[94e-18-R18-NTN-IoT] NTN IoT Enhancements - Version 0.0.6

RAN

1 Introduction

In accordance with RAN Chairman's guidance in RP-213469, the draft NTN IoT WID RP-212729 resulting from the October email discussion has been revised by the Moderator ("the *Revision*"). Please note that the *Revision* has a reduced scope vs. the result of the October email discussion.

The *Revision* is subject to discussion in this email thread [94e-18-R18-NTN-IoT].

The *Revision* is available in the Inbox/Drafts/[94e-18-R18-NTN-IoT] folder, see "*RP-21nnnn was RP-212729 r00 MOD.doc*". It incorporates the changes in RP-213469 *Appendix 2 Detailed scope for potential R18 items for email discussion.pptx* (Slide 24). Please note that given RP-213469 proposes removing the objective on "Further enhancement to discontinuous coverage", the Moderator also removed, for consistency, all references to "Further enhance[ment to] discontinuous coverage" from the justification and the objectives in the *Revision*.

This email discussion is scheduled into three phases, as per the timeplan provided by the RAN Chairman, in UTC time as follows.

- Initial Phase comments: Dec 6th @08:00h – Dec 7th @17:00h
- Intermediate Phase comments: Dec 7th @23:30h – Dec 8th @19:00h
- Final Phase comments: Dec 8th @23:30h – Dec 9th @19:00h

The email discussion is organized such as to discuss the Justification section, the Objective section incl. each Objective individually as well as other inputs to this meeting.

In the spirit of the *Revision*, the Moderator would like to:

- discourage discussions that expand the scope of the work compared to the result of the October email discussion i.e. adding (sub-)objectives not already included in the result of the October email discussion;
- encourage discussions that focus on confirming, reducing and/or clarifying the scope of the work.

For reference, company contributions submitted to this meeting on Rel-18 NTN IoT (RAN1/RAN2/RAN3) are listed below, alongside a crystallization of their proposals. Note: Objectives 1/2/3 are in the same order as in the draft work item.

Table 1: Inputs TDocs on IoT NTN

TDOC	Title	Source	Proposals

RP-212912	Views on Rel-18 NTN	Intel Corporation	**Scope reduction** **Objective 1:** Deprioritize Improved GNSS operation **Objective 2:** Deprioritize Enh. for NB-IoT carrier selection **Objective 3:** Deprioritize Enh. for discontinuous coverage
RP-213424	On NTN in Rel-18	Nokia, Nokia Shanghai Bell	**Scope confirmation** **Objective 3:** Do not deprioritize. Remove the square brackets on Further power saving enh. for IoT NTN.
RP-213103	Discussion on the Rel-18 IoT NTN enhancement	Beijing Xiaomi Mobile Software	**Scope reduction and clarification** **Objective 1:** Remove the statement that "This work considers existing IoT-NTN as baseline as well as Rel-17 outcome" **Objective 2:** - clarify RLF relates to NB-IoT - Deprioritize Enh. for NB-IoT carrier selection **Objective 3:** - Remove the opening statement on Rel-17 dependency and outcome - Remove the bullet with "[…]" i.e. Further power saving enhancements for discontinuous coverage.

RP-213327	Views on Rel-18 IoT NTN enhancements	NEC	**Scope expansion** **Objective 1:** - (Prio 1) HARQ enh: *add* increasing the number of HARQ processes; *add* PDCCH monitoring reduction - (Prio 2) *Add* Beam level mobility: Ncells with multiple anchor carriers **Objective 2:** - (Prio 1) sub-objectives related to RLF, CHO - (Prio 2) enh. for NB-IoT carrier selection - *Consider adding* (depending on NR NTN discsussions) HO signalling reduction, RACH congestion handling, NTN/TN mobility enh. **Objective 3:** - Power saving aspects to be re-evaluated once R17 completes
RP-213401	Discussion on IoT-NTN in Rel-18	ZTE, Sanechips	**Scope reduction** **Objective 2:** - Remove ref. to RLF in "Enh. on RLF and RRC reestablishment" - Deprioritize Enh. for NB-IoT carrier selection - Clarify the note on discontinuous coverage **Objective 3:** - Do not deprioritize - Keep only the sub-objective on efficient power saving mechanisms
RP-213352	On Rel-18 Package	MediaTek Inc.	**Scope clarification** **Objective 3:** revisit once Rel-17 completes

RP-212940	New WI: IoT NTN (Non-Terrestrial Networks) enhancements	THALES	**Scope clarification and expansion** **Objective 1:** clarification **Objective 2:** keep Enh. for NB-IoT carrier selection (remove square brackets) **Objective 3:** remove "further power saving enh. […]" Add a new objective: store&forward
RP-213452	Views for NTN for IoT projects	Qualcomm	**Scope confirmation** **Objective 1:** Confirm HARQ disabling and Improved GNSS operation **Objective 3:** Confirm enh. beyond Rel-17 discontinuous coverage

2 Initial Phase

2.1 Justification section

The justification is a revision of the result of the October email discussion. The *Revision* removes "Further enhance discontinuous coverage" as per the removal of the corresponding objective (see below in 2.4); please refrain from commenting on this in the justification.

Please comment on any areas where you believe that the Justification in the *Revision* is not aligned with the listed Objectives in the Revision. Please do NOT propose added justification for objectives that you would like to see but are not yet covered. This will be handled in a later phase of the discussion. The Moderator will update the Justification section if necessary as a result of the discussion on the objectives in this email discussion.

Please keep your comments brief and accurate.

Feedback Form 1: Comments on the Justification

1 – Guangdong OPPO Mobile Telecom.

Power consumption was not considered in R17 NTN IOT and it is still not stressed in R18 objectives as well as the justifications. We think that the power consumption for IOT service is an essential KPI, without which there might be a showstopper for the market penetration. Thus, we propose a revision of the following item:

- Improve performance in terms of throughput and power consumption.

2 – DOCOMO Communications Lab.

We feel current justification part might not be sufficient. Now which aspect to be enhanced is mentioned, but why the enhancement is necessary is not explained. If the necessity is clear among companies, it would be better to add some texts to say the necessity in the section.

3 – Eutelsat S.A.

We support the revised WI as defined in RP-212940. In particular we support the inclusion of Store & Forward operation as it can signficantly reduce the cost of the ground station portion of the network.

We note the moderator has excluded RAN4/ out-of-scope at this stage. However, it is important that this is not forgotten in later discussions. The multi-sourced document RP-213428 suggests a way forward, we also support the MediaTek proposals RP-213360 and associated Draft WID RP-213361.

4 – Beijing Xiaomi Mobile Software

We think the power consumption is the key aspects to enable a successful deployment. In Rel-18, this should be addressed with careful justification.

5 – Panasonic Corporation

We are fine with the justification.

6 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are fine with the justification.

7 – VODAFONE Group Plc

this part of the justification seems to need some editing:

- Optimize the GNSS operation with **spare use** of GNSS and power efficiency for long-term connection (compared to Rel-17)

8 – Apple AB

We are mostly fine with the justification section. We are also OK to keep "support of discontinuous coverage" in the justification, depending on the outcome of the discussion on Objective 3.

9 – HUGHES Network Systems Ltd

Overall justification is good, we suggest to add the following in the last bullet:

- Further enhance support for discontinuous coverage and store and forward operation

10 – MediaTek Inc.

We are supportive of the justification

11 – NOVAMINT

we are supportive of the justification (beside the topics which can be added after discussion)

12 – Sateliot

Fine with the justification

13 – Intel Corporation SAS

We are fine with the justification section in the revised draft WID.

14 – Sony Europe B.V.

The Rel-17 IoT-NTN SI was cut short to focus on only essential minimum functionality. The Rel-17 WI considered only essential minimum functionality and only for "sporadic short transmissions". The Rel-18 project should look at supporting broader functionality than the essential minimum and for long (normal length) transmissions.

The objectives on performance enhancements target one specific aspect of capacity enhancement (disabling HARQ feedback) and support of long connections and one specific aspect of reduced power consumption (GNSS). The justification says that the performance enhancements are targeting throughput improvements, which they don't.

Our suggested updated text in the justification section is:

"In Release 17, a work item was carried out to enable only essential minimum functionality for NB-IoT and eMTC to support sporadic short transmissions in Non-Terrestrial Networks (NTN) under the following assumptions:

- Transparent payload based GEO and NGSO network scenarios addressing at least 3GPP power class 3 UE with GNSS capability in both Earth fixed &/or moving cell configurations.

As part of release 18, a new work item is proposed to define further enhancements for NB-IoT NTN and eMTC NTN in order to:

- Improve mobility aspects
- Improve performance in terms of throughput, capacity, power consumption and latency
- Support long term connections

"

2.2 Objective 1: Performance enhancements

This objective results fully from the October email discussion i.e. it is identical to that in RP-212729 and is not modified in the *Revision*. This objective is expected to be stable. It is quoted below for reference (see the *Revision*).

Table 2: Objective 1: IoT-NTN Performance Enhancements in Rel-18 to address remaining issues from Rel-17

This work considers existing IoT-NTN as baseline as well as Rel-17 WI outcome and the further IoT-NTN performance enhancements objectives are listed below: – Disabling of HARQ feedback to mitigate impact of HARQ stalling on UE data rates [RAN1,RAN2] – Study and specify, if needed, improved GNSS operations for a new position fix for UE pre-compensation during long connection times and reduced power consumption [RAN1]

The Moderator would like to note that as listed in the introduction:

- RP-212912 proposes to remove the sub-objective on improved GNSS operation
- RP-213103 proposes to remove the opening statement that "This work considers existing IoT-NTN as baseline as well as Rel-17 outcome […]"
- RP-213327 proposes to add increasing the number of HARQ processes, PDCCH monitoring reduction and (2nd priority) beam-level mobility.
- RP-212940 proposes some clarification.
- RP-213452 confirms the proposed scope of the objective i.e. HARQ disabling and improved GNSS operation

Please indicate, using the feedback form below, any critical comment you may have to this objective and if so, please provide the necessary accompanying justification. Please keep your comments brief and accurate.

