3GPP TSG-RAN WG2 #116-e R2-21xxxxx

Electronic, 1st – 12th Nov, 2021

Agenda Item: 5.4.1

Source: R2 Chair (MediaTek inc)

Title: [AT116-e][049][TEI17] TEI17 NR proposals (Chairman)

Document for: Discussion, Decision

# Introduction

This document is to kick off the following email discussion:

* [AT116-e][049][TEI17] TEI17 NR proposals (Chairman)

 Scope: Collect comments on selected NR TEI17 proposals
Intended outcome: Report
Deadline: Tuesday W2

The intention with this offline discussion is to collect comments to identify proposals that could be agreeable.

**Chair on TEI proposals**

A TEI item shall have a limited scope, it should be possible to complete the work in 1 quarter (given sufficient attention and focus). The work should be limited to one WG (small exceptions are allowed).

TEI proposals are usually judged differently according to novelty - in a range, e.g.

* Corrections not implemented in a previous release, small proposals that should obviously/reasonably have been implemented in a previous WI but was missed for some reason.
* Well known earlier WI proposals with some support but were not done e.g. due to lack of time. Small features that were implemented in earlier system.
* New items, giving better performance, or enabling a new use case etc.

Corrections or almost corrections are typically judged similarly to corrections, e.g. the motivation for the full story is assumed pre-known. Discussions can be quite simple, straightforward opinions on impact vs gain and the bar for acceptance is usually medium (higher or somewhat higher than for pure corrections).

New features most often require a more comprehensive analysis and understanding, sometimes similar to judging new WI proposals at Plenary. Understanding justifications vs impact/possibility to deploy etc is important. Operator input is sometimes helpful to verify validity of justifications. The bar for acceptance is usually quite high.

Other aspects are usually considered, e.g. proposals that has recently been rejected would be considered again if the situation has changed somehow, but not otherwise. Proposals that were rejected for an ongoing WI should generally not be considered for TEI.

As usual and always, for all kinds of proposals, technical sanity check is fundamental. Does the proposal work? Is it feasible? Does the proposal address the intended issue / intended case.

Please consider these aspects when you provide comments in this discussion so there can be a balanced result.

**Opinions and Comments**

Please provide opinions. It is appreciated that you give a concise motivation. You can refer to other company’s motivation if your’s is the same. You can also ask questions, and make comments that you think may impact the perception of the proposal.

Opinions will be interpreted as follows:

Support = Support the proposal, think it is useful

Not Support = Don’t support the proposal, not useful etc. Could be acceptable.

Not Acceptable = This is objected to.

Unclear = Don’t know yet, asking some questions, may decide later if there are replies.

**Updating this document**

This is a big document so collision updates may happen. When naming your file update, please:

1) Increase the revision one step compared to your baseline version.

2) Keep the previous editor company name and add your company name last (i.e. two company names)

E.g. CATT revision based on Nokias:
*[AT116-e][049][TEI17] TEI17 NR proposals\_v12\_Nokia\_CATT.docx*

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# Discussion

## Undecided proposal (has been treated no decision)

### CGI Report extension

CGI Report Extension Proposal

[R2-2110981](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110981.zip) On the support of NG-based handover using CGI report Huawei, HiSilicon, CMCC, China Telecom, China Unicom discussion Rel-17 TEI17

[R2-2109716](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109716.zip) CR to 38.331 on support of NG-based (i.e. via CN) handover based using CGI report China Telecom, Huawei, HiSilicon CR Rel-17 38.331 16.6.0 2816 - F TEI17

Some Comments has already been provided in the following tdoc

[R2-2110856](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110856.zip) On using RAN3 based solution for unsupported SCS+BW of neighbor cell Ericsson discussion

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Huawei, HiSilicon | Support(Proponent)  | Issue: unmatched capability of SCS/BW between UE and target cell leads to HO failureTwo options on the table:a) RAN2 solution: add SCS and BW into CGI report;b) RAN3 solution (proposed by Ericsson): enhance the ’cause’ values in the HANDOVER FAILURE message to reflect unsupported SCS and/or BWWe think RAN2 solution is better. For UEs configured to report CGI, SCS/BW info of target cell is already obtained by the UE and the UE will send the CGI report anyway. No big effort to include extra known fields into the CGI report. Besides, the HO failure can be prevented.Drawback of RAN3 solution: 1) The HO has to be failed first to know the SCS/BW is(/are) unsupported;2) Even though the source node know the reason for failure, it is not aware about the exact the SCS/BW of target node, thus future failures can happen again. |
| Nokia, Nokia Shanghai Bell | Not accept | As proposed, this seems to require source to do the same checks as target already does. * When source sends HO request to target, the target cell will check the UE capabilities and current RRC configuration. If they do not match the cell, target will reject the HO request.
* If there are multiple HO failures to a cell, that would likely be recognized as a bad HO candidate and blocked.

