rel-18, since there was not much discussion on earth moving cell in Rel-17.
20 – Intel Corporation SAS Agree. In Rel-17 we only focus on cell reselection enhancements for quasi-earth fixed cell, it's also beneficial to consider similar enhancements for moving cell.
21 – ESA We are fine.
22 – NOVAMINT We agree

Issue 3.2-2: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

Feedback Form 16: Issue 3.2-2: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

1 – THALES

We agree

2 – Guangdong OPPO Mobile Telecom.

Yes, we agree. This has been studied in the study item phase but not specificed in Rel-17. We support adding this for Rel-18.

3 – Apple AB

Agree.

4 – Lockheed Martin

We agree.

5 – CATT

Agree, feeder link switch should be furhter considered in both RAN2 and RAN3.

6 – Beijing Xiaomi Mobile Software

Agree

7 – LG Electronics France

We are fine with this.

8 – KT Corp.

Agree

9 – Qualcomm Incorporated

We are fine but we suggest not to exclude the moving cell scenario for now.

10 – HUAWEI TECHNOLOGIES Co. Ltd.

Agree. Signaling overhead is one important aspect that needs to be addressed in NTN.

11 – HUAWEI TECHNOLOGIES Co. Ltd.

Agree.

In the NTN-TN co-existence scenarios, Rel-17 UE will have to measure all the neighbor TN cells broadcast in the system information of NTN, even if there is no valid neighbor TN cells according to the current location of the UE. This will cause considerable power consumption. It is therefore beneficial to specify cell reselection enhancements in NTN-TN mobility scenario for RRC_IDLE/INACTIVE UEs to reduce UE power consumption in Rel-18.

12 – Lenovo (Beijing) Ltd Lenovo: OK with it.
13 – HUAWEI TECHNOLOGIES Co. Ltd. The second resposne from Huawei is intended for Form 12. Please ignor it.
14 – Panasonic Corporation We are fine with the proposal.
15 – ZTE Corporation Fine to us.
16 – Spreadtrum Communications Agree.
17 – Transsion Holdings Maybe agreed. If we have time to discuss minimize signaling overhead.
18 – MediaTek Inc. We are fine with the proposal
19 – Ericsson LM We agree, although ”maintenance” is out of context and should not be mentioned.
20 – Intel Corporation SAS Agree. This enhancement was raised in SI phase, but not included in Rel-17 WI.
21 – Samsung R&D Institute UK We agree.
22 – ESA Agree
23 – NOVAMINT We agree

Issue 3.2-3: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

Feedback Form 17: Issue 3.2-3: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

1 – THALES

We agree

2 – Guangdong OPPO Mobile Telecom.

Yes, we agree. This is the leftover issue from Rel-17 and should be addressed in Rel-18.

3 – HUGHES Network Systems Ltd

Yes, we agree.

4 – Apple AB

Agree

5 – Lockheed Martin

We agree.

6 – CATT

Agree, but how about connected mode mobility between TN-NTN? This should also be the important use case to be considered. Suggest to add one sentence for TN-NTN handover:

"Specify the connected mode moility mechanism(s) for NTN-TN mobility, e.g. measurement and handover. [RAN2, RAN3, RAN4]"

7 – Beijing Xiaomi Mobile Software

We agree

8 – LG Electronics France

We support this.

9 – KT Corp.

We agree

10 – Qualcomm Incorporated

We agree

11 – HUAWEI TECHNOLOGIES Co. Ltd.

Agree.

In the NTN-TN co-existence scenarios, Rel-17 UE will have to measure all the neighbor TN cells broadcast in the system information of NTN, even if there is no valid neighbor TN cells according to the current

location of the UE. This will cause considerable power consumption. It is therefore beneficial to specify cell reselection enhancements in NTN-TN mobility scenario for RRC_IDLE/INACTIVE UEs to reduce UE power consumption in Rel-18.

12 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

13 – Panasonic Corporation

We are fine with the proposal.

14 – ZTE Corporation

We understand the cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs would also be needed to prioritize TN over NTN or vice versa. TN over NTN has been agreed in Rel-17 without further detailed enhancements progressed.

Thus, it is suggested to change the sub-bullet as follows:

"Specify cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption **and prioritize certain network type, e.g. TN over NTN or NTN over TN**. [RAN2, RAN3, RAN4]"

15 – Spreadtrum Communications

Since the smart phone is involved in NTN in Rel-18, we think power consuming shall be considered in mobility procedure.

16 – MediaTek Inc.

We are fine with the proposal.

17 – Transsion Holdings

No. We may optimize this in later release. We should focus on make it woke first.

Also, as we had made assumption in TR38.821, minimizing UE power consumption is only secondary priority :

5.4.3 Assumptions

The NTN-TN service continuity and mobility mechanisms targeted to minimizing UE power consumption, e.g. DRX enhancement solutions are only a secondary priority.

18 – Ericsson LM

Currently specified enhancements are agnostic to whether a network is terrestrial or not, so they can be reused. And given the Rel-17/18 architecture, we believe that NTN-TN mobility aspects should be down-prioritized. We don't support this addition.

19 – Intel Corporation SAS

Not sure. In Rel-17 WI, RAN2 confirmed TN prioritization over NTN can be achieved by legacy mechanism. So it's not very clear to us what extra enhancements are needed for this scenario, especially considering the enhancements mentioned in **Issue 3.2-1** can also be reused inNTN-TN scenario.

20 – Samsung R&D Institute UK

Cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption is not limited to NTN-TN mobility, for NTN-NTN mobility, UE power consumption issue also exists so enhancement is also needed. We suggest to remove the restriction to NTN-TN mobility, or to add NTN-NTN mobility.

21 – ESA

Agree

22 – NOVAMINT

We agree

Issue 3.2-4: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

Feedback Form 18: Issue 3.2-4: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

1 – CATT

Firstly, we should confirm the work scope of RAN3 in Rel-18.

Base on the analysis in [12], the Xn/NG interface enahcments seems benefical for feeder link switch, CHO, and TN-NTN mobility use cases.

On how to capture that in the WID, we understand two possible ways:

Option 1: use a separate bullet as proposed in [12], e.g.

- "Enhancement to Xn/NG signallings to support feeder link switch-over, CHO, TN-NTN coordination, e.g. exchange of necessary information between gNBs. [RAN3]"

Option 2: specify the RAN3 work explicitly or implicitly in related cases.