Feedback Form 2: [Initial Phase] Comments on Objective 1: IoT-NTN Performance Enhancements

1 – Guangdong OPPO Mobile Telecom. For NTN IOT in R18, we believe that besides data rates improvements, the performance enhancements should definitely consider UE power consumption reduction in particular for connected mode. To address this, in objective 1, we should look at improved GNSS operation, and PDCCH monitoring reduction.
2 – Ligado Networks We agree with the objective in particular disabling of HARQ and related improvements.
3 – Classon Consulting for FUTUREWEI If further reduction in scope is deemed necessary we prefer to include the HARQ disabling and not the improved GNSS.

4 – Beijing Xiaomi Mobile Software

Only sporadic short transmission is supported in Rel-17. We do think it is important to specify the solutions suporting the long transmission considering the power consumption in Rel-18 including the improved GNSS, and/or potentially other aspects.

5 – Samsung Research America

We are fine with this objective.

6 – ZTE Corporation

We are fine with this objective and share the view that GNSS-related discussion is important to support the long transmission for Rel-18.

7 – CATT

We are fine with the objective.

8 – Spreadtrum Communications

We are supportive of this objective.

9 – LG Electronics Inc.

We think GNSS operation can be prioritized to satisfy the limited TU for this item.

10 – NEC Corporation

We are supportive of this objective.

11 – China Mobile Com. Corporation

The objective looks fine to us.

12 – Deutsche Telekom AG

OK

13 – Panasonic Corporation

We are fine with the objective.

14 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are fine with the proposal.

15 – THALES

Overall fine but we suggest to clarify as follow

We suggest to replace

"This work considers existing IoT-NTN as baseline as well as Rel-17 WI outcome …"

By

*"This work considers **Rel-17** IoT-NTN **WI** as baseline as well as Rel-17 **NR-NTN** WI outcome ..."*

16 – NOVAMINT

We are fine with the objective.

Agree with Thales suggestion for clarification

17 – VODAFONE Group Plc

The second objective is ambiguous and should be clarified as it can be read as:

... improved GNSS operations for reduced power consumption and a new position fix for UE pre-compensation during long connection times.

While it might be intended to say:

Study and specify, if needed, reduced power consumption, and, improved GNSS operations for a new position fix for UE pre-compensation during long connection times

18 – Qualcomm Incorporated

We agree that both objectives are fundamental improvements to NTN IOT: HARQ disabling for increased throughput and reduced power consumption, and GNSS improvements for support of longer connections and reduced power consumption.

19 – Apple AB

We are fine to support both HARQ disabling and improved GNSS operation. If some down-scoping is really warranted, then we would prefer to keep the HARQ disabling objective.

20 – HUGHES Network Systems Ltd

We agree with the objectives and support disabling of HARQ and related improvements.

21 – MediaTek Inc.

We are generally supportive of this objective.

22 – HUAWEI TECHNOLOGIES Co. Ltd.

we are ok with the objective of HARQ disabling.

In Rel-17, a UE have to go to idle when either GNSS becomes out-of-dated or the validity duration of common TA and satellite ephemeris expires. In Rel-18, the enhancement on "improved GNSS operations for a new position fix" and "common TA and ephemeris update" can be considered together since they all target long connections. The enhancements seems to us more related to RAN2 than RAN1. We do not see clear benefit of reduced power consumption, so we suggest not to explicitly mention reduced power consumption in the WID.

Therefore, we suggest the following update:

*Study and specify, if needed, improved GNSS operations for a new position fix**, common TA and ephemeris update** for UE pre-compensation during long connection times **~~and reduced power consumption~~** [RAN2, RAN1]*

23 – TURKCELL

We are supportive of this objective. The wording of Vodafone is ok.

24 – Gatehouse Satcom A/S

We are generally supportive of this NTN IoT objective.

25 – Sateliot

Fine with the general objective.

Nevertheless, second objective seems to need some re-phrasing for the sake of clarity. Our suggestion: ”Study and specify, if needed, improved GNSS operation for UL pre-compensation during long connection times while ensuring reduced power consumption”

26 – Intel Corporation SAS

In our view it is not necessary to enhance Rel-17 IoT NTN GNSS operation. Considering that the corresponding subobjective has study phase, we can accept it to be included in WID if time permits.

27 – Sequans Communications

We are fine with the objective, we have same comment as Thales.

28 – Ericsson LM

In Rel-17 RAN2 concluded that it is not essential to specify a mechanism to disable HARQ feedback. This is, partially due to lack of evidence of significant gain especially considering that it is already possible for the network to schedule transmission in the UL using the same HARQ process ID before ACK/NACK is received. Thus we think it is premature to specify a mechanism to disable HARQ feedback. At the very least it should be clarified that need and benefit should be studied first and specified only if justified and found beneficial.

29 – Sony Europe B.V.

We need to have a study to determine how to improve performance in terms of throughput, capacity, power consumption and latency. We shouldn’t just jump into specifying disabling HARQ feedback (to improve capacity). Why pick this specific technique over other techniques to support improved capacity?

The objective on GNSS is inconsistent with the justification and the status of Rel-17 IoT-NTN as only sporadic short transmissions are supported in Rel-17 IoT-NTN.

What we really need is a study on how to enable IoT-NTN to support more than essential minimum functionality and to support traffic models that go beyond sporadic short transmissions.

A potential objective would be:

“Study enhancements to IoT-NTN that:

-improve performance in terms of throughput, capacity, power consumption and latency

- Support long connections”

2.3 Objective 2: Mobility Enhancements

This objective is a revision of the result of the October email discussion. It is quoted below for reference (see the *Revision*).

Table 3: Objective 2: Mobility Enhancements

The following candidate set of mobility enhancements objectives are listed.

- Enhancements on ~~RLF and~~ RRC reestablishment, e.g., conditional RRC reestablishment. [RAN2]
- Support of neighbor cell measurements and corresponding measurement triggering before RLF. This may include legacy (Rel-17) [RAN2]
- Solutions introduced in Rel-17 NR NTN for mobility enhancements (e.g. location-based CHO and timing-based CHO) for eMTC [RAN2]
- ~~[NB-IoT carrier selection based on the coverage level, and associated carrier specific configuration] [RAN1, RAN2]~~

~~Note: There is potential overlap concerning RRC reestablishment enhancements proposed for mobility enhancements and further enhancement to discontinuous coverage. A unified solution is expected.~~

Other items in this objective are expected to be stable.

The Moderator would like to note that as listed in the introduction:

- RP-212912 proposes to remove the sub-objective (in “[]”) on NB-IoT carrier selection based on coverage level.
- RP-213103 proposes to clarify “RLF” relates to NB-IoT and to remove the sub-objective (in “[]”) on NB-IoT carrier selection based on coverage level.
- RP-213327 proposes to prioritize sub-objectives related to RLF, CHO and to treat enh. for NB-IoT carrier selection (2nd priority). It also proposes to consider adding HO signalling reduction, RACH congestion handling, NTN/TN mobility enh. (depending on NR NTN discussions)
- RP-213401 proposes to remove reference to RLF in “Enh. on RLC and RRC reestablishment”, to remove the sub-objective (in “[]”) on NB-IoT carrier selection based on coverage level and to clarify the note on discontinuous coverage.
- RP-212940 proposes to keep the sub-objective (in “[]”) on NB-IoT carrier selection based on coverage level.

Please indicate, using the feedback form below, any critical comment you may have to this objective and the changes above. If so, please provide the necessary accompanying justification. Please keep your comments brief and accurate.

Feedback Form 3: [Initial Phase] Comments on Objective 2: Mobility Enhancements

1 – Guangdong OPPO Mobile Telecom.

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We suggest to keep the RLF in the first bullet. Removing the part on
   carrier selection is acceptable as it is not related to mobility
   enhancement.
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2 – Ligado Networks

We support the objective, but would prefer not to delete carrier selection.

3 – Samsung Research America

Regarding the third bullet "*Solutions introduced in Rel-17 NR NTN for mobility enhancements (e.g. location-based CHO and timing-based CHO) for eMTC [RAN2]"*, our preference is to refine the list in parenthesis and not to have a list of solutions as examples for an objective that is to be specified. We are also fine to remove this bullet entirely.

4 – ZTE Corporation

We share the same view to removing the examples listed in the bracket (*(e.g. location-based CHO and timing-based CHO)*).

5 – CATT

We understand the NB-IoT multi-carriers should be supported to extend the capacity of the system. Just wondering what's the meaning of "NB-IoT Carrier selection based on coverage level" ?

6 – LG Electronics Inc.

We are fine with objective.

7 – NEC Corporation

We are supportive of this objective.

8 – China Mobile Com. Corporation

We tend to keep the "RLF" in the table.

9 – Deutsche Telekom AG

We also propose to keep RLF in the objectives

10 – Panasonic Corporation

We are fine with the objective.

11 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are generally fine with the proposal.

For the second bullet, there is no need to mention "This may include legacy (Rel-17)" as Rel-18 study is based on legacy Rel-17.

12 – VODAFONE Group Plc

We would prefer not to delete NB-IoT carrier selection based on coverage level.

13 – Qualcomm Incorporated

We suggest keeping the RLF in the first bullet. A clarification can be added that the focus should be on potential enhancements to prevent RLF from happening instead of enhancement to RLF recovery after RLF has already happened.