In any case, this is really a RAN3-only issue and should be solved there. Huawei Response: we have explained the problem if it is left to RAN3. It seems that there is same understanding here that this would lead to potential handover failures, thus we think it is worth discussing which solution is better in RAN2. |
| CMCC | Support | As one of the proponent companies, we are supportive to enhance CGI reporting to facilitate NG-based handover. Source gNB still has no idea of the SCS/BW of the target gNB. So the failure may happen again.  |
| Apple | Not support | Our understanding is the channel bandwidth, and SCS of one frequency should be rather stable configurations. It is not likely that for one spectrum, different cells are deployed with different channel bandwidth.With this logic, isn’t it better to solve the problem by OAM? Relying on UE reporting seems an overkill to us. |
| OPPO | NSupport | If network based solution can solve the issue as Ericsson‘ paper said, we would like not to impact UE. |
|  |  |  |
| vivo | Support | From our perspective, a proactive approach is preferred as it is beneficial in avoiding the potential failure events. The UE reporting SCS+BW information is straight-forward in this sense. The CR looks good to us, but some minor editorial issues should be fixed, e.g., „5> include the *scs-SpecificCarrier-listUL* and set it as scs-SpecificCarrierList obtained from uplinkConfigCommon of the concerned cell”“ [[ reportSCSAndBandwidth-r17 ENUMERATED {true} OPTIONAL~~,~~ -- Need N ]]“ |
| China Telecom | Support | RAN3 based solution needs to reject HO request first which could be avoided by adding SCS and BW into CGI report. Thus, we think RAN2 based solution can solve this issue directly. |
| NEC | NSupport | First, we would like to know how much „such cell‘ is important for handver. If the cell is important, then it is to be known by the network (source gNB). Second, it could be assumed that SCS would be common within a frequency, i.e. not per cell basically. This means the OAM approach (well-known in RAN3) will be feasible. |
| Samsung | Support | We support the proposals and agree not to introduce additional information on the CGI report.  |
| Google | NSupport | We think this can be solved by the network based solution without any impact to the UE. |
| Docomo | Support | We support the motivation of this proposal. Deployment and migration of the spectrum sometimes takes multiple steps and each step could be several years, leading to different BWs for the same band.As for a solution, although the target gNB could validate the UE caps and refuse the handover, preventative approach would be better. |
| Ericsson (Pradeepa) | NSupport | This should be resolvable easily in RAN3. Also, the drawback mentioned by Huawei for RAN3 solution is not really a drawback i.e., claiming that we should prevent the first HO failure as well. |
| China Unicom | Support | The ANR mechanism is used to fix the holes of OAM. When OAM is not so perfect to prevent the HO failure caused by unmatched BW, we think the RAN2 solution proposed is efficient without much extra UE effort since the UE has already read the related information from SIB1. |
| Intel | NSupport | As indicated in R2-2110856, network based solutions are possible. UE impacting solutions should normally only be considered where network based solutions are not possible/have strong disadvantage. |
| Qualcomm Incorporated | Neutral | We would prefer that this issue is solved by OAM without any UE impact. But we can accept the majority view. |
| LG | NSupport | The raised problem happens at particular deployments with disjoint configuration cboundary, which we think is not sofrequent in the normal deployments. Hence, we think it is better to be resolved via OAM or RAN3 solution. Some trial and errors may be encountered but we think it should not be a big problem for infrequent cases and it will be sorted out anyway after that.  |

### Location Privacy in RRC

Location Privacy in RRC

[R2-2110047](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110047.zip) User preferences to control location information sharing Apple, Samsung, Google, Xiaomi, Vivo, BT Plc, Rakuten Mobile, MediaTek Inc discussion TEI17