Either way is fine with us, we just want to show our views on the potential and essential RAN3 work to be done in Rel-18.

2 – KT Corp.

We agree and slightly prefer Option 1.

3 – Qualcomm Incorporated

No. At this point RAN3 assumption is OAM is responsible to provide necessary information on satellite to gNB. CHO is not supported over NG interface. RRC message (container) can include the necessary information for handover. The motivation of the proposal is not clear.

4 – KT Corp.

For the NTN-TN mobility scenarios, we think it is very difficult to provide necessary information on satellite to all the adjacent TN gNBs by OAM. NTN gNBs provide a wide coverage and there are huge number

of adjacent TN gNBs. So, we think CHO via Xn/NG interface is essential for NTN-TN service continuity. However, until CHO is configured in the UE in the source cell, the RRC message does not include whether the service of the NTN gNB is available. Therefore, we believe enhancement to Xn/NG signaling are needed. NTN-TN service continuity is very important for the success of NTN service to expand the TN coverage.

5 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

6 – Panasonic Corporation

We are fine with the proposal.

7 – HUAWEI TECHNOLOGIES Co. Ltd.

RAN3 discussed de-centralized feeder link switch over in Rel-17 but did not specify it. Rel-17 only supports feeder link switch over via OAM. We think the feeder link switch over via OAM is the main scenario and de-centralized solution is not as important as feeder link switch over via OAM. In Rel-16 and Rel-17, CHO and the neighbor cell information exchange are only supported in the Xn. Therefore we think the NG signaling enhancement is not needed. We therefore suggest the following updates:

"Enhancement to Xn~~/NG~~ signallings to support ~~feeder link switch-over,~~ CHO, TN-NTN coordination, e.g. exchange of necessary information between gNBs. [RAN3]"

8 – ZTE Corporation

No, similar view as QC, the motivation is not clear.

9 – Spreadtrum Communications

We support the comments of CATT, and prefer option 1 slightly.

10 – Transsion Holdings

No. We may optimize this in later release. We should focus on make it woke first.

Also, as we had made assumption in TR38.821, minimizing UE power consumption is only secondary priority :

5.4.3 Assumptions

The NTN-TN service continuity and mobility mechanisms targeted to minimizing UE power consumption, e.g. DRX enhancement solutions are only a secondary priority.

11 – Transsion Holdings

(To correct above comment for wrong section.) We are ok with this proposal.

12 – MediaTek Inc.

More discussions are needed to add the proposed sub-bullet in the WID. The WGs can first discuss potential enhancements and clarify assumptions for Xn/NG signalling. We have preference to prioritize Group HO for feeder link switch / HO signalling reduction / new trigger mechanisms

13 – Ericsson LM

We are in favor of supporting feeder link switchover and CHO. Given the current Rel-17/18 architecture, we believe TN-NTN coordination does not make sense to be specified at this time (OAM-based coordination is sufficient with the current architecture).

14 – Intel Corporation SAS

In Rel-17, RAN3 already concluded to use OAM for centralized feeder link switchovers (which is pre-planned switchover events) and the decentralized switchover was never discussed during the SI phase. We don't see a strong need to enhance Xn/NG signalling for this. Moreover, CHO is not supported for N2 (S1/NG) based handover and we don't see what more enhancements are necessary other than the existing IEs for CHO in XnAP for NTN. But we are open for further discussion on TN-NTN coordination where there was no consensus in Rel-17.

15 – Samsung R&D Institute UK

We support Xn signalling enhancement for feeder link switch and CHO. Support of TN-NTN coordination can be discussed in the later release.

16 – NOVAMINT

More discussion seems needed

Issue 3.2-5: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

Feedback Form 19: Issue 3.2-5: Do you agree to the proposed sub-bullet in clause 4.1.4 of the WID?

1 – Guangdong OPPO Mobile Telecom.

No. DAPS requires similar complex UE capabilities as those required for CA and/or DC. So far, NTN UEs do not support CA/DC and we think Rel-18 is not the right timing to consider DAPS. To reduce data interruption, we think Rel-18 should rather look into RACH-less handover which does not require complex capabilities as DAPS.

2 – Apple AB

Agree

3 – CATT

No. This is beautiful, but maybe not suitable to be included in Rel-18.

In Rel-18, we should focus on the most essential enhancements, e.g. the leftovers, or necessary enhancement on top of Rel-17. As OPPO said, DAPS requires similar complex UE capabilities as those required for CA and/or DC, and which is not supported in Rel-17.

4 – Beijing Xiaomi Mobile Software

While we think it is a useful feature, we don't think it is neccesary to have it in Rel-18. It might complex the UE's design.

5 – LG Electronics France

We do not support this. Currently CA/DC is not supported for NTN. However, UE architecture and complexity to support DAPS is similar to DC. We should focus on enabling VoIP, if needed in Rel-18, and we do not see that VoIP optimization for handover in NTN is urgent in Rel-18.

6 – KT Corp.

No.

7 – Qualcomm Incorporated

No, we also think that support of DAPS in NTN itself is a complex feature as there is no support of CA/DC. Besides, from SA2, the TN and NTN are different RATs. LEO, MEO and GEO are also different RATs. SA2 involvement is also needed.

8 – HUAWEI TECHNOLOGIES Co. Ltd.

No. DAPS has been discussed in RAN#94e, but was ruled out. There is no need to discuss it again.

9 – Lenovo (Beijing) Ltd

Lenovo:

We are OK to have this and think DAPS can help TN-NTN service continuity.

10 – Panasonic Corporation

We are fine with the proposal.

11 – ZTE Corporation

No, we also understand DAPS is complex feature with limited gain foreseen in NTN.

12 – Spreadtrum Communications

No, DAPs is too complex for NTN UE.

13 – MediaTek Inc.

We have preference no to support legacy DAPS for NTN-TN mobility and service continuity due to UE complexity and case for it is unclear. We think Rel-17 CHO for LEO can be re-used for for TN-NTN with smaller impact on specification

14 – Transsion Holdings

No. Same view with companies, NTN support DC would make it complicated.

Also, as we had made assumption NTN support is a secondary priority.

5.4.3 Assumptions

...

The study of dual-connectivity mechanisms between NTN and TN, in the baseline NTN-TN service continuity and mobility solutions is a secondary priority.