We are ok with removal of the carrier selection based on coverage level.

14 – Apple AB

Looks good.

15 – HUGHES Network Systems Ltd

We support the objective, but would prefer not to delete carrier selection.

16 – MediaTek Inc.

We are generally supportive of this objective. The examples listed in the bracket (*(e.g. location-based CHO and timing-based CHO)*) for eMTC can be removed.

17 – HUAWEI TECHNOLOGIES Co. Ltd.

Our general view is that there is no major issue with mobility as defined in Rel-17 for IoT NTN. In addition, we have some comments on the first two objectives:

For objective 1 on conditional RRC reestablishment, if this mandates the UE to perform reestablishment with the conditional cells but the cell quality is not as good as a suitable one, this brings undesirable latency than the legacy reestablishment procedure. In addition, in our understanding, this objective is related to the NB-IoT. The motivation is to reduce the latency of RRC reestablishment. But the IoT services are delay-tolerant/non-real-time services. Therefore we think the legacy reestablishment is enough and no enhancement in Rel-18 is needed.

For objective 2, the UE behavior to perform neighbor cell measurements is decoupled with the RLF detection procedure. The wording "corresponding measurement triggering before RLF" is unclear and the use case for this bullet should be clarified.

For objective 3, we did see urgent need to have further eMTC-specific optimization for NTN.

We therefore suggest to remove all objectives under mobility enhancement

18 – NOVAMINT We are generally supportive of this objective. The examples listed in the bracket ”(e.g. location-based CHO and timing-based CHO)” for ”Solutions introduced in Rel-17 NR NTN for mobility enhancements for eMTC” can be removed.
19 – Philips International B.V. Looks fine as it is.
20 – Intel Corporation SAS We are fine with the objective for mobility enhancements.
21 – Sateliot We are fine with this objective, but we would prefer keeping ”RLF” in the first bullet and potentially add the clarification suggested by Qualcomm.
22 – Sequans Communications We are generally fine, we propose to clarify the second bullet as follows: Support of neighbor cell measurements and corresponding measurement triggering before RLF. This may include legacy **mechanism** (Rel-17) [RAN2]
23 – Ericsson LM We are fine, in principle, with the current objective. RAN2 has already agreed that Rel-16 CHO is supported in IoT NTN and we anticipate that adopting Rel-17 NR NTN mobility enhancements for CHO would require quite little effort. Connected state mobility support is an integral aspect of eMTC and if we do NTN mobility enhancements in Rel-18, enhancing mobility for eMTC should have the same priority as other mobility objectives. It is not clear what is meant with ”This may include legacy (Rel-17)” in the second objective.
24 – Sony Europe B.V. Unless long connections are supported in Rel-18 IoT-NTN, it is unclear that these mobility enhancements are required for the support of sporadic short transmissions.

2.4 Objective 3: Further enhancement to Discontinuous Coverage

This objective is entirely removed in the *Revision* compared to the result of the October email discussion. It is quoted below for reference (see the *Revision*). Please note this objective was initially intended to be ”highly dependent on the outcome of Rel-17”.

Table 4: Objective 3: Further enhancement to Discontinuous Coverage

~~4.1.3 Further enhancement to Discontinuous Coverage~~
~~The list of objectives and their scope is highly dependent on the outcome of Rel-17. Further refinement of the list will be needed once the Rel-17 outcome is known. The following list of objectives is pending the Rel-17 outcome.~~

- ~~Efficient power saving mechanisms (e.g., eDRX/PSM) for sparse satellite constellations [RAN2]~~
- ~~Improvements to UE mobility among sparse cells [RAN2]~~
  - ~~Enhancements in RRC reestablishment or recovery based on the discontinuity of coverage~~
- ~~[Further power saving enhancements for IoT NTN to support discontinuous coverage including PUR for NGSO (2nd priority)] [RAN2]~~

~~Note: There is potential overlap concerning RRC reestablishment enhancements proposed for mobility enhancements and further enhancement to discontinuous coverage. A unified solution is expected.~~

The Moderator would like to note that as listed in the introduction above:

- RP-212912 proposes to remove this objective
- RP-213424 proposes to keep this objective while also removing the square brackets around Further power saving enh. for IoT NTN.
- RP-213103 proposes to keep this objective and remove the opening statement on Rel-17 dependency and outcome and the sub-objective on "[Further power saving enhancements for IoT NTN to support discontinuous coverage [...]]"
- RP-213327 proposes that power saving aspects be re-evaluated once Rel-17 completes.
- RP-213401 proposes to keep this objective but to focus only on efficient power saving mechanisms.
- RP-213352 proposes to revisit this objective once Rel-17 completes.
- RP-212940 proposes to keep the objective but to remove the sub-objective on "[Further power saving enhancements for IoT NTN to support discontinuous coverage [...]]".
- RP-213452 proposed to study possible enh. to Rel-17 support for discontinuous coverage

Please indicate, using the feedback form below, if you have any critical comment to the removal of this objective. If so, please provide the necessary accompanying justification. If you prefer to keep this objective, please also indicate which of the sub-objective(s) listed in RP-212729 should be kept. Please keep your comments brief and accurate.

Feedback Form 4: [Initial Phase] Comments on Objective 3:
Further enhancement to Discontinuous Coverage

1 – Guangdong OPPO Mobile Telecom.

We are ok to drop the whole objective at this stage because it is still being discussed in Rel-17. We can always come back to this after Rel-17 has concluded.

2 – Classon Consulting

for FUTUREWEI prefer not to add back this objective

3 – Beijing Xiaomi Mobile Software

We prefer to keep this objective. Power consumption is a key aspects for IoT devices. Only RRC IDLE UE is considered in Rel-17 IoT NTN on the discontinuous coverage, so the RRC connected UE should be considered in Rel-18 phase.

Regarding the detailed scope, we prefer to keep the following sub-objectives:

- *Efficient power saving mechanisms (e.g., eDRX/PSM) for sparse satellite constellations [RAN2]*
- *Improvements to UE mobility among sparse cells [RAN2]*
  - *Enhancements in RRC reestablishment or recovery based on the discontinuity of coverage*

4 – Samsung Research America

OK to drop this objective for now, although power consumption is important for NTN-IoT and it needs to be prioritized eventually.

5 – ZTE Corporation

We understand that there is an ongoing discussion in Rel-17 on this topic, but it seems that some pending issues, especially for LEO, can not be finished in the previous release. Then, considering the power assumption is essential for IoT devices, it's preferred to **keep the first two bullets** as a placeholder. Then, we can revise it later once the related discussion in Rel-17 is concluded.

6 – CATT

Rel-17 work for discontinuous coverage is still ongoing, we're not sure if there's any leftover issues to be addressed in Rel-18. Furthermore, it seems SA/CT will work on discontinuous coverage in Rel-18□at least some coordination work maybe required.

If we drop this objective for now, we should open the door for the come back of this objective according to Rel-17 output and progress of SA/CT in Rel-18.

7 – NEC Corporation

We are ok to re-evaluate this after completion of Rel-17.

8 – Eutelsat S.A.

Power saving aspects to support discontinuos coverage is already part of R17. Further power saving aspects should be re-evaluated once Rel-17 completes.

9 – Deutsche Telekom AG

Postpone to later based on the still ongoing Rel-17 discussions.

10 – Panasonic Corporation

We are okay to remove the objective.

11 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We would like to keep this objective. It seems Rel-17 have just started to discuss on the actual enhancements while the remaining time is short. At least we can add a NOTE to keep the possibility of revisiting this objective when Rel-17 completes.

12 – NOVAMINT

We agree with Xiaomi and ZTE that it is important to consider further power consumption aspects linked to discontinuous coverage as currently in Rel-17 the focus is on MO and it is likely that MT/paging will not covered.

Furthermore, as pointed out by CATT, it seems SA/CT will work on discontinuous coverage in Rel-18 and some coordination work would likely be needed.

So, we would prefer to keep the first two sub objectives and to keep the possibility of revisiting this objective once R17 is completed.

13 – VODAFONE Group Plc

Okay to remove this objective - but review of the final Release 17 outcome would be useful.

14 – Qualcomm Incorporated

Discontinuous coverage has not been finalized yet, but it is very likely that further enhancements will be needed in Rel-18. Also, the approved SA2 SI (S2-2108164) includes discontinuous coverage as one of the objectives, so RAN should align with the SA2 outcome. We are open to putting a placeholder item regarding this objective, which can be further refined based on Rel-17 final status and Rel-18 SA2 study.

15 – Apple AB

Given the limited amount of time in Release 17 for this feature, we feel that this objective will not be fully completed in Release 17. At the very least we would like to keep the following sub-objective in R18 scope for now: Improvements to UE mobility among sparse cells [RAN2]

o Enhancements in RRC reestablishment or recovery based on the discontinuity of coverage

Since RAN2 has not really done much on this aspect, we can direct RAN2 to not work on this in Release 17.

16 – Sateliot

We prefer to keep this objective as a placeholder and revisit its scope once Rel-17 completes.

Proper handling of discontinuous coverage is key for efficient power consumption of the IoT devices. Due to the limited time left in RAN2/RAN3 and the decision in SA2 of supporting disc. coverage under Rel-17 only re-using existing functionality at CN level, it is highly likely that the solution specified under Rel-17 will be only a minimum workable solution, with room for improvement. Thus, we think that addressing any leftover or further enhancement to discontinuous coverage under Rel-18 at both RAN and SA/CT levels

(discontinuous coverage is currently included under the scope of the "FS*5GSAT*ARCH_Ph2" SID proposal discussed at SA level) is very important for the consolidation of this feature in 3GPP IoT NTN technologies.