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia, Nokia Shanghai Bell | NSupport | This is outside 3GPP: The intent of "available" for location information was that UE indicates the information if it UE has it at the time of reporting, but not that UE has to do location update to obtain the information. This seems like a UE implementation matter and not something RAN2 should discuss. User consent is already taken into account for MDT (once user consent is provided it ensures privacy and legal obligations are fulfilled), so it's unclear what the problem is.The proposed solution (by statement in RRC specification) does not actually help either, as this would be still implementation issue on how the RRC layer gets this “User Preference”. This is some application layer-level information and actual perception of the user preference information into RRC still remains implementation specific.Furthermore, we believe the intention does not differ from what is already captured in the current RRC: “The UE may not succeed e.g. because the user manually disabled the GPS hardware, or due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.” |
| CATT | NSupport | We can understanding the requirement and intention to introduce User Preferences, but this may be out of RAN2 scope, this issue coudl be left to other groups to confirm or discuss, not RAN2. |
| CMCC | NAccept | We have shared our opinion in last meeting. This is unacceptable for us. The reasons are as follows:1. Firstly, anything related with security or privacy should be discussed in SA3 or SA5, not in RAN2. RAN2 is not responsible to discuss on privacy unless any issue is identified by SA3.
2. The current user consent mechanism is sufficient. If the UE sign the user consent, it means the UE is willing to share MDT reporting containing location info. It looks strange if UE still don’t prefer to report location. If UE don’t want to report location or not trust operator, the UE can simply not sign the user consent.
3. For SON reporting, e.g., RLF-reporting, CEF-reporting, they are one shoot reporting. With UE ID anonymization, the UE cannot be tracked.
4. UE ID is anonymized by the gNB. For SON/MDT related reporting, the UE ID is removed by the gNB from the record before send it to OAM. So there won’t be any privacy issue.
 |
| Huawei, HiSilicon | Not a RAN2-led TEI | If the proposal is referring to the user consent, we understand there is already discussion in other groups. RAN2 is not the leading group to discuss this. |
| ZTE | NSupport | According to current specs UE can decide its preference on location report by turn on/off GPS module, and by user consent. And operator would offer special discount to UE who have signed the user consent, so if UE is allowed to refuse to report the location info even when it has already signed the user consent, the efforts from operators are wasted.Anyhow, we don’t see a need to discuss this in RAN2, if there are concerns then SA3 will initiate the discussion.  |
| OPPO | Support |  |
| Lenovo, Motorola Mobility | unclear | We agree with the intention but think a note is sufficient. Adding the phrase “allowed by the user” in the normative text looks strange in AS specs. |
| MediaTek | Support | At least, RAN2 should confirm that location information may not be provided to newtork due to user preference. CR content could be further discussed. |
| Apple | Support | We would like to address the points raised above, specifically: * Some companies mention user consent; however, TS 32.422 is very clear – user consent is not defined for SON (only for MDT).
* Some companies mention this is not in 3GPP/RAN2 scope; however, the notion of user preferences is not new to RAN2, see for example clause 5.5.3.1 and clause 5.6.15.4 in TS 36.331.
* Some companies mention this should be discussed in SA3; however, SA3 have already discussed it and acknowledged the issue (see S3-211338).
* Some companies claim UE ID anonymization solves the issue; however, with proliferation of machine learning re-identification techniques this is no longer the case.
* Some companies believe the user can turn GNSS off to preserve privacy. This is rather radical, don’t you think?

Regarding how to capture this in the specs – we are open to discuss the actual CR text. |