15 – Ericsson LM In principle we agree with the addition, but given the current Rel-17/18 architecture, we believe TN-NTN aspects do not make sense to be specified at this time (i.e. no specific optimizations should be considered). We believe that RACH-less handover should be considered among the possible solutions.
16 – Intel Corporation SAS Our understanding is CA UE capability is the baseline for UE's DAPS capability, we wonder if the support of DAPS also implies that UE needs to support CA in NTN.
17 – Samsung R&D Institute UK We can support DAPS for NTN. NTN DAPS will require UE capability similar to CA/DC, but for UE with such capability no additional complexity is required, so DAPS can be considered as an enhancement and an optional feature for capable UE.

Issue 3.2-6: Do you agree to remove the existing note in clause 4.1.4 of the WID?

Feedback Form 20: Issue 3.2-6: Do you agree to remove the existing note in clause 4.1.4 of the WID?

1 – THALES We agree
2 – Guangdong OPPO Mobile Telecom. We agree.
3 – HUGHES Network Systems Ltd Yes, we agree.
4 – Apple AB Agree
5 – Lockheed Martin We agree.
6 – CATT Agree.
7 – Beijing Xiaomi Mobile Software OK.
8 – LG Electronics France Yes

9 – KT Corp.

Agree

10 – Qualcomm Incorporated

As RAN2 has not addressed the Rel-17 TN-NTN service continuity objective (if any additional specification change is needed in Rel-17) and in case the objectives for the Rel-18 WIDs are not determined, we suggest revisiting this in RAN#96e.

11 – Intelsat

We agree.

12 – HUAWEI TECHNOLOGIES Co. Ltd.

Agree

13 – Lenovo (Beijing) Ltd

Lenovo:

OK with it.

14 – Panasonic Corporation

We are fine with the proposal.

15 – ZTE Corporation

Fine to us.

16 – Spreadtrum Communications

We agree.

17 – MediaTek Inc.

We are fine with the proposal

18 – Transsion Holdings

Agreed.

19 – Ericsson LM

We agree.

20 – Intel Corporation SAS

This could be discussed in the final round if we can make some progress in the first and second rounds.

21 – ESA

Agree

22 – Samsung R&D Institute UK We agree.
23 – NOVAMINT We agree

3.2.3 Summary and recommendation for further discussion

The following summarizes the discussion in the first round and the recommendations for further discussion.

Issue 3.2-1:

The vast majority of companies supported the addition of the sub-bullet to specify cell reselection enhancements for earth moving cell in Rel-18. OPPO and vivo do not support adding the objective. Huawei indicated that it was agreed to be not supported in Rel-17 due to the complexity but would go with majority view. Based on the majority view, the moderator recommends adding the sub-bullet as proposed during the initial round and no intermediate round discussion is necessary. Any further discussion can take place on the draft revised WID when available.

The moderator recommends adding the following sub-bullet in clause 4.1.4 of the revised WID as below.

"For NTN-NTN mobility, specify cell reselection enhancements for earth moving cell, the timing based and location-based cell reselection for quasi-earth fixed cell in Rel-17 can be considered as the starting point. [RAN2, RAN3, RAN4]"

Issue 3.2-2:

All companies agreed to add the sub-bullet in Rel-18. Qualcomm did not want to exclude the moving cell scenario. Ericsson indicated that maintenance is out of context and should be removed.

The moderator recommends adding the following sub-bullet in clause 4.1.4 of the revised WID as below.

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

The sub-bullet appears stable with the exception of the Qualcomm comment. Concerning the Qualcomm comment, the moderator has identified an additional issue to resolve in the intermediate round identified as Issue 3.3-1 in section 3.3.1. If needed after the intermediate round, the sub-bullet will be updated accordingly.

Issue 3.2-3:

The vast majority of companies supported the addition of the sub-bullet to specify cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. CATT, ZTE, and Samsung seemed to suggest additional scope which was not presented in any input paper for RAN#95e. The moderator would prefer to take note of their suggestions but not update the sub-bullet at this time until further discussion can be held at a future meeting based on company contribution(s). In addition, the proposal to add TN-NTN mobility is outside of the scope of the objective. Transsion Holdings, Ericsson, and

Intel do not agree with adding the sub-bullet. The moderator recommends continuing discussion in the intermediate round to see if companies can compromise on a solution.

The moderator has identified an additional issue to resolve in the intermediate round identified as Issue 3.3-2 in section 3.3.1.

Issue 3.2-4:

CATT suggests adding the objective as a separate bullet as opposed to a sub-bullet. CATT's proposal was supported by a number of companies. The moderator's view is that the Rel-18 package agreement was that NTN-TN and NTN-NTN mobility and service continuity enhancements objective was to have one bullet based on the decision at RAN#94e. Therefore, the moderator would prefer to add the clarifications on the objective as sub-bullets assuming that they can be agreed. A number of companies commented that TN-NTN coordination should not be addressed and can be considered in a future release. The moderator agrees that TN-NTN mobility is outside of the present scope of the objective and should be deferred until a future release. Several companies expressed the concern that the motivation is not clear. Qualcomm, Huawei, and Intel indicated that CHO is not supported over NG interface. The moderator recommends continuing discussion in the intermediate round.

The moderator has identified an additional issue to resolve in the intermediate round identified as Issue 3.3-3 in section 3.3.1.

Issue 3.2-5:

Ten (10) companies out of seventeen (17) did not support adding the sub-bullet concerning DAPS. The moderator proposes to not consider this sub-bullet in the revised WID based on the majority of companies objecting. No further discussion is needed.

Issue 3.2-6:

All companies, except for two, supported removing the note given the additional clarifications for the objective on mobility and service continuity enhancements that have been provided at RAN#95e.

Qualcomm suggested deferring this until RAN#96e since RAN2 has not addressed the Rel-17 TN-NTN service continuity objective. Intel suggested to defer the decision until the final round. In the moderator's view, the clarifications provided during the initial round (and any subsequent revisions in future rounds) have met the goal to clarify the objective at RAN#95e as presented by the note. Any future clarifications and/or revisions can be considered as normal operating procedure. Based on the majority view, the moderator recommends removing the note and no intermediate round discussion is necessary.

The moderator recommends removing the existing note in clause 4.1.4 of the WID as shown below:

"~~NOTE: The objective on mobility and service continuity enhancements will be clarified at RAN#95-e.~~"

3.3 Intermediate Round

In the intermediate round, the moderator proposes to consider the following open issues.