17 – MediaTek Inc.

Discontinuous coverage is in scope of Rel-17 IoT NTN WI. Further enhancements to improve prediction for UE wake up for improved cell access time and reduced UE power consumption could be considered in Rel-18 if not enough time for discussion in Rel-17– e.g. satellite assisted information with TLE ephemeris format and beam size / elevation.

18 – TURKCELL

We can postpone this objective to later based on the Rel-17 discussions.

19 – Gatehouse Satcom A/S

We support Xiaomi, ZTE and Novamint that it is important to consider further power consumption aspects linked to discontinuous coverage. Rel-17 mainly focuses on the MO scenario. Power reduction for especially the MT scenario (depends on paging) is seen as relevant.

The SA support for Rel-17 drives on the re-use of Core Network functionality for covering the basic scenarios.

SA/CT seems to have scheduled with discontinuous coverage work in Rel-18 what will require some RAN coordination and support. By doing this, improvement on system level will be feasible.

Agreeing with ZTE, Novamint, we are supportive in keeping the first two sub-objectives, though with the remark that we should also consider to revisite this objective once Rel-17 has been completed.

20 – Intel Corporation SAS

We are fine to remove the objective corresponding to discontinuous coverage.

21 – Sequans Communications

We don't have strong view on whether to keep this objective but agree with other companies that this will need to be revisited depending on Rel-17 work which is still on-going.

22 – Ericsson LM

OK to remove. May be better to consider at a later time.

23 – Sony Europe B.V.

We are OK to drop this objective. It is a "nice to have", but we need to firstly focus on a system that supports more than just the essential minimum functionality to support only sporadic short transmissions.

2.5 Other: Store and forward operation

The October email discussion resulted in not having an objective on store and forward operation.

The Moderator would like to note that as listed in the introduction above:

– RP-212940 proposes to add and objective on store and forward.

Please indicate, using the feedback form below, if you have any comment on the proposal to add an objective on Store and forward operation as listed in RP-212940. Please keep your comments brief and accurate.

Feedback Form 5: [Initial Phase] Comments on Store and forward operation

1 – Guangdong OPPO Mobile Telecom. From our viewpoint, regenerative payload may be considered in later release. For R18, we should rather add an objective for power consumption.
2 – Samsung Research America This can be considered for NTN-IoT if/after it is specified for NR NTN.
3 – ZTE Corporation This aspect can be considered in a later release once the impacts on the architecture of the core are clear.
4 – CATT This could be considered in the later release, once the regenerative architecture(s) is supported for NR NTN.
5 – Eutelsat S.A. This feature enables better coverage and fewer ground stations. As a satellite operator we want to stress, this feature is needed for 3GPP technologies to be competitive with existing non-3GPP IoT satellite technologies which support this functionality.
6 – Deutsche Telekom AG This is not important for Rel-18 and hence should be postponed (also for workload reasons)
7 – THALES As discontinuous coverage has been considered in Rel-17 IoT-NTN on service, we suggest to consider mechanism to mitigate a discontinuous feeder link with eNB on board. This would impact RAN3 only
8 – VODAFONE Group Plc (At least for workload reasons), prefer to leave this as a candidate for future releases.
9 – NOVAMINT We agree with Eutelsat - this is already a reality in non 3GPP world for IoT and we need to have competitive solution for the horizon considered with less dependency to ground stations (which is very important to mobile operators to be able to use the service with selected ground stations).

Moreover, the main original concern for this topic was the dependency to SA and it seems SA will work on Store and Forward (for IoT only).

Furthermore as pointed out by Thales, this would impact RAN3 only.

10 – Qualcomm Incorporated

Although we are supportive of this feature in general, adding this item at this time may not fit in the allocated TUs. If introduced, it can be combined as a particular case of discontinuous coverage (in this case, discontinuous backhaul).

11 – Apple AB

We don't see how this fits in with the overall scope of Release 18 NTN and IoT NTN features. Prefer to drop this for now.

12 – HUGHES Network Systems Ltd

We are supportive of this feature, it can be combined as part of discontinuous coverage enhancement.

13 – Sateliot

We think it is important to address store and forward operation for IoT NTN in Rel-18.

Work is expected to impact mainly on RAN3.

Work can be addressed in coordination with SA/CT groups under Rel-18, where support for NGSO regenerative payload for IoT NTN is currently included as part of the scope of the "FS_5G_SAT_ARCH_Ph2" SID proposal being discussed at SA level.

Store and forward operation will allow operators to offer delay-tolerant IoT NTN services with NGSO constellations in areas where the satellites are not (or cannot be) connected to any ground station (e.g. maritime areas). As noted by Eutelsat, this feature is needed for 3GPP technologies to be competitive with existing non-3GPP IoT satellite technologies which support this functionality.

14 – MediaTek Inc.

We are generally supportive of this objective. It cannot be assumed that the LEO satellite is always linked to a GateWay, especially across vast oceans or deserts.

15 – HUAWEI TECHNOLOGIES Co. Ltd.

In our understanding, the store and forward operation is based on the regenerative satellite. RAN has not decide to specify the regenerative satellite in Rel-18. Also even if RAN decides to support the regenerative satellite in Rel-18, we think Store and forward operation has significant specification impact on network architecture, RAN and core network. Therefore we think this objective should not be included in Rel-18.

16 – TURKCELL

We prefer not to add an objective on store and forward operations in Rel-18. This could be considered in later releases.

17 – Philips International B.V.

Agree with Qualcomm's way forward.

18 – Gatehouse Satcom A/S

Our comments are in line with those of other contributors: The regenerative/Store & Forward functionality makes the NTN IoT complementary to the current TN IoT, since global IoT coverage will be possible. Today this is only possible by using non-3GPP/proprietary NTN solutions that do not convergence with 3GPP TN IoT.

Originally, the regenerative/S&F was seen as ”challenged” by not committed SA support. Now SA will work on S&F and this issue is no longer blocking. It is important to reconsider; the original reasoning used for the removal of this functionality seem no longer valid. Additionally, Thales notes that the implementation for this will mostly influence RAN3.

19 – Intel Corporation SAS

Regenerative payload is assumed for the store and forward operation while transparent payload was mainly considered for Rel-17 WI and for other objectives in the Rel-18 draft WID. In our view store and forward operation can be considered in later releases with other features for regenerative payload, if any.

20 – Sequans Communications

We share Thales/Eutelsat/Novamint view.

21 – Sony Europe B.V.

We don’t see the need to add this objective. It is a “nice to have”, but we need to firstly focus on a system that supports more than just the essential minimum functionality to support only sporadic short transmissions.

Store and forward functionality would presumably also require SA2 involvement.

22 – Ericsson LM

We agree that there is a relation to/dependency on regenerative architecture which is currently not anticipated to be included in Rel-18. To be precise, we believe that a standardized store-and-forward operation functionality should be based on standardized regenerative architecture. With the current (transparent) architecture the satellite is a bent pipe, so store-and-forward functionality can be present only by implementation. In fact, the proposal in RP-212940 ”an eNB on board architecture is assumed” seems to contain an inconsistency: either we assume an eNB on board ”by implementation”, which is not possible, or we specify such an arrangement, which goes against the other assumption that we should reuse current NR NTN architecture.

2.6 Other comments

Please indicate, using the feedback form below, whether you any any other comment.

Please keep your comments brief and accurate.

Feedback Form 6: [Initial Phase] Other comments

1 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

RAN3 TUs have been allocated for this WI but RAN3 involvement is unclear. This should be clarified.

2 – Qualcomm Incorporated

Our input contribution RP-213452 is missing from the list of documents in Section 1

3 – MediaTek Inc.

MODERATOR My sincere apologies to Qualcomm for missing RP-213452!! Will fix it in the next iteration

4 – HuaWei Technologies Co.

RAN4 Chair: according to the clarification in section 4.2, the reserved TU for this WI may need be put in [ ]. And more discussion on the RAN4 scope for this WI is needed. It would be related to the potential discussion on how to handle RAN4 requirement for Rel-17 feature.

5 – Intel Corporation SAS

We prefer to include leftover RAN4 core and performance requirements from R17 in this Rel-18 IoT NTN item. Furthermore, given that Rel-17 IoT NTN Core RF/RRM requirements are unavailable and will not be defined in Rel-17 timeframe, we think it is better to put all potential RAN4 work on Core requirements associated with Rel-18 IoT NTN enhancements on hold and the work can start only once baseline requirements from the Rel-17 work are defined.

6 – Sony Europe B.V.

We would rather that this work was focussed on an initial study phase on performance enhancements and the support of long connections. After the study phase, we could firm up on the aspects that need to be specified.

2.7 Summary from the initial phase

The summary will be provided in RP-213494.

Justification

- 14 companies commented. 8 companies are fine with the proposed justification (some typo to be fixed). One company requested adding improvements to throughput. Two companies requested adding improvements to power consumption. Two companies requested keeping ref. to discontinuous coverage (this is subject to discussion on objective 3). Two companies requested addition of store & forward (not part of the current objectives and under discussion in this email discussion). One company suggested some overall rewriting of the justification. One company suggested adding more justification to the justification.
- The Moderator has updated the justification to retain a ref. to discontinuous coverage (see proposal 4)
- **Proposal 1: Justification:** The Moderator proposes to park the discussion on the justification (unless objectives change drastically)

Objective 1: Performance Enhancements

- 29 companies commented.
- Disabling HARQ feedback
  - 22 companies expressed support
  - 2 companies questioned the need, whilst also suggesting some study
  - 1 company indirectly suggested to deprioritize this item
- Improved GNSS operation
  - 24 companies expressed support
  - 1 of these companies expressed it could however be downscoped
  - 2 companies expressed no need to improve GNSS operation
  - 1 company requested though this changes the intention of the objective. (The Moderator has instead corrected the original objective adding a missing ”for”)
  - 1 company requested to add ”common TA and ephemeris update”
- Three companies requested to expand the scope
  - 1 requesting to consider PDCCH monitoring reduction
  - 1 requesting to expand towards ”and/or potentially other aspects”
  - 1 company requested to fully open the scope of the objective to study misc. enhancements
  - 1 company requested to expand the scope on improved GNSS operation to common TA and ephemeris update
- **Proposal 2: Performance Enhancements:** The Moderator recommends to confirm the objectives on Disabling HARQ feedback and Improved GNSS operation (with minor wording clarification to avoid confusion). The Moderator proposes not to expand the scope at this stage.