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| Futurewei | NSupport | This should be discussed in other WGs first, and RAN2 can follow up upon their progress, if needed. It looks like more straightforward to clarify the provacy requirement of SON in TS 32.422. |
| NTTDOCOMO | See comments | There is no quesiton user consent should be taken into account before network acquire UE location info. We agree observation4 in the paper that current user consent in 3gpp spec applies to MDT only, not to SON. So we prefer to clarify that gNB should confirm user consent through core network signaling like MDT before configuring UE to acquire location info in SON report (i.e. RLF report, SCGFailureInfomation) |
| vivo | Support  | Currently user consent defined in 3GPP specifications applies to MDT only, not to SON. In some cases UE may be required to report user location when GNSS is otuned n, but user may not be willing to share his location info with the network. In such case user should be allowed to able to share his location based on his prefence or not. |
| NEC | NAccept | This had been discussed long time ago (Rel-10) but not agreed. The reason was that 3GPP (at least RAN2) does not specify something related to or involving „user“ of the UE. |
| Samsung | Support | We support the proposals to introduce user preference concept for SON, which is similar to user consent defined in MDT.  |
| Google | Support | A user always decided whether to report the location information and the current text should be clarified. |
| BT | Support | We support to clarify that user consent is required for SON in the same way it is required for MDT. |
| Ericsson (Pradeepa) | Not a RAN2 topic | The terminology used in the current RRC specification is ’if available’ and this terminology is based on the fact that the UE’s GPS receiver might be turned off or the etc. NOTE 1: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.The changes proposed in the CR is not fool proof either. ’User preferences’ is not directly visible to the RRC, at least this is the current behaviour. We believe the highlighted text above already captures the intention of the changes proposed by the supporting companies. Further, the NR RRC specification procedural text has explicitly stated when the UE is expected to be configured to make the location information available and it has been known from LTE days that the RAN can configure the UE to report location information only when the user consent is available.  |
| KDDI |  | 1. We are supportive to clarify that gNB should confirm user consent in SON report, just same as MDT.
2. In our understanding, the current 3gpp doesn’t prohibit UE to manage user consent at the UE side also. So, if there is any issue with having user consent at both sides, network and UE, then we are supportive to discuss the issue.
3. We don’t have any preference which WG, SA3 or RAN2 starts the discussion.
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| Rakuten Mobile | Support | As mentioned in the paper, there is an ambiguity on getting user consent about “ the usage of location data for SON purpose“ this need to be clarified.We think Apple have sufficiently answered most of the concerned raised by other companies. |
| SoftBank | NSupport | Agree that user consent is only applied to MDT, and not applied to SON. We have some sympathy with the intention but it is not sure that this kind of clarification should be defined in AS/RRC layer. We suppose it could be defined in NAS layer. If the SA3 or SA5 indicates it should be handled in AS/RRC, we are OK to address this in RAN2. |
| Intel | NSupport (with comments) | While we agree in principle, we are not sure if specification text in RAN2 stage 3 should be updated. We wonder if having a single statement somewhere in the general section that “availability of user location information should also consider whether it is allowed by the user” would be sufficient and could address most of the concerns. |
| Qualcomm Incorporated | NSupport | Not sure how the configuring entity (OAM) will know that whether the inclusion of location information in the SON/MDT report is allowed by the user. Furthermore, we believe that first, this needs to be discussed in SA2, as the framework to support the proposal is not clear and has never been discussed.  |
| LG | NSupport | We are not sure if this change is really needed at this moment. If the concern here is that UE is enforced to report its location infomation even when user has no willingness to so, we think sensible UE implementation shoud be able to address such concern and hence prevent such case from happeing, i.e., we do not see any privacy concern or the similar in the current specification. The reason of our thinking is a) the current spec is never enforcing UE to report location information when user does not want to do it, and b) UE is only required to report available location information, and we think how to determine the "availity“ is left to UE implementation, and c) from my recollection, RAN2 discussed the same issue when we were introducing MDT at Rel-10 and chose to use `avaiable‘ location to avoid any enforcement on UE location information reporting, which the paper seems to address now. However, if companies really want to clarify something, we can add a Note stating that availability of location information may be subject to user’s consent in stage-2 or state-3 where appropriate. .   |

### System Information Scheduling

System Information Scheduling Proposal

[R2-2111248](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111248.zip) On the need of providing explicit SI start position for SI Scheduling Ericsson, Verizon, Deutsche Telekom, Softbank, Swift Navigation, ESA, T-Mobile USA discussion Rel-17

Some comments has already been provided in the following tdoc

[R2-2110799](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110799.zip) SIB and posSIB scheduling constraints MediaTek Inc. discussion Rel-17 TEI17

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| Company | Support / Nsupport / NAccept / unclear | Comments |
| Ericsson | (Proponent for R2-2111248) | Some comments on R2-2110799.It is difficult to solve (avoid collision and have more rooms for SI) just by means of changing parameters in deployment.Reducing SI window length implies:* Reducing coverage
* decreased Transport Block Size; which may increase latency for PWS SI which then would have to be provided in very small segments
* Not possible to have large number of beam sweeps. Each beam needs to have the SI information and if the SI window length is small; NW can’t provide large number of beams for UE beam sweeping procedure

Increasing SI periodicity implies:* Increased latency. Longer time for UE to preform cell selection and cell reselection which will also impact how quickly a UE can access a cell for RACH procedures etc. Can consume more UE power.