3.3.1 Open Issues

Issue 3.3-1: Do you agree to include the moving cell scenario in the sub-bullet to specify NTN-NTN handover enhancement for RRC_CONNECTED UEs to reduce the signalling overhead? If so, please provide any recommended updates for the moving cell scenario to the latest stable version of the sub-bullet as identified below.

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

Issue 3.3-2: The moderator proposes to collect additional feedback on the following sub-bullet in clause 4.1.4 of the WID as below. Companies are encouraged to work towards a compromise given that this item is identified as a leftover issue from Rel-17.

"Specify cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Issue 3.3-3: Based on the initial round discussion, the moderator proposes to add the following sub-bullet in clause 4.1.4 of the WID as below.

"Enhancement to Xn~~/NG~~ signalling~~s~~ to support feeder link switch-over, CHO, ~~TN-NTN coordination,~~ e.g. exchange of necessary information between gNBs. [RAN3]"

3.3.2 Collection of company views

Issue 3.3-1: Do you agree to include the moving cell scenario in the sub-bullet to specify NTN-NTN handover enhancement for RRC_CONNECTED UEs to reduce the signalling overhead? If so, please provide any recommended updates for the moving cell scenario to the latest stable version of the sub-bullet.

Feedback Form 21: Issue 3.3-1

1 – CATT

We agree to consider both quasi fixed cell scenario and earth moving cell scenario.

Thus, the objective could be revised to (in bold texts):

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) **and earth moving cell** to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

2 – Apple AB

We think moving cell scenario should be included in the scope of NTN-NTN handover enhancements. We prefer a simple update along the lines of "Specify NTN-NTN handover enhancement for RRC_CONNECTED

UEs in the quasi-earth-fixed cell **and moving cell scenarios**(feeder link and service link switch) to reduce the signalling overhead. [RAN2, RAN3]"

3 – Lenovo (Beijing) Ltd

We agree to include the moving cell scenario for mobility enhancements in NTN.

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) **and earth-moving cell** to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

4 – Guangdong OPPO Mobile Telecom.

We agree to include the moving cell scenario as feeder link switch is common for both earth-moving cells and earth-fixed cells.

5 – Samsung Research America

We are fine to include earth moving cell scenario. Suggest to revise as "Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in quasi-earth-fixed cell and earth moving cell to reduce the signalling and maintenance overhead. [RAN2, RAN3]".

6 – Qualcomm Incorporated

There is already large support to address moving cell for IDLE mode mobility, i.e., time-based criteria for measurements/cell reselection. Similar approach can also be useful for handover decision in moving cell scenario. The case of feeder link switch should also equally apply to earth moving cell (in that scenario many UEs will perform a handover simultaneously). Thus, we propose to revise as follows:

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) <u>and earth-moving cell (feeder link switch)</u> to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

7 – ZTE Corporation

Agree to include the moving cell scenario in the sub-bullet to specify NTN-NTN handover enhancement for RRC_CONNECTED UEs to reduce the signalling overhead.

8 – Transsion Holdings

We agree to include the moving cell scenario for NTN HO enhancement and recommend to modify as : "Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in both moving cell and quasi-earth-fixed cell (feeder link and service link switch) to reduce the signalling overhead. [RAN2, RAN3]"

9 – THALES

We agree with QC latest suggestion

10 – MediaTek Inc.

Support proposal from moderator

11 – Intel Corporation SAS

Agree with moderator.

But we suggest to further clarify the understanding of feeder link and service link switch. For feeder link switch, does it refer to both soft feeder link switch and hard feeder link switch, i.e., we would like to clarify if one satellite can connect to two gNBs on ground simultaneously. For service link switch, we would like to clarify if we only consider the cell change case, i.e., we exclude the possibility that after a service link switch UE is still connected to the same cell.

12 – HUAWEI TECHNOLOGIES Co. Ltd.

We understand this scenario exists, and the solutions for the quasi-earth fixed cell and the moving cell may be different. We can go with majority.

13 – vivo Mobile Communication Co.

We agree with intel and huawei, we should give more clear description for earth moving cell case.

14 – Ericsson LM

The wording proposed by the moderator is OK. It is acceptable to also consider earth-moving cells. We do not support adding further details to that statement at this point.

15 – NOVAMINT

We are fine with Qualcomm's suggestion

16 – Lockheed Martin

We agree with Qualcomm's proposal

17 – HUGHES Network Systems Ltd

We support proposal with QC suggestion

18 – Nokia France

OK

19 – Inmarsat

We support the proposal with Qualcomm's suggestion and we support Intel's suggestion for clarification.

Regarding hard vs soft feeder link switch, we think both should be considered.

We propose the following amendments on top of Qualcomm's proposed wording

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link **switch, both hard and soft** and service link switch) and earth-moving cell (feeder link switch**, both hard and soft**) to reduce the signalling ~~and maintenance~~ overhead. [RAN2, RAN3]"

20 – Nokia France

We are also fine to include earth-moving cells.

Issue 3.3-2: Please provide suggestions to reach a compromise on the proposed sub-bullet in clause 4.1.4 on specifying cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption.

Feedback Form 22: Issue 3.3-2

1 – THALES We do agree
2 – CATT It's fine.
3 – Apple AB The cell reselection framework developed in R17 is not adequate to address the fact that an NTN cell may have tens or even hundreds of TN neighbor cells. UE power consumption in idle.inactive states is critical, and RAN should develop mechanisms to relieve the UE from unnecessarily searching for cells it is never going to find. We also think that there is not much to be gained from looking at NTN-TN prioritization since we think legacy prioritization mechanisms are adequate. So we prefer either keeping the proposed objective from the rapporteur as is, or add a qualifier that this objective does not consider NTN-TN prioritization.
4 – Lenovo (Beijing) Ltd We think the agreements in Rel-17 have provided sufficient solutions to the already-identified issues for cell reselection. But we are OK to have this sub-bullet in case new issues are found.
5 – Guangdong OPPO Mobile Telecom. We agree.
6 – Samsung Research America We agree to specify cell reselection enhancements to reduce UE power consumption. But we think the enhancement for NTN-NTN mobility can also be considered as for clause 4.1.4, i.e. NTN-TN and NTN-NTN mobility and service continuity enhancements, so we should not limit to NTN-TN mobility only. Suggest to update as "Specify cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]".
7 – ZTE Corporation Similar view with Samsung that NTN-NTN mobility should also be considered thus prefer Samsung's suggested wording of this sub-bullet.
8 – THALES We agree with Samsung's latest suggestion
9 – Transsion Holdings It depends. We need to figure out is there any enhancement is need for NTN-TN mobility, then consider power saving.