Objective 2: Mobility Enhancements

undefine~~d~~ 24 companies commented.

- Two companies indicated there is no need for mobility enhancements. 22 companies commented otherwise.
- On enhancement on ~~RLF and~~ RRC reestablishment:
  - 5 companies requested not to delete RLF
- On R17 solutions for NR NTN for mobility (e.g. location-based CHO and timing-based CHO)
  - 1 company requested to define a list without ”e.g.”
  - 3 companies requested to remove the parenthesis (and content thereof) altogether
  - 1 company stressed that work on CHO would required little effort
- On removing ~~[NB-IoT carrier selection based on the coverage level and associated carrier specific configuration] [RAN1, RAN2]~~

    - 3 companies indicated a preference not to remove it.
    - 18 companies are otherwise ok (implicitly or explicitly (2))
    - 1 company is unsure what it means

- **Proposal 3: Mobility Enhancements:** The Moderator proposes:
    - To reinstate the ”RLF” in the first sub-objective
    - To keep the parenthesis on CHO but to remove the ”e.g.”
    - To confirm the removal of ~~[NB-IoT carrier selection based on the coverage level and associated carrier specific configuration] [RAN1, RAN2]~~

Objective 3: Further enhancement to Discontinuous Coverage

- 23 companies commented
- 5 companies are ok to remove the objective
- Other companies indicated dependencies with ongoing discussions in Rel-17 that are not not finalized at this point hence the objective should be reeavaluated once these discussions conclude.
- **Proposal 4: Discontinuous Coverage:** The moderator proposes to keep an objective *placeholder* for Further enhancements for Discontinuous Coverage (without any sub-objective) with a NOTE to revisit the status in RAN#95e.

Other: Store and forward operation (company input in RP-212940)

- 22 companies commented - while there is a general support for S&F there is clearly no consensus that it should be done in Rel-18.
- 9 companies support adding this objective - 2 of these companies however emphasize there is unlikely enough TU to accomodate the work in Rel-18
- 12 companies prefer the work be done in a later release, once regenerative arch. is supported with NR NTN
- 1 company sees it as nice-to-have only
- **Proposal 5: Store and Forward operation:** The moderator proposes that no objective be added to the scope of the WID. The Moderator proposes to close this debate.

Other comments:

- 5 companies + RAN4 Chairman commented
- One company commented that RAN3 TU in RAN3 plan are not needed in view of the WID.
- RAN4
    - RAN4 Chairman recommended further discussions on RAN4 objectives for this work, also dependent on the handling on the RAN4 requirements corresponding to Rel-17 IoT NTN

- One company commented to include left-over RAN4 core and performance requirements from Rel-17 in this WID. Another company indicated (in the justification discussion) that this needs to be discussed

- **Proposal 6: RAN4 requirements:** The Moderator proposes that handling of the RAN4 part be discussed alongside the proposal to this meeting (RP-213361) to define the RAN4 core&perf requirements for Rel-17 IoT-NTN, as these two discussions are interrelated as already indicated in the draft WID §4.2.
- **Conclusion of initial Phase: Updated WID:** The moderator has updated the WID (see blue highlights) in the inbox/drafts/[94e-18-R18-NTN-IoT] folder: r01 MOD

3 Intermediate phase

The discussion focuses on r01 MOD in inbox/drafts/[94e-18-R18-NTN-IoT]. The moderator would like to stress once again to avoid expanding the scope of the work esp. considering the limited TU for the work.

Please note the Intermediate phase runs as follows: (UTC time)

- Intermediate Phase comments: Dec 7th @23:30h – Dec 8th @19:00h

3.1 Justification section

The Moderator has updated the Justification to reinstate a ref. to discontinuous coverage in accordance with Proposal 4, with a checkpoint at RAN#95e. The Moderator would like to focus the Intermediate phase on finalizing the objectives.

If necessary, resulting from the discussion, the Moderator will update the Justification.

3.2 Objective 1: Performance Enhancements

As per **Proposal 2**, the Moderator has updated the objective as follows (see text in ***BOLD ITALIC***):

This work considers ***Rel-17*** IoT-NTN as baseline as well as Rel-17 ~~***WI***~~***NR-NTN*** outcome and the further IoT-NTN performance enhancements objectives are listed below:

- Disabling of HARQ feedback to mitigate impact of HARQ stalling on UE data rates [RAN1,RAN2]
- Study and specify, if needed, improved GNSS operations for a new position fix for UE pre-compensation during long connection times and **for** reduced power consumption [RAN1]

The Moderator notes that one company (Ericsson) proposed to add a "Study and specify, if needed, Disabling of HARQ feedback [...]". Disabling HARQ feedback was studied in R17 SID so there should not be a need to study that again - however the Moderator would like to understand company views on the following: "**If found beneficial,** disabling of HARQ feedback [...]" - Please provide your comment below.

Feedback Form 7: Intermediate Phase: Performance Enhancements - Disabling HARQ Feedback

1 – CATT

A compromised wording could be:

”Study and specify, if beneficial is found, xxxxx”

2 – ZTE Corporation

We are in general fine with these two bullets. Regarding the HARQ part, adding the ”if found beneficial” is also acceptable.

3 – LG Electronics Inc.

We still think GNSS operation can be prioritized to satisfy the limited TU for this item. But, as a compromise, adding ”if found beneficial” in the HARQ part is also acceptable.

4 – Guangdong OPPO Mobile Telecom.

It is not clear to us what kind of study should be conducted to confirm the benefits other than the conclusions from 36.763 section 6.5, where the benefits have been clearly indicated. By adding this sentence, does it mean that we shall redo the study again?

5 – HUAWEI TECHNOLOGIES Co. Ltd.

We don’t think there is need to add a study phase for support of disabling HARQ feedback given it has been studied during SI phase already.

6 – NEC Corporation

We think there is no need to rephrase it. Disabling HARQ feedback was studied in Rel-17 SID and the benefits on UE power consumption and latency is quite clear.

7 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are fine with the modification.

8 – Beijing Xiaomi Mobile Software

We don’t think further study phase is needed as this was already done in Rel-17

9 – Apple AB

Looks good mostly; we also don’t see a need to HARQ feedback further in R18.

10 – Samsung Research America

We are fine with the wording in objective 1.

11 – Nokia France

This is objective is fine.

12 – Classon Consulting

for FUTUREWEI The current wording is fine and well represents the feedback received. Adding a study condition rather than just doing it will increase the workload.

13 – VODAFONE Group Plc

Agree with the Huawei comment, and support the moderators' "proposal 2"

14 – Ligado Networks

We don't believe further study is needed as disabling HARQ feedback was addressed in the SI.

15 – NOVAMINT

We support the moderator's proposal 2

16 – Intel Corporation SAS

We are fine with this objective.

17 – Qualcomm Incorporated

HARQ disabling was already studied during the SI phase in Rel-17, so we do not see the need to repeat the study. We support the objective in its current form.

18 – Ericsson LM

It is true that disabling of HARQ feedback was studied in Rel-17. As indicated in the TR it was the view of ***some companies*** that disabling HARQ feedback can mitigate HARQ stalling. There was no consensus w r t disabling of HARQ feedback. The SI concluded however that HARQ stalling could be mitigated with existing mechanisms. Furthermore, we don't believe the consequences of not having HARQ feedback, e.g. for link adaptation, have been studied. Thus we must assess the need and consequences of disabling HARQ feedback in Rel-18. Then, if found justified, specify.

19 – MediaTek Inc.

We are generally fine with the two bullets in Moderator's proposal. "if found beneficial" in the HARQ disabling part is also fine.

20 – HUGHES Network Systems Ltd

Support moderator's proposal

21 – Philips International B.V.

We are ok with the updates. Regarding the HARQ part, adding the "if found beneficial" is also acceptable.

22 – Sequans Communications

We are fine with the objective.

23 – Sony Europe B.V.

Disabling HARQ feedback should be included only ”if found beneficial”. It was not the view of the RAN1 group as a whole in Rel-17 that disabling HARQ feedback was beneficial, it was the view of some companies. Other companies saw little benefit.

It is not clear why ”disabling HARQ feedback” alone is an objective for [questionable] performance enhancement when there are so many other issues that need to be sorted out for a system that supports more than just essential minimum functionality. We assume that the goal of Rel-18 is that we support ”desirable functionality” rather than the lowest common denominator of ”essential minimum functionality”, which was the goal of the Rel-17 WI.

24 – TURKCELL

We are fine with the modification.

Should you have any remaining comment to the revised objective, please indicate so below.

Feedback Form 8: Intermediate Phase: Performance Enhancements (general)

1 – Intel Corporation SAS

We are fine to accept the study for improved GNSS operation. Based on the study we can decide whether to support it or not.

2 – HUGHES Network Systems Ltd

support Intel’s suggestion

3 – Sony Europe B.V.

We should have a study phase on what performance enhancements are needed as we go beyond ”essential minimum functionality”.