For DSS:* Even in a legacy deployment the current solution is not good and there might be a need to introduce e.g. more MBSFN subframes to counter for the legacy SIBs. However, without a future proof solution for NR new SIBs (MBS, UE power savings in rel-17 may introduce new SIBs) and posSIBs we see a high risk that there will not be possible to support new functionality together with DSS without deteriorating the performance.

For Positioning SIBs: Also, R2-2110799 analysis show need of at least 9 SIs for positioning.* One version of RTK (~5 SI messages)
* GNSS assistance data for one constellation (~3 SI messages)
* DL positioning (1 SI message)

Even with 80ms offset solution; we will not be able to schedule 9 positioning SIs. Pls note that these offsets based will anyway have the same constraints as mentioned in Observation Observation 1: If the shortest SI periodicity is x\*si-WindowLength, the SI scheduling mechanism can only accommodate x SI messages.That is as 80ms SI needs to be repeated and hence we will be able to accommodate only 7 positioning SIs at maximum. It would become x-1 in fact.Further in Rel-17, there will be further new posSIBs (around 10) |
| ESA | Support | We agree with Ericsson´s analysis. The number of posSIBs is already high and it is expected to increase even more in Rel17. There is need to find a way to be able to schedule more posSIBs. |
| CMCC | Support | The identified issue is valid for the current SI mechanism in NR system. We are open if the solution can be backward compatible and future proof for more SIBs in the future.  |
| CATT | unclear | The observations in R2-2110799 are quite objective. We need to figure out what the real issue is with the deployment, and how serious the issue is at first. CATT share the similar understanding as MTK that the SI scheduling issue mainly comes from positioning SI. This issue is valuable to further discuss since the posSI becomes larger and larger in Rel-17. We need further analysis before we jump into some solution, such as a new scheduling mechanism. |
| Huawei, HiSilicon | NAccept for Rel-16 Nsupport/unclear for Rel-17 | For Rel-17, we are not sure whether there will be such cases in real deployment. The major issue here is based on the assumption that quite a lot SIs are deployed for positioning and no 80ms SI are scheduled in SIB1, which we think is a corner case. This proposal leads to a fundamental change on current SI scheduling mechanism, and also requires the UEs to adapt to such new scheduling mechanism. The network usually can use proper implementation scheudling planning to avoid such corner cases.In any case, we cannot accept this mechanism extending to Rel-16 SIBs, which would impact legacy UEs. |
| Apple | Support with comments | We agree that the current posSI-scheduling is problematic when the minimum SI periodicity is not 80ms, we support to find a way to fix this issue and allow more posSIBs to be accommodated without causing conflict. |
| OPPO | NSupport | It’s also not clear whether such cases may happen in real field and we have concern on the proposed mechanims which may have big impacts on the Ues. |
| MediaTek | See comment | We see merit in Ericsson’s analysis; we think the scenario described in their paper is a bit too pessimistic, but indeed the problem can occur that systems need to either exclude some SIBs or modify their SI scheduling, especially where posSIBs are concerned and especially for DSS deployments.We think this could be addressed first by fixing the “80 ms only” issue with offsetToSI-Used, which would allow more flexibility in scheduling (and we consider that it could be done with the magic sentence, so that a Rel-16 UE need not be “locked out” of the posSIBs). Beyond that, let’s discuss how severe the residual problem is and whether it’s necessary to introduce a new scheduling mechanism to avoid the costs of longer SI intervals and/or shorter windows.We appreciate the operators’ involvement in this discussion and think it helps to clarify the need for a solution. |
| vivo | NSupport | At least RAN2 RAN2 should confirm the SI scheduling problem, i.e. whether more SI messages are really needed than possible so far.Moreover, The new SI scheduling mechanism is non-backward compatible. The performance of SI scheduling should be also considered, such as SI reception latency.In our understanding, SI deployment can be accommodated with a suitbale minimum SI period and suitbale window size.  |
| Samsung | Support | We agree with the first proposal to discuss the justification of the problem in the operator perspective first, and if that was justified, then we suggest to start considering the change only in posSI offset modifications. |
| BT | Support | We consider the analysis done by Ericsson in R2-2111248 is correct. It is required to address the potential problem in DSS frequencies with 15 SCS since LTE MBSFN subframes are desirable for NR throughput, they have a severe impact in LTE throughput so initial deployments will tend to reduce or simply avoid them.For regulatory reasons, operators are required to broadcast public warning system SIBs which require 3 SIBs in NR. The number of positioning SIBs, as mention above, is high considering also Rel-17. Therefore, we support this TEI17. |
| Nokia | Unclear | We agree with MediaTek that the scenario described in Ercisson paper is a theoretical worst case scenario. We also agree that the problem, if any, may manifest more for the positioning use case, but only if multiple RTK GNSS positioning methods are simultaneously deployed in the same network. However, we are not sure if this is a practical scenario in a real network. So, we are not sure the enhancement is required. |
| SoftBank | Support | Agree with Ericsson’s analysis. It is useful and more important for DSS operation scenario. We already see some scheduling issues in DSS frequencies for NR SI transmissions. Thus, we prefer to minimize the impact casued by additional NR posSIB/SIBs. |
| Intel | Unclear | It is still not clear if there is a real issue that cannot be addressed by implementations. At the same time, we acknowledge that Rel-17 will introduce new posSIBs and this may be useful.  |
| Qualcomm Incorporated | Nsupport | We do not support having two different PosSI scheduling methods that the UE supposed to implement to interwork with different network implementations. |
| T-Mobile USA | Support | 3GPP is about half way thorough the development of 5G and this needs to be adopted.  |
| Deutsche Telekom | Support | We agree with Ericsson’s analysis. Taking into account the identified limitations of the existing SI mechanism of NR system, especially for DSS deployments and positioning functionality, and the high number of posSIBs expected in Rel-17, a future-proof SI Scheduling mechanism is required.    |