10 – Intel Corporation SAS

We could try adding some detail to this sub-bullet , e.g.,

"Specify cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE

power consumption, **e.g., more effective detection of TN cells**. [RAN2, RAN3, RAN4]"

11 – MediaTek Inc.

Support proposal from moderator

12 – HUAWEI TECHNOLOGIES Co. Ltd.

In Rel-17, the enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs is down-prioritized due to the time limitation. We believe it is important to work further on this scenario in Rel-18.

For the smartphones, the power consumption is one important aspect that needs to be addressed. Therefore we support the proposed sub-bullet. According to the reply in the first round, some companies think the Rel-17 enhancements can be reused in the NTN-TN mobility. We agree that the Rel-17 cell reselection enhancements can be used in NTN-TN mobility. But the cell reselection measurement enhancements in Rel-17 only reduces the neighbor cell measurements of "NR intra-freq or inter-freq with equal or lower priority, or inter-RAT frequency with lower priority". UE will still always measure the high priority neighbor cell based on the system information. Operators will want TN prioritization over NTN. In some cases, only small part of coverage of NTN cells has the TN neighbor cells, e.g. the boundary between land and ocean. In these cases, according to the current specification, UE will have to measure all the neighbor TN cells broadcast in the system information of NTN, even if there is no valid neighbor TN cells according to the current location of the UE. This will cause considerable power consumption. So we suggest to specify solutions to address power consumption issues for NTN-NT mobility

13 – Ericsson LM

As previously commented, given the Rel-17/18 NTN architecture, it does not seem justified to enhance the scenario of NTN-TN mobility. We should concentrate, if anything, on the NTN-NTN scenarios. As a compromise, we propose to at least add "with lower priority" to the proposed statement.

14 – vivo Mobile Communication Co.

we only see the motivation for NTN-TN case as huawei claim that the opertor want to give higher priortiy for TN freqency. for TN-NTN case can not R17 enhancement not meet the measurement requirement□ i.e., Timing and location based cell reselection for quasi-earth fixed cell□

15 – NOVAMINT

We agree

16 – Lockheed Martin

We agree

17 – HUGHES Network Systems Ltd

We support moderator's proposal

18 – Nokia France OK
19 – Inmarsat We agree with moderator's proposal

Issue 3.3-3: Do you agree with the moderator proposal concerning the addition of the sub-bullet in clause 4.1.4 of the WID as below?

"Enhancement to Xn~~/NG~~ signallings to support feeder link switch-over, CHO, ~~TN-NTN coordination,~~ e.g. exchange of necessary information between gNBs. [RAN3]"

Feedback Form 23: Issue 3.3-3

1 – CATT We agree with the moderator's proposal, adding an additional sub-bullet in 4.1.4 to reflect the impact to Xn interface.
2 – Lenovo (Beijing) Ltd We agree with the moderator's proposal.
3 – Samsung Research America We agree with moderator's proposal.
4 – Qualcomm Incorporated We still have doubt on the usefulness of the objective as satellite gateway and target gNB may not be collocated and Xn interface may not be possible. But if a very large majority of companies support this version, we will not object.
5 – ZTE Corporation We are also not sure about the usefulness of the objective but this sub-bullet is acceptable to us if the majority want it.
6 – THALES We share the same views as Qualcomm and ZTE. Therefore if majority wants it, we will not object
7 – Intel Corporation SAS We are fine with the moderator's proposal.
8 – Transsion Holdings We are fine with majority view.

9 – MediaTek Inc. Support proposal from moderator
10 – HUAWEI TECHNOLOGIES Co. Ltd. In our view the motivation of the enhancement to support feeder link switch over is not clear. We believe the de-centralized solution is not as important as feeder link switch over via OAM. But if majority companies support feeder link switch over, we can go with majority view.
11 – Ericsson LM The proposed wording is OK except that NG signaling impact should still be mentioned in the statement (i.e. it should not be ruled out at this point). This can be left to technical discussion in RAN3.
12 – vivo Mobile Communication Co. OK
13 – NOVAMINT Same views as Qualcomm and ZTE.
14 – Lockheed Martin We agree
15 – Nokia France Similar to Qualcomm, ZTE, etc, we are not convinced of the usefulness of this objective. Especially, this was never discussed in the SI. Therefore, if it is included, it should be a study only.
16 – Inmarsat We agree with the moderator proposal. Regarding Qualcomm and ZTE comments, even if the gNB and gateway are not co-located, if the switch is implemented as a gNB handover, some work on Xn will still be required in our understanding. We should not preclude flexibility of deployment

3.3.3 Summary and recommendation for further discussion

The following summarizes the discussion in the intermediate round and the recommendations for further discussion.

Issue 3.3-1:

The moderator proposed text to remove “and maintenance” was acceptable to all companies. There was also acceptance from all companies to consider the moving cell scenario. However, Ericsson proposed to not update the sub-bullet at this time. Given that all companies could agree to consider the moving cell scenario, the moderator proposes to update the sub-bullet at this meeting to capture this understanding.

There were a number of suggestions concerning the text for the recommended update for the moving cell scenario ranging from simplified text to more detailed text concerning feeder link switch and hard vs. soft

feeder link switch. The moderator proposes to take the Qualcomm proposed text at this time as it was supported by a number of companies and provides a balance between the simplified text and the more detailed text. The moderator has listed this as an open issue to resolve in the final round.

Issue 3.3-2:

Thanks for the progress in working towards a compromise. The original moderator proposed text was acceptable to the vast majority of companies. Samsung proposed that NTN-NTN mobility should also be considered and not to limit to NTN-TN mobility only. The Samsung proposal was supported by a number of companies. Intel suggested to add some detail to the sub-bullet to provide some example of the enhancements. Based on the moderator understanding, companies have differing views on the set of enhancements needed based on Rel-17 outcome. Therefore, the moderator would like to avoid adding examples at this time until company proposals are discussed in the RAN WGs to avoid any misconceptions about prioritization of certain enhancements. Ericsson suggested to consider this objective with lower priority. The moderator doesn't see a need to identify the priority level for each of the NTN-TN and NTN-NTN mobility and service continuity enhancements at this time. Based on RAN WG discussions on the overall set of objectives, RAN can consider any necessary prioritization at that time, if needed.