3.3 Objective 2: Mobility Enhancements

As per **Proposal 3**, the Moderator has updated the objective as follows (see text in ***BOLD ITALIC***):

The following candidate set of mobility enhancements objectives are listed.

- Enhancements on ***RLF and*** RRC reestablishment, e.g., conditional RRC reestablishment. [RAN2]
- Support of neighbor cell measurements and corresponding measurement triggering before RLF. This may include legacy (Rel-17) [RAN2]
- Solutions introduced in Rel-17 NR NTN for mobility enhancements (~~**e.g.**~~ location-based CHO and timing-based CHO) for eMTC [RAN2]
- ~~[NB-IoT carrier selection based on the coverage level, and associated carrier specific configuration] [RAN1, RAN2]~~

~~Note: There is potential overlap concerning RRC reestablishment enhancements proposed for mobility enhancements and further enhancement to discontinuous coverage. A unified solution is expected.~~

Please indicate below should you have any further comment to this objective.

Feedback Form 9: Intermediate Phase: Mobility Enhancements

1 – CATT We are fine with the objective.
2 – ZTE Corporation In general, the scope is fine but focusing on the 1st bullet is preferred due to the limited TU.
3 – LG Electronics Inc. We are fine with revision
4 – Guangdong OPPO Mobile Telecom. We are fine with the revision
5 – THALES We are fine with the objective.
6 – NEC Corporation Support.
7 – HUAWEI TECHNOLOGIES Co. Ltd. According to our understanding: 1) the first two objectives can be applied to both NB-IoT and eMTC, while the third objective focuses only on potential enhancement for eMTC. 2) for third bullet, we believe R17 CHO mechanism (i.e. CHO based on legacy triggering events) is enough considering that IoT services are typically not latency-sensitive. Further enhancements add extra complexity and power consumption to eMTC UEs with only limited benefit. Consider above aspects, we suggest to remove the third bullet.
8 – Lenovo (Beijing) Ltd **Lenovo, Motorola Mobility:** We are fine with the objective.
9 – Beijing Xiaomi Mobile Software Fine with it.

10 – Deutsche Telekom AG

Fine with the revision, but what does this means ? ”*This may include legacy (Rel-17) [RAN2]*”

What is the need to mention it ?

This is confusing ..

11 – Apple AB

Looks mostly fine to us. OK to remove CHO enhancements for eMTC.

12 – Samsung Research America

OK to remove the third bullet.

13 – Nokia France

This objective is fine. Some clarification to address DT’s question would be good, though.

14 – Classon Consulting

for FUTUREWEI Same view as Apple, Samsung.

15 – VODAFONE Group Plc

OK, if TU is limited then focus on what benefits both NB-IoT and eMTC

16 – Ligado Networks

We are ok with the revision.

17 – NOVAMINT

We are fine with the revision

18 – Intel Corporation SAS

We are fine with the objective considering the latest modifications.

19 – Ericsson LM

We think there is no need to remove ”e.g.” regarding the objective on CHO considering that the objective already refers to the solutions introduced in Rel-17 NR NTN for mobility enhancements. If the intention is to clarify the scope as much as possible, and thus the need to remove e.g., we suggest the following updates:

- Enhancements on RLF and RRC reestablishment (conditional RRC reestablishment) [RAN2]
- Support of neighbour cell measurements and corresponding measurement triggering before RLF to reduce the time it takes for cell search prior to triggering random access for RRC re-establishment without defining specific gaps (legacy solution introduced in Rel-17 for NB-IoT devices) [RAN2]
- Solutions introduced in Rel-17 NR NTN for mobility enhancements (location-based CHO, timing-based CHO, and support A4 event for CHO) for eMTC [RAN2]

Note that CHO enhancements are very simple adoptions of what has already been done in NR NTN.

20 – MediaTek Inc. We are generally fine with this objective. First two bullets can be priority.
21 – HUGHES Network Systems Ltd Support moderator's proposal
22 – Philips International B.V. We are fine with the objective.
23 – Sequans Communications We are fine with the objective.
24 – Sony Europe B.V. Are these mobility enhancements targeted at "long connections" or "sporadic short transmissions"? Assuming these mobility enhancements are targeted an "long connections", we support the third bullet including location-based CHO and timing-based CHO.
25 – TURKCELL We are fine with the objective.

3.4 Objective 3: Discontinuous Coverage

As per Proposal 4, the Moderator has updated the objective as follows (see text in ***BOLD ITALIC***):

4.1.3 Further enhancement to discontinuous coverage

This objective will be revisited at RAN#95e / March 2022, subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#95e.

~~The list of objectives and their scope is highly dependent on the outcome of Rel-17. Further refinement of the list will be needed once the Rel-17 outcome is known. The following list of objectives is pending the Rel-17 outcome.~~

- ~~Efficient power saving mechanisms (e.g., eDRX/PSM) for sparse satellite constellations [RAN2]~~
- ~~Improvements to UE mobility among sparse cells [RAN2]~~
    - ~~Enhancements in RRC reestablishment or recovery based on the discontinuity of coverage~~
- ~~[Further power saving enhancements for IoT NTN to support discontinuous coverage including PUR for NGSO (2nd priority)] [RAN2]~~

~~Note: There is potential overlap concerning RRC reestablishment enhancements proposed for mobility enhancements and further enhancement to discontinuous coverage. A unified solution is expected.~~

Please indicate below whether you have any comment on the above.

Feedback Form 10: Intermediate Phase: Discontinuous Coverage

1 – CATT We are fine with the objective, i.e. keeping Discontinuous Coverage open, which could be revisited in RAN#95.
2 – ZTE Corporation We are fine with the moderator's suggestion.
3 – Eutelsat S.A. Moderator's suggestion is acceptable.
4 – Guangdong OPPO Mobile Telecom. We are fine with the moderator's suggestion.
5 – THALES Moderator's suggestion is acceptable.
6 – NEC Corporation Support.
7 – HUAWEI TECHNOLOGIES Co. Ltd. OK with moderator proposal
8 – Lenovo (Beijing) Ltd **Lenovo, Motorola Mobility:** We support Moderator's proposal.
9 – Deutsche Telekom AG Fine
10 – Sateliot Fine with moderator's proposal
11 – Apple AB Looks good.
12 – Samsung Research America OK with moderator's suggestion.

13 – Nokia France We support the Moderator's proposal.
14 – Classon Consulting for FUTUREWEI OK
15 – Ligado Networks Agree with the moderator proposal.
16 – VODAFONE Group Plc Agree (although it may be the R17 outcomes of SA94 (December)/CT 95 (March) that needs to be checked, rather than RAN-internal R17 progress)
17 – NOVAMINT We support the moderator's proposal.
18 – Intel Corporation SAS Fine to reconsider this objective later.
19 – Ericsson LM We are fine with the moderator's proposal.
20 – MediaTek Inc. We are generally fine with the Moderator's proposal to re-visit this objective at RAN#95-e / March 2022.
21 – HUGHES Network Systems Ltd support moderato's proposal
22 – Philips International B.V. We are ok with the moderator's proposal.
23 – Sequans Communications We agree with the moderator's proposal.
24 – Sony Europe B.V. We are OK revisiting at RAN#95. As stated by Vodafone, the outcomes from SA will be important input to the decision process at RAN#95 wrt discontinuous coverage.

3.5 Other comments

The Moderator is inviting feedback on **Proposal 6** regarding RAN4 part.

Please indicate below whether you agree with the proposal or whether you have any other suggestion.

Feedback Form 11: Intermediate Phase: Handling of RAN4 Requirements

1 – ZTE Corporation

We are fine with the moderator's suggestion on the RAN4 part. It can be done either in the same item (different phases) or as different RAN4 item (up to RAN4's capacity)

2 – Eutelsat S.A.

Acceptable.

3 – THALES

We are fine with the moderator's suggestion on the RAN4 part

4 – CATT

We are fine with this proposal.

5 – HUAWEI TECHNOLOGIES Co. Ltd.

We support moderator proposal in section 4.2 of the draft WID. Our understanding is then that RAN4 is not involved in this work item, hence we suggest below revision regarding work item leadership part.

Secondary working groups: RAN1~~, RAN4~~

Regarding how to capture the text in section 4.2, we are wondering would it be better to just capture it as a conclusion instead of to include the text in a WID. We do not have strong view though.

6 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We support Moderator's proposal.

7 – Sateliot

Fine with moderator's proposal

8 – Nokia France

The moderator's proposal is OK for now.

9 – Ligado Networks

Support the moderator proposal.

10 – NOVAMINT

We are fine with the moderator's proposal.

11 – Intel Corporation SAS

As we commented in the previous round, we prefer to include leftover RAN4 core and performance requirements from R17 in this Rel-18 IoT NTN item.

Furthermore, given that Rel-17 IoT NTN Core RF/RRM requirements are unavailable and will not be defined in Rel-17 timeframe, we think it is better to put all potential RAN4 work on Core requirements associated with Rel-18 IoT NTN enhancements on hold and the work can start only once baseline requirements from the Rel-17 work are defined.

We would like to clarify whether moderator proposal means that RAN4 objectives will be discussed in RAN #94e or in RAN #95e.

12 – Qualcomm Incorporated

We are OK to postpone the decision on RAN4 impact to next RAN plenary, but we think it would be better to have the objectives for Rel-18 items (core and perf.) within the work item discussed in this thread.

13 – Ericsson LM

We support moderator proposal in section 4.2 of the draft WID and Huawei's proposals regarding revision of work item leadership part and how to capture.