### C-DRX enhancements for 5G applications

[R2-2109730](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109730.zip) C-DRX enhancements for 5G applications vivo, CMCC, China Telecom, China Unicom, Spreadtrum, Guangdong Genius discussion Rel-17 TEI17 R2-2107416

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NSupport | At the beginning of NR, RAN2 has discussed this issue, i.e., Active Time is not well aligned with frame boundary or Active Time does not incldue sufficient PDCCH Monitoring opportunity. However, it was considered difficult to keept the PDCCH-subframe concept in NR because of various numberologies. Thus, we are not in favor of introducing PDCCH-subframe like concept to NR at this moment (option1)Given that DRX cycle is defined in an absolute value, we are not sure how solution2 solves this problem. Our understanding is that solution3 would be the today’s implementation, i.e., no need to specify.[vivo] It is true that there was some discussion on DRX cycle and timers at the beginning of NR, i.e. ms/slot vs. PDCCH monitoring occasion. But considering the complexity, it is hard for NR to use unit of PDCCH monitoring occasion. But with the deployment of 5G, more applications have requirements of latency, and also need power saving, e.g. XR, or cloud gaming. For these applications, short DRX cycle will be configured to seek for the balance of power saving and latency. In order to achieve power saving, shorter drx-onDurationTimer will be configured. In case several subframes are configured as UL, there will be case that the running DRX timer duration may (or partially) fall into the UL subframes. In this case, UE will have no (or less) opportunities to monitoring PDCCH. In this way, the latency requirements for the traffic would not be guaranteed.Regarding option 2: one potential solution is DRX timer could be adapted if falling into UL slot, i.e. extending DRX timer with UL slots (i.e. by skipping UL slots) or suspend DRX timer during UL slots. |
| Nokia | NSupport | Agree with LG and wondering how that would work with dynamic patterns.[vivo] See above. Regarding option 2: one potential solution is DRX timer could be adapted if falling into UL slot, i.e. extending DRX timer with UL slots or suspend DRX timer during UL slots. |
| CATT | NSupport | This is quite a big change at this late stage and should rather be discussed in XR WI. Solution 3 (longer *onDurationTimer*) is enough for R17.[vivo] We are fine to postpone this discussion until we have stable scope of Rel-18 XR WI.Based on our understanding, it is critical not only for XR traffic, but also for other CG traffic in current deployment.  |
| CMCC | Support | The issue can happen for some specific DRX configuration. We are open for solutions. |
| Huawei, HiSilicon | NSupport | We think such enhancements should be considered in Rel-18 relevant discussion, no duplicated discussion here.[vivo] See above. We are fine to postpone this discussion until we have stable scope of Rel-18 XR WI.Based on our understanding, it is critical not only for XR traffic, but also for other CG traffic in current deployment. |
| Apple | NSupport | Agree with LG. This issue was discussed and NR at the early stage and also discussed in LTE previously, and RAN2 agreed the current after thorough discussion.[vivo] See above. |
| OPPO | Nsupport | It’s understood in the early NR discussion, this case was brought up however, due to the complexity of the UE monitoring duration, it’s decided to use absolute time for controlling the monitoring behaviour. In general, if network configure UL heary frame structure, it mean more UL traffic is expected compared with DL traffic, in order to balance the power saving and the low latency requirement as pointed by this contribution, one way is that netowkr can configure proper configured grant while keeping the DRX related timers in a reasonable duration. Thus, we dont think for now we need to specially handle this case, and we can keep the R15 design as it is.[vivo] See above reply to LG. Besides, we agree with your proposal “*one way is that network can configure proper configured grant while keeping the DRX related timers in a reasonable duration*”. But in actual deployment, DRX timer is not adapted to fit the service type or user requirements. And also, it is hard for network to estimate how long of the DRX timers should be configured.  |
| Lenovo, Motorola Mobility | NSupport | Very likely DRX enhancement to support applications like XR will be discussed in Release 18, wherein similar issues, e.g., dynamic DRX to better fit non-integer traffic period, are considered. Optimization as such would be more appropriate to discuss in Release 18.[vivo] See above. We are fine to postpone this discussion until we have stable scope of Rel-18 XR WI.Based on our understanding, it is critical not only for XR traffic, but also for other CG traffic in current deployment. |
| MediaTek | Unclear | We agree with the observation in this document, i.e. the current DRX framework does not take TDD operation very well into account, effectively forcing the use of longer DRX timers – leading to higher power consumption. However the solution being proposed isn’t very clear. Is it option 2, and if so, does option 2 mean that DRX timers disregard UL slots/symbols? Which DRX timers would this be applicable to?[vivo] Yes, we think solution 2 would be a good direction to be further progressed. Yes, our intention is to disregard UL slot/symbols for some DRX timers, at least for onDurationTimer and InactivityTimer.  |