Based on the company views, the moderator proposes to consider the Samsung proposal in the final round as an open issue in order to collect company views prior to updating the bullet point further.

Issue 3.3-3:

The majority of companies agreed with the moderator proposal. Qualcomm, ZTE, Thales, NOVAMINT, and Nokia are not convinced of the usefulness of this objective but don't object. Nokia would like to see this as a study only. Huawei questions the motivation of the enhancement to support feeder link switch over but indicated that the majority view was acceptable. Ericsson proposed to keep NG signalling impact in the statement, and it should not be ruled out at this point and can be left to technical discussion in RAN3.

Based on the feedback received, the moderator proposes to add text to the beginning of the sub-bullet to emphasize a study phase for the objective and to place NG signalling impact in brackets for now to allow for confirmation at the next RAN Plenary.

3.4 Final Round

In the final round, the moderator proposes to consider the following open issues.

3.4.1 Open Issues

Issue 3.4-1: Do you agree to the updated text below to add the earth moving cell scenario?

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) <u>and earth-moving cell (feeder link switch)</u> to reduce the signalling overhead. [RAN2, RAN3]"

Issue 3.4-2: Do you agree to the updated text below for the sub-bullet in clause 4.1.4 of the WID?

"Specify cell reselection enhancements ~~in NTN-TN mobility~~ for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Issue 3.4-3: Do you agree to the updated text below for the sub-bullet in clause 4.1.4 of the WID?

"Study and, if needed, specify e~~E~~nhancement to Xn[/NG] signalling to support feeder link switch-over, CHO, e.g. exchange of necessary information between gNBs. [RAN3]"

3.4.2 Collection of company views

Issue 3.4-1: Do you agree to the updated text below to add the earth-moving cell scenario?

"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell (feeder link and service link switch) and earth-moving cell (feeder link switch) to reduce the signalling overhead. [RAN2, RAN3]"

Feedback Form 24: Issue 3.4-1

1 – Apple AB We are mostly fine with this recording. Handling service link switch in earth moving case may be less of a problem than for earth fixed case, but we would prefer to keep the wording a bit general and just say "Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell ~~(feeder link and service link switch)~~and earth-moving cell (feeder link **and server link** switch) to reduce the signalling overhead. [RAN2, RAN3]" But we are also OK to go with majority view.
2 – Qualcomm Incorporated We are fine with the proposed revision. If needed, we are also OK to keep service link switch for RAN2 consideration.
3 – CATT Similar view with Apple and QC, for earth-moving cell case, it's better to open the door to RAN2 for further consideration.
4 – Samsung R&D Institute UK We wonder why service link switch is excluded for earth moving cell. We think all cases of switch, e.g. feeder/service link, soft/hard switch, should be generally considered for both quasi fixed cell and moving cell and mechanism applicable to different cases can be targeted, so we think it's fine to update as: "Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell and earth-moving cell to reduce the signalling overhead. [RAN2, RAN3]".
5 – Lenovo (Beijing) Ltd We are fine to include "service link switch" for earth-moving cell as well. For now we see no reason to specifically exclude this.

6 – Inmarsat

We are also fine to include service link switch for earth-moving cells, and note that indeed as Samsung suggests all cases including hard/soft switch should be looked at.

7 – THALES

We are fine to consider earth moving cell secnario as well. Either way is fine through explicitly mention of both feeder and service link switch (Apple proposal) or implicitly address both (Samsung proposal)

8 – MediaTek Inc.

We have preference for Samsung proposed wording. "Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell and earth-moving cell to reduce the signalling overhead. [RAN2, RAN3]". No need to mention explicitly feeder link and service link. This can be discussed in RAN2/RAN3.

9 – Ericsson LM

It's also not clear to us why the earth-moving cell scenario should be limited to the feeder link switch. Samsung's proposed rewording is appropriate.

10 – HUAWEI TECHNOLOGIES Co. Ltd.

We are fine with the proposal.

11 – Nokia France

We agree, and that "server link switch" should also be included for the earth moving cell case.

Issue 3.4-2: Do you agree to the updated text below for the sub-bullet in clause 4.1.4 of the WID?

"Specify cell reselection enhancements ~~in NTN-TN mobility~~ for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Feedback Form 25: Issue 3.4-2

1 – Apple AB

Our view is that R17 has already worked extensively on NTN-NTN mobility for cell reelection. It is the NTN-TN cell reselection topic that could be not addressed in R17 due to lack of time. So our preference would be to have a more focused objective that primarily considers NTN-TN mobility. If companies insist on studying NTN-NTN mobility, then we suggest that we should at least prioritize NTN-TN mobility.

2 – CATT

Similar view with Apple. We are ok to open the door for NTN-NTN cell reselection in Rel-18, but is seems better to prioritize the TN-NTN mobility.

3 – Samsung R&D Institute UK

We agree with the updated text. We think NTN-NTN cell reselection priority can also be enhanced to reduce UE power consumption considering Rel-17 cell reselection as baseline, and mechanism applicable

to both NTN-NTN and NTN-TN cell reselection priority may be possible. So we suggest not to limit the scenario.

4 – Lenovo (Beijing) Ltd

We have concerns on what exactly to be done in Rel-18 with the updated text, considering that the Rel-17 enhancements to cell reselection are exactly ”cell reselection enhancements for RRC_IDLE/INACTIVE UEs”. We agree with apple that the objective is better to be more specific.

5 – Inmarsat

We are of the view that cell-reselection should be looked at in general as part of Rel-18, both NTN-TN but also possibly NTN-NTN. It’s very likely that with more work on VSAT above 10 GHz the cell reselection for VSAT UEs at least will have to be looked at.

6 – THALES

same view as Inmarsat

7 – MediaTek Inc.

We have similar view Apple on a more focused objective. The revised objective is ambiguous on the scope for cell re-selection to reduce UE power consumption. TN-NTN mobility can be prioritized scenario.

8 – Ericsson LM

The proposed updated text is OK for us. Once again, we have to point out that in general an NTN-TN Xn may not be feasible, hence a number of NTN-TN enhancements may not work in practice. For this reason, we believe NTN-TN enhancements should have lower priority with respect to NTN-NTN enhancements.