W r t Proposal 6, it is our understanding that the RAN4 part for (Rel-17) NTN IoT will be discussed in March together with the rest of the RAN4 package for Rel-18. Thus, we assume that the proposal is to discuss RAN4 parts for both Rel-17 and Rel-18 NTN IoT in March. That is ok to us.

14 – MediaTek Inc.

We are fine with Moderator's proposal 6.

15 – HUGHES Network Systems Ltd

Support moderator' proposal

3.6 Summary from the Intermediate Phase

Objective 1: Performance enhancements:

On Disabling HARQ Feedback:

- the Moderator had proposed a tentative re-wording to condition the objective to "*if found beneficial*", in order to check companies' views on one company's comment in the initial phase ("study and if found justified and beneficial").
- While the rewording was deemed ok by 8 9companies, 9 companies expressed concerns against reopening study discussions that did take place in Rel-17
- The Moderator is therefore proposing to stick to the original wording, and at this point would proposed to conclude this discussion.
- **Proposal 7:** Disabling HARQ feedback: stick to the original wording i.e. "Disabling of HARQ feedback to mitigate impact of HARQ stalling on UE data rates [RAN1,RAN2]". Conclude this discussion.

Objective 2: Mobility enhancements:

On the objective: Solutions introduced in Rel-17 NR NTN for mobility enhancements (e.g. location-based CHO and timing-based CHO) for eMTC [RAN2]

- Mixed views were expressed whether or not to remove the objective, whether to remove the ”e.g.” or fully expand the list in parenthesis. Given the situation: the moderator sees two options:
  a) Remove the objective altogether
  b) Keep the objective as originally phrased i.e. ”Solutions introduced in Rel-17 NR NTN for mobility enhancements (e.g. location-based CHO and timing-based CHO) for eMTC [RAN2]”
- The moderator expects falling back to b) (as in RP-213469’s appendix) may be the default option, however would like to raise the issue for decision in GTW instead.
- **Proposal 8:** The Moderator proposes a decision be made in GTW between a) and b) (The Moderator expects falling back to b) (i.e. as in RP-213469’s appendix) may be the default option).

Some clarification was requested on the meaning of ”This may include legacy (Rel-17)” in the objective:

- Support of neighbor cell measurements and corresponding measurement triggering before RLF. This may include legacy (Rel-17) [RAN2]
- The Moderator understands this text refers to Rel-17 (TN) baseline and therefore proposes:
- **Proposal 9:** Support of neighbor cell measurements and corresponding measurement triggering before RLF, ***using Rel□17 (TN) NB-IoT, eMTC as a baseline.*** ~~**This may include legacy (Rel-17)**~~ [RAN2]

Objective 3: Discontinuous coverage:

There is a common view on Proposal 4 to have an objective placeholder for Further enhancements for Discontinuous Coverage (without any sub-objective) with a NOTE to revisit the status in RAN#95e. The status of discussions at SA#94e/CT#95e will also need to be checked. The moderator would therefore like to conclude this discussion.

- **Conclusion:** an objective placeholder for Further enhancements for Discontinuous Coverage (without any sub-objective) is confirmed including a NOTE to revisit the status on Rel-17 discontinuous coverage in RAN2, SA#94e and CT#95e, at RAN#95e.

Handling of RAN4 requirements:

There is common view on Proposal 6 above - some clarification was asked on the overall handling. The moderator would therefore like to conclude this discussion as follows:

- **Conclusion: RAN4 requirements:**
  - RAN4 parts for the Rel-17 IoT NTN WI and RAN4 parts for the Rel-18 IoT NTN WI will be discussed at RAN#95e

        - Whether a single WID or separate WIDs will be used is for discussion and decision at RAN#95e
    - RAN4 parts for the Rel-18 IoT NTN WI will not be included in the Rel-18 IoT NTN WI at this RAN#94e plenary
    - For consistency RAN4 responsibility is removed from the Rel-18 IoT NTN WI for the time being - this will be revisited at RAN#95e/March 2021 as per the above.

Conclusion of Intermediate Phase:

A revised WID is available in inbox/drafts/[94e-18-R18-NTN-IoT]: see r02 MOD

Wednesday GTW

- Discontinuous coverage: will be assessed at RAN#96e/June 2022 (not RAN#95e/March 2022). The Moderator has updated the WID accordingly.
- Mobility: Rel-17 NR NTN for mobility enhancements for eMTC: update to ensure the changes are constrained. The Moderator has implemented the request from GTW.
- Mobility: Enhancement on RLF and RRC reestablishment, e.g., conditional RRC reestablishment: to be discussed in the Final phase.
- The Moderator has uploaded a new version in inbox/drafts/[94e-18-R18-NTN-IoT]: see r03 MOD - Green highlights are changes following GTW. Cyan highlights are other changes from the intermediate phase

4 Final Phase

Please refer to **r03 MOD** in Inbox/drafts/[94e-18-R18-NTN-IoT]

4.1 Justification

The Moderator sees the Justification part is good enough. Should you have any critical comment, please indicate so below.

Feedback Form 12: Final Phase - Justification (Critical comments only)

1 – CATT

Generally, we are fine with the Justification.

It seems better to have some kind of refinement to the wording of the discontinuous coverage part, e.g.

- Further ~~enhance support for~~ **enhancement on** discontinuous coverage (subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#96e/June 2022)

2 – Guangdong OPPO Mobile Telecom.

We are fine with the justification.

3 – Lenovo (Beijing) Ltd

We are OK with the justification.

4 – THALES

We are OK with the justification.

5 – HUGHES Network Systems Ltd

We are fine with the justification. Thank you

6 – Sony Europe B.V.

The justification states that the discontinuous coverage objective will be revisited based on RAN#96e status:

Further enhance support for discontinuous coverage (subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#96e/June 2022)

Section 4.1.3 says that this will be revisited based on the RAN#95e status:

This objective will be revisited at RAN#96e / June 2022, subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#95e, SA#94e, CT#95e.

There seems to be an inconsistency here. Shouldn't section 4.1.3 refer to RAN#96e for the sake of consistency?

7 – Ligado Networks

We are ok with the justification.

4.2 Objective 1 - Performance Enhancements

The Moderator considers this Objective to now be stable in view of the earlier rounds of discussions, however should you have any final (Critical) comment, please indicate so below.

Feedback Form 13: Final Phase - Objective 1 Performance Enhancements

1 – Sony Europe B.V.

The justification states that the discontinuous coverage objective will be revisited based on RAN#96e status:

Further enhance support for discontinuous coverage (subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#96e/June 2022)

Section 4.1.3 says that this will be revisited based on the RAN#95e status:

This objective will be revisited at RAN#96e / June 2022, subject to Rel-17 IoT-NTN status on discontinuous coverage at RAN#95e, SA#94e, CT#95e.

There seems to be an inconsistency here. Shouldn't section 4.1.3 refer to RAN#96e for the sake of consistency?

2 – Ericsson LM

We are still not convinced about disabling of HARQ feedback, but provided that all parts of the WF from the GTW on Wednesday materialize, we can accept it.

4.3 Objective 2 - Mobility Enhancements

Objective: Enhancements on RLF and RRC reestablishment, e.g., conditional RRC reestablishment. [RAN2]

- GTW/Wednesday advised discussion to clarify this objective. Please provide comments below, especially considering mechanisms already available in Rel-17 (e.g. is this objective actually necessary?)

Feedback Form 14: Final Phase - Objective 2 Mobility Enh: Enh. on RLC and RRC reestablishment

1 – CATT

We are fine to keep it in Rel-18.

As in Rel-17, RLF and RRC Reestablishment are supported without any enhancement on top of the mechanism defined for NB-IoT. Some companies believed the procedure could be optimized, e.g., considering conditional RRC reestablishment.

We understand only minor spec work is needed for this objective.

2 – Guangdong OPPO Mobile Telecom.

We support to keep it in R18.

3 – LG Electronics Inc.

We think discussion point is not clear in this objective. So do not support this objective.

4 – MediaTek Inc.

This objective is not clear and also not clear whether it is needed. Conditional RRC reestablishement is supported for eMTC in Rel-15 and is in scope of Rel-17 IoT NTN. For NB-IoT, it cannot be supported.

5 – NEC Corporation

Support.

6 – ZTE Corporation We also prefer to keep this bullet and regarding the detailed works, it mainly refers to the design of conditional or pre-configured RRC reestablishment with limited efforts.
7 – TURKCELL We are fine to keep it in Rel-18.
8 – Lenovo (Beijing) Ltd **Lenovo, Motorola Mobility:** We prefer to keep this objective. This could be useful for NB-IoT mobility.
9 – Beijing Xiaomi Mobile Software We prefer to keep this bullet
10 – MediaTek Inc. **MODERATOR: The guidance from GTW was to clarify what this bullet means. If no clarification is actually provided (I have checked myself and cannot quite decrypt it - nor from the October NWM discussion) it is very likely to be removed.**
11 – NOVAMINT Clarification is needed
12 – Gatehouse Satcom A/S This objective requires clarification, before we can consider our support
13 – Intel Corporation SAS We are fine to consider this objective.
14 – Apple AB The scope is not clear so we would support dropping this.
15 – Ligado Networks We support keeping this objective.

Objective: Support of neighbor cell measurements and corresponding measurement triggering before RLF

- Please indicate whether you are ok the clarification brought by Proposal 9 (i.e. ”using using Rel□17 (TN) NB-IoT, eMTC as a baseline” instead of ”This may include legacy (Rel-17)”

Feedback Form 15: Final Phase - Objective 2 Mobility Enh: NCell meas. and meas. triggering before RLF

1 – CATT

We are fine with it.

2 – Guangdong OPPO Mobile Telecom.

We are fine.

3 – MediaTek Inc.