| ZTE | Nsupport | First of all, we think we can discuss it in R18 and no redundant discussion here, and, as NW vendor, we’ll try to cover at lease one DL slot for each onduration period when the NW configuring the DRX configuration to the UE.[vivo] See above. We are fine to postpone this discussion until we have stable scope of Rel-18 XR WI.Regarding NW implementation solution, we think it is not feasible, as one DL slot is not enough for some traffics in many scenarios.  |
| Vivo | Support (Proponent) | It is true that there was some discussion on DRX cycle and timers at the begining of NR, i.e. ms/slot vs. PDCCH monitoring occasion. But considering the complexity, it is hard for NR to use unit of PDCCH monitoring occasion. Current unit of ms/slot, without considering TDD frame flexibility, has no issue in early deployment of NR, where long DRX cycle is actually configured. But with the deployment of 5G, more applications have requirements of latency, and also need power saving, e.g. XR, or cloud gaming. For these applications, short DRX cycle will be configured to seek for the balance of power saving and latency. In order to achieve power saving, shorter drx-onDurationTimer will be configured. In case several subframes are configured as UL, there will be case that the running DRX timer duration may (or partially) fall into the UL subframes. In this case, UE will have no (or less) opportunities to monitoring PDCCH. In this way, the latency requirements for the traffic would not be guaranteed.Regarding option 2 (reply to @LG): one potential solution is DRX timer could be adapted if falling into UL slot. We are open with the solutions. **As in last RAN2 meeting, some companies confirm the problem, but think it should be included in Rel-18 XR WID. We think more time is needed for companies check after the discussion on Rel-18 XR scope stable. Thus, we could accept to postpone the discussion for this TEI by now.**  |
| China Telecom | Support | This issue may happen for some specific DRX configuration. We are fine to discuss the solutions and find potential enhancement.  |
| NEC | NSupport | As the issue is only for TDD, it is not sure why network cannot take into account TDD config (DL/UL) in DRX configuration?[vivo] If network configure DRX timers to be long enough by taking into account TDD configure, the power consumption for UEs may not be saved, which is also critical for some use cases. What service we considered here is XR or CG, which requires low latency and power saving.  |
| Samsung | NSupport | Agree with LG and we do not think the possible misalignment of DRX period and UL subframes as an urgent problem.[vivo] See above. Besides, it is true there may be no issue in early deployment for NR, where only long DRX cycle is actually configured. But with the deployment of 5G, more applications have requirements of latency, and also need power saving, e.g. XR, or cloud gaming. For these applications, short DRX cycle will be configured to seek for the balance of power saving and latency. The problem will be more urgent.  |
| Docomo | See comments | Tend to prefer to tackle this in Rel-18 for more consistent solution with e.g. RAN3 and/or SA.[vivo] See above. We are fine to postpone this discussion until we have stable scope of Rel-18 XR WI. |
| Ericsson (Mattias) | NSupport | RAN2 discussed this at length during Rel-15. The outcome is what we have in the spec now. Of course, we will always be able to find unfortunate configurations, like shown in this paper. In the "cases" discussed in this paper it would be possible to adjust the DRX settings so that the issue is addressed sufficiently well.[vivo] See above. It is true there may be no issue in early deployment for NR, where only long DRX cycle is actually configured. But this problem will be more urgent considering the deployment of 5G with more applications have requirements of latency, and also need power saving, e.g. XR, or cloud gaming.Regarding NW implementation solution, we think it is not feasible, as these services requires both low latency and power saving. If shorter DRX timers is configured, in order to achieve power saving gain, UE will have no (or less) opportunities to monitoring PDCCH. On the contrary, if longer DRX timers is configured, power consumption will be increased, which is not the desirable outcome.  |
| Intel | NSupport | Agree with LG. This is discussed at the beginning of NR, and current absolute value timers are the outcome of extensive discussion. It would be difficult to revert back to LTE PDCCH subframe concept. [vivo] See above.In addition, our understanding is that the potential issue only happens when DRX cycle is not a multiple of TDD periodicity. As long as DRX cycle is a multiple of TDD periodicity, or DRX cycle is long enough, the potential issue of scheduling efficiency can be minimized.[vivo] See above. If DRX cycle is long enough, there is of course no problem. But the power consumption will be increased, which is not the desirable outcome for some scenarios, e.g. XR or CG.  |
| Qualcomm Incorporated | Not support | It seems that the motivating scenario can be avoided through proper network configuration. For example, in the case of XR/CG applications (the reason why short on duration timer and short cycle are configured), because of their tight latency requirement, it is unlikely that network would configure long streak of UL slots because that would impact DL latency. So at least in the current release, our preference is not to change UE behaviors for DRX timers. [vivo] It is true that there will be no problem if network doesn’t configure long streak of UL slots considering the impact of DL latency. But there are many services to be served by operator. It is hard for operator to configure less UL slots for these traffics which requires latency. Besides, network also needs to configure enough UL slots to guarantee the UL data rate for these traffics.  |