9 – HUAWEI TECHNOLOGIES Co. Ltd.

We share the same views as Apple, better to have a more focused objective.

10 – Nokia France

We share the view of Apple, that the focus should be on TN-NTN mobility in Rel-18.

Issue 3.4-3: Do you agree to the updated text below for the sub-bullet in clause 4.1.4 of the WID?

“Study and, if needed, specify e~~E~~nhancement to Xn[/NG] signalling to support feeder link switch-over, CHO, e.g. exchange of necessary information between gNBs. [RAN3]”

Feedback Form 26: Issue 3.4-3

1 – CATT

We agree to add this sub-bullet in clause 4.1.4.

It’s benefical to make better guidance for RAN3 work in the Rel-18.

2 – Samsung R&D Institute UK

We are fine with the revision.

3 – Lenovo (Beijing) Ltd We agree with the updates.
4 – Inmarsat We agree with this wording
5 – THALES We agree with this
6 – MediaTek Inc. We are fine with the revision
7 – Ericsson LM Adding back the mention of NG is OK. But we are strongly against ”study and if needed specify”: feeder link switchover has been *already* studied at length during the Rel-16 SI and thoroughly documented in TR 38.821 (Sec. 8.7 and others - it helps to read TRs). No need to study it again. Someone commented in the previous round that ”it was not studied before”: that is simply *not true*. RAN2 and RAN3 know what this is about and can go ahead and specify it.
8 – HUAWEI TECHNOLOGIES Co. Ltd. Agree with the proposal
9 – Nokia France We would prefer to delete the whole bullet, but if it is included then ”Study and if needed...” is essential.
10 – Ericsson LM It makes no sense to study again something which has been already studied and is documented in the appropriate TR. No objection was made to it back then.

3.4.3 Summary and final recommendations

Issue 3.4-1:

Many companies preferred to keep “service link switch” for earth-moving cell for RAN2 consideration. Apple suggested text to have “(feeder link and service link switch)” to apply to both scenarios. Samsung suggested edits to remove the text in parentheses and not mention feeder link and service link explicitly as these aspects can be discussed in RAN2/RAN3. Either option seems agreeable but the preference seemed to be the Samsung proposal. Based on the outcome of the final round discussion, the following sub-bullet in clause 4.1.4 of the WID can be agreed. No further discussion is required. The rapporteur is asked to add the following sub-bullet in clause 4.1.4 of the revised WID as below accordingly in [13].

“Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell and earth-moving cell to reduce the signalling overhead. [RAN2, RAN3]”

Issue 3.4-2:

Of the ten (10) companies responding, six (6) would prefer to keep the objective more detailed to emphasize NTN-TN mobility or to, at least, prioritize it over NTN-NTN mobility. Given that the previous suggestion for the intermediate round discussion emphasized NTN-TN mobility, it is not clear as to a preferred option at this point. The moderator proposes the following options for consideration during the extended round email discussion. Companies are encouraged to provide their preferred option over email and the moderator will capture the final outcome in section 4 of this discussion summary document. If there is no strong view, Option 4 will be the outcome.

Option 1: "Specify cell reselection enhancements in NTN-TN mobilityfor RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Option 2: "Specify cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption. [RAN2, RAN3, RAN4]"

Option 3: "Specify cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption (NTN-TN mobility is prioritized). [RAN2, RAN3, RAN4]"

Option 4: No sub-bullet is added to address this objective at this time, and it can be further discussed at RAN#96.

Issue 3.4-3:

The vast majority of companies supported the updated text for the proposed sub-bullet on enhancements to Xn[/NG] signalling in clause 4.1.4 of the WID. Nokia had requested a study in the intermediate round which resulted in the moderator proposal and indicated in the final round that the study part is essential. Ericsson commented in the final round that they are strongly against adding a study. Ericsson indicated that the study is not needed since feeder link switchover is thoroughly documented in TR 38.821.

Given that the core part of the sub-bullet seems agreeable, the moderator proposes the following two options for consideration during the extended round email discussion. Companies are encouraged to provide their preferred option over email and the moderator will capture the final outcome in section 4 of this discussion summary document.

Option 1: "Specify enhancement to Xn[/NG] signalling to support feeder link switch-over, CHO, e.g. exchange of necessary information between gNBs. [RAN3]"

Option 2: "Study and, if needed, specify enhancement to Xn[/NG] signalling to support feeder link switch-over, CHO, e.g. exchange of necessary information between gNBs. [RAN3]"

23 March Update after Extended Round and Wednesday GTW:

The following captures the outcome of the extended round feedback concerning Issue 3.4-2 and Issue 3.4-3.

Issue 3.4-2:

The company views on Cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption are listed as follows.

- Option 1: Nokia, OPPO, vivo, CATT, Apple, Xiaomi, KT, LGE, Huawei, FGI, H3C

- Option 2: QC, Samsung, Thales, Ericsson, ZTE, Lenovo
- Option 3: Nokia, QC, Samsung, CATT, Apple, Xiaomi, LGE, Huawei, Intel, Thales, FGI, H3C, ZTE, Lenovo
- Option 4: None

The moderator proposes to take Option 3 as only one company which chose Option 2 did not list Option 3 as an alternative and only three companies which chose Option 1 did not list Option 3 as an alternative. Option 1 was the original proposed text in the initial round and 8 companies out of 11 supported Option 3 as an alternative. The original proponent of Option 2 (Samsung) also supported Option 3.

Based on the outcome of the Wednesday GTW, Option 3 was agreed.

Issue 3.4-3:

The company views on Enhancement to Xn[/NG] signalling are listed as follows.

- Option 1: Samsung, CATT, KT, Ericsson
- Option 2: Nokia, OPPO, QC, vivo, CATT, Xiaomi, LGE, Huawei, Intel, Thales, FGI, H3C, ZTE, Lenovo

The moderator proposes to take Option 2. Based on the comments from Ericsson concerning the study that has already been completed in RAN3, it should be clear that any aspect of this study should not duplicate the work already performed during the Rel-16 study. The majority of the companies support some study to allow RAN3 to decide if further enhancements are needed and/or to address some aspects that were not considered during the original study. ZTE commented that there may be a need to further check the feasibility to enable the information exchange between gNBs since the separation distance may be much larger. In the moderator's view, the addition of the study does not adversely impact the objective as RAN3 should be able to ensure that duplicate studies are not performed.