We are generally ok to keep this objective. To our understanding, RAN2 may not need to do anything but some minimum necessary changes may be considered.

4 – NEC Corporation

Support.

5 – ZTE Corporation

We are fine with it.

6 – TURKCELL

We are fine with the objective.

7 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are OK with the objective.

8 – Beijing Xiaomi Mobile Software

Fine with it.

9 – NOVAMINT

we are fine with the objective

10 – Gatehouse Satcom A/S

We are OK and supportive to the objective

11 – Intel Corporation SAS

The updated wording is fine for us.

12 – HUGHES Network Systems Ltd

Support this. Thank you

13 – Apple AB

OK

14 – Ericsson LM

It is a bit unclear what is meant with baseline here. We therefore suggest to change ”... using Rel-17 ...” to ”... based on Rel-17 solution for (TN) NB-IoT ”. And to conform with the understanding in the GTW that this is expected to be small also append ”with minimum necessary changes to adapt to NTN NB-IoT/eMTC”.

15 – Sony Europe B.V.

This wording is an improvement.

16 – Ligado Networks

We support this objective.

Objective: Solutions introduce in R17 NR-NTN for eMTC

- Please indicate whether you are ok with the proposal in r03 MOD, in view of GTW/Wednesday recommendation.
-

Feedback Form 16: Final Phase - Objective 2 Mobility Enh: R17 NR NTN solutions for eMTC

1 – CATT

It’s fine, to be precious, suggest to add ”adopt” or ”reuse” the solutions introduced in Rel-17 NR NTN....

- **Adopt/Reuse** ~~S~~solutions introduced in Rel-17 NR NTN for mobility enhancements for eMTC, with minimum necessary changes [RAN2]

2 – Guangdong OPPO Mobile Telecom.

We are fine.

3 – MediaTek Inc.

We are ok with this proposal with minimum necessary changes considered.

4 – Ericsson LM

In the GTW it was understood that location-based CHO, timing-based CHO and A4 event for CHO can be included as the expected effort is small; essentially a copy-paste. It should be clarified that the expected effort is small, but the proposed revision introduces ambiguity w r t the scope and which solutions are considered. To avoid that the objective is misread, we should either list the CHO enhancements explicitly or clarify like:

”The CHO enhancements introduced in Rel-17 NR NTN for mobility enhancements, for eMTC, with minimum necessary changes ”

5 – NEC Corporation

Support.

6 – ZTE Corporation

We can compromise to support the current version with clarification.

7 – TURKCELL

We are fine with the objective. We can use Ericsson's wording.

8 – Lenovo (Beijing) Ltd

Lenovo, Motorola Mobility:

We are OK with the objective.

9 – NOVAMINT

we are fine with the objective

10 – Gatehouse Satcom A/S

We are OK and supportive to the objective

11 – Intel Corporation SAS

We are fine with the current wording in WID.

12 – MediaTek Inc.

MODERATOR: based on the suggestion from CATT and further comments - will further clarify as - which I see is a sound way forward in view of all the discussions:

Reuse the solutions introduced in Rel-17 NR NTN for mobility enhancements for eMTC, with minimum necessary changes **to adapt them to eMTC.**

13 – HUGHES Network Systems Ltd

support moderator's inputs above.

14 – Apple AB

OK with moderator's suggestion.

15 – Sequans Communications

We are ok, Ericsson proposal might be useful too.

16 – Sony Europe B.V.

We agree with the point made by Ericsson and support the wording:

"**The CHO enhancements introduced in Rel-17 NR NTN for mobility enhancements, for eMTC, with minimum necessary changes** "

17 – Ligado Networks

We support the objective.

4.4 Other comments

Should you have any other comments (e.g. proposed handling on RAN4 part), please indicate so below.

Feedback Form 17: Other comments

1 – Classon Consulting

for FUTUREWEI Please add FUTUREWEI as a supporting company

2 – Gatehouse Satcom A/S

Please add GateHouse as supporting company

3 – Intel Corporation SAS

In our understanding the original plan for Rel-18 package was to endorse the RAN4 objectives for all RAN1/2/3-led items in December plenary. Considering the unique situation for NTN-IoT where there is no basic Rel-17 requirements we are ok to postpone this discussion to the next meeting. However, we prefer to avoid the discussion on single/separate WID for RAN4 requirements on IoT-NTN. In our view there is no need to create new projects, all the RAN4 work can be done within Rel-18 IoT-NTN WI. Thus, we propose the following revision of conclusion provided by the moderator. Even though it has no impact on WID now, we think it is important to align understanding for further discussion.

- Conclusion: RAN4 requirements (revised by Intel):

○ RAN4 parts for the Rel-17 IoT NTN WI and RAN4 parts for the Rel-18 IoT NTN WI will be discussed at RAN#95e 36

~~○ Whether a single WID or separate WIDs will be used is for discussion and decision at RAN#95e~~

○ RAN4 parts for the Rel-18 IoT NTN WI will not be included in the Rel-18 IoT NTN WI at this RAN#94e plenary

○ For consistency RAN4 responsibility is removed from the Rel-18 IoT NTN WI for the time being - this will be revisited at RAN#95e/March 2021 as per the above.

4 – Nokia France

Please add Nokia and Nokia Shanghai Bell as supporting companies. Thank you.

5 – MediaTek Inc.

MODERATOR to Intel: OK with the proposal.
(though in my view the discussion one/separate WI will take place anyway)

6 – Guangdong OPPO Mobile Telecom.

Please add OPPO as supporting company. Thank you.

7 – HUGHES Network Systems Ltd Please add Hughes/EchoStar as supporting company. Thank you for this work
8 – VODAFONE Group Plc Thanks, Vodafone can support.
9 – Sony Europe B.V. SONY will want to be a supporting company for this WID.

4.5 Summary from Final Phase

Justification:

- One company proposed ”some kind of refinement of the wording” which is equivalent to the original text. Another company spotted an inconsistency between two subclauses on the discontinous coverage milestone. The Moderator has fixed the inconsistency in the latest version of the draft WID (r04 MOD)
- **Moderator Conclusion:** The discussion is closed. The Justification is stable.

Objective 1: Performance Enhancements

- One company repeated concerns on Disabling HARQ feedback as this company had already expressed in the Initial Phase
- Moderator Conclusion: The discussion is closed. This objective is stable.

Objective 2: Mobility Enhancements

- Objective: Enhancements on RLF and RRC reestablishment, e.g., conditional RRC reestablishment. [RAN2]
  - GTW#2: There was clear guidance from the Chairman to clarify this objective in the Final Round.
  - 9 companies supported the objective. From the Moderator’s perspective no adequate clarification was given by the 2 companies who attempted a clarification:
    - ”*As in Rel-17, RLF and RRC Reestablishment are supported without any enhancement on top of the mechanism defined for NB-IoT. Some companies believed the procedure could be optimized, e.g., considering conditional RRC reestablishment*”
    - *”it mainly refers to the design of conditional or pre-configured RRC reestablishment with limited efforts”*
  - 4 companies expressed concerns that the objective remains unclear.
    - One company indicated conditional RRC reestablishment is already supported for eMTC and is in scope of Rel-17 work, and indicated it is not applicable to NB-IoT.
  - In view of the above the Moderator recommends removal of this objective.

- **Moderator Proposal 10:** remove the objective

- Objective: Support of neighbor cell measurements and corresponding measurement triggering before RLF
  - The Moderator had proposed (Proposal 9) at the end of the Intermediate Phase:
    - **Proposal 9:** Support of neighbor cell measurements and corresponding measurement triggering before RLF, **using Rel□17 (TN) NB-IoT, eMTC as a baseline.** ~~**This may include legacy (Rel-17)**~~ [RAN2]
  - 16 companies commented, 15 of which supported the proposal. 1 company proposed a slightly different wording "i.e. based on Rel-17 (TN) NB-IoT, eMTC" instead of "using Rel-17 (TN) NB-IoT, eMTC as a baseline.". The Moderator does not see any difference between the two wordings, and is therefore proposing to agree proposal 9.
  - **Moderator Proposal 11:** Agree Proposal 9 and close the discussion.

- Objective: Solutions introduce in R17 NR-NTN for eMTC
  - Based on the comments received during the discussion and considering R17 NR-NTN work is ongoing, the Moderator proposes an updated wording
    - **Reuse the** solutions introduced in Rel-17 NR NTN for mobility enhancements for eMTC, with minimum necessary changes **to adapt them to eMTC.**
  - **Moderator Proposal 12:** Agree the updated wording by the Moderator

- NOTE the moderator has also updated the wording at the beginning of this objective to avoid confusion:
  - The following ~~candidate set of~~ mobility enhancements objectives are listed. This objective

Other comments: RAN4 Parts:

- One company proposed an update (shown below) to the Moderator proposal on handling of the RAN4 requirements
  - **RAN4 requirements:**
    - RAN4 parts for the Rel-17 IoT NTN WI and RAN4 parts for the Rel-18 IoT NTN WI will be discussed at RAN#95e
      - ~~Whether a single WID or separate WIDs will be used is for discussion and decision at RAN#95e~~
    - RAN4 parts for the Rel-18 IoT NTN WI will not be included in the Rel-18 IoT NTN WI at this RAN#94e plenary
    - For consistency RAN4 responsibility is removed from the Rel-18 IoT NTN WI for the time being - this will be revisited at RAN#95e/March 2021 as per the above.

- **Moderator Proposal 13:** Agree the handling of RAN4 requirements as shown above.

The Moderator has provided an update of the WID:

- With revision marks r04 MOD in the inbox/drafts/[94e-18-R18-NTN-IoT]

- Clean version in RP-213543 in the inbox

(Note there seems to be a glitch in NWM below at the time of writing)