Based on the outcome of the Wednesday GTW, Option 2 was agreed.

4 Final Conclusions

Moderator Recommendations:

The moderator recommendations for the discussion [95e-25-R18-NR-NTN-WI] can be found below.

23 March Update after Extended Round and Wednesday GTW: Recommendations updated based on GTW agreement.

1) For "Topic #1: General corrections of NR_NTN_enh WID", the following way forward can be agreed.

- **Concerning the revisions presented in [1], the following items are confirmed.**
    - **The rapporteur is asked to remove the revisions to section 5 related to adding a new internal TR "NR; Solutions for NR to support non-terrestrial networks (NTN): Non-terrestrial networks (NTN) related RF and co-existence aspects in above 10 GHz" and to keep TR 38.863 in the list of affected documents.**
    - **The rapporteur is asked to remove the new TS 38-101-X "NR; User Equipment (UE) radio transmission and reception, part X: Satellite Access Radio Frequency and performance requirements in above 10 GHz" from the list of new documents in section 5.**
    - **The remaining updates to the WID are acceptable.**
- **Capture requirements related to above 10GHz User Equipment (UE) radio transmission and reception in the existing TS 38.101-5 NR; User Equipment (UE) radio transmission and reception, part 5: Satellite Access Radio Frequency (RF) and performance requirements.**

2) For "Topic #2: Network verified UE location", the following way forward can be agreed.

- **The rapporteur is asked to revise the following bullet in clause 4.1.3 of the revised WID as below accordingly in [13].**
    - **"Study detailed regulatory requirement (e.g. accuracy, privacy, reliability, latency) for network-verified UE location for potential use cases/services (i.e. emergency call, lawful intercept, public warning, charging/billing)~~, e.g. accuracy requirement~~ (at RAN plenary, from RAN#95 to RAN#96)."**
- **The rapporteur is asked to revise the clause 4.1.3 of the revised WID in [13] to add the following note below the objectives.**
    - **"Note: RAN WG studies on solutions (if any) will start only after RAN study is concluded"**
- **Concerning the TR skeleton presented in [7] and revised in [14], the following items are confirmed.**
    - **The rapporteur is asked to revise the clause 5 to "Requirements for UE location verification"**
    - **The rapporteur is asked to revise the clause 6 to "Verification methods for UE location"**
    - **The rapporteur is asked to revise clause 6.2 to "Network verified UE location and its relationship to positioning"**
    - **The rapporteur is asked to revise clause 6.3 to "Candidate methods assessment and gap analysis"**
    - **The remaining items in the TR skeleton are acceptable.**

The sub-bullet related to clause 6.2 of the TR skeleton will be updated in the way forward after conclusion of the extended round email discussion.

3) For "Topic #3: NTN-TN and NTN-NTN mobility and service continuity enhancements", the following way forward can be agreed.

- **The rapporteur is asked to add the following sub-bullets in clause 4.1.4 of the revised WID as below accordingly in [13].**

  - **"For NTN-NTN mobility, specify cell reselection enhancements for earth moving cell, the timing based and location-based cell reselection for quasi-earth fixed cell in Rel-17 can be considered as the starting point. [RAN2, RAN3, RAN4]"**
  - **"Specify NTN-NTN handover enhancement for RRC_CONNECTED UEs in the quasi-earth-fixed cell and earth-moving cell to reduce the signalling overhead. [RAN2, RAN3]"**
  - **"Specify cell reselection enhancements for RRC_IDLE/INACTIVE UEs to reduce UE power consumption (NTN-TN mobility is prioritized). [RAN2, RAN3, RAN4]"**
  - **"Study and, if needed, specify enhancement to Xn[/NG] signalling to support feeder link switch-over, CHO, e.g. exchange of necessary information between gNBs. [RAN3]"**

- **The rapporteur is asked to remove the existing note in clause 4.1.4 of the revised WID as below accordingly in [13]:**

  - **"~~NOTE: The objective on mobility and service continuity enhancements will be clarified at RAN#95-e.~~"**

The possible sub-bullets related to cell reselection enhancements in NTN-TN mobility for RRC_IDLE/INACTIVE UEs to reduce UE power consumption and enhancement to Xn[/NG] signalling will be updated in the way forward after conclusion of the extended round email discussion.

4) The following conclusions can be taken on the Tdocs.

Documents [2] through [6], [8] through [12], and [15] can be noted.

RP-220953 [13] can be approved.

RP-220959 [14] can be noted and the proposed TR skeleton can be endorsed.

5) Concerning the revised WID in RP-220953 [13], MCC indicated that the RAN-led study on regulatory requirements for network-verified UE location within REL-18 WI NR_NTN_enh will need to be transferred into a separate RAN-led SI at RAN #96.

This is necessary to avoid precedence cases of RAN contributing to normative WIs of RAN WGs and to avoid creating problems e.g. for corresponding reporting processes.

5 References

[1] RP-220137: Revised WID NR-NTN-enh; THALES

[2] RP-220138: Rel-18 WID NR-NTN-enh rationale for corrections; THALES

[3] RP-220139: Network verified UE location aspects; THALES

[4] RP-220174: Network verification of UE location in NTN; Qualcomm Incorporated

[5] RP-220200: On Network-verified UE location for NR NTN; Intel Corporation

[6] RP-220421: Discussion on network-verified UE location for NR NTN; Huawei, HiSilicon

[7] RP-220525: skeleton for ”NR; Network verified UE location for NTN”; THALES

[8] RP-220559: Discussion on the scope of Rel-18 NR NTN enhancements; Beijing Xiaomi Mobile Softwar

[9] RP-220601: Discussion on NTN-TN and NTN-NTN measurement/mobility and service continuity enhancements; vivo

[10] RP-220615: Views on NR NTN enhancements; NTT DOCOMO, INC.

[11] RP-220646: R18 NR-NTN-enh WID revisions related to Nwk verified UE loc; THALES

[12] RP-220740: Further clarifications on the objectives of Rel-18 NR NTN WID; CATT

[13] RP-220953: Revised WID NR-NTN-enh; THALES

[14] RP-220959: skeleton for ”NR; Network verified UE location for NTN”; THALES

[15] RP-220422: Discussion on NTN-TN and NTN-NTN mobility and service continuity; Huawei, HiSilicon