## New Proposals (has not been treated yet for R17)

### EPS Fallback

EPS Fallback

[R2-2110485](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110485.zip) EPS fallback enhancements for UEs in IDLE/INACTIVE Huawei, HiSilicon, CMCC, China Telecom, China Unicom, LG Uplus discussion Rel-17 TEI17

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| Huawei, HiSilicon | Support (Proponent) | Following legacy procedure, when an IDLE/IACTIVE UE is paged for voice, the EPS falllback latency includes 1) UE response paging and establish/resume RRC in NR Cell, 2) the HO/redirection procedure triggered by the NR cell blindly or based on UE measurement reporting, 3) UE initiates access to LTE cell to get voice service.The EMR based solution proposed by vivo is trying to save the time of measurement configuration and reporting time in NR side.While the key point in this contribution is that after UE receives the paging message indicating EPS fallback, UE can directly select and access to the LTE cell, which can save the time of all procedure in NR side. This also omits the measurement reporting, while we understand the real scenario in the field is largely blind HO/redirection scenarios, assuming LTE coverage is better than NR. |
| Nokia | NSupport | Decreasing latency is interesting for voice fallbacks in general. We are wondering what is different compared to LTE CS fallback – this seems analogous to that. And secondly, we wonder why focus on MT cases? Shouldn’t one also consider MO like in CS fallback that UE establishes connection directly in LTE(or wherever)?Additionally at least in the past there has been strong concerns on adding new IEs in the paging message as it would decrease the paging capacity. We are wondering why this would be different now?Huawei response: we understand in LTE, CS fallback is triggered by UE, i.e. UE request to do CS fallback in NAS message, based on which MME will inform RAN to perform the corresponding AS procedures.In NR, it was assumed UE and CN would support IMS voice, while gNB can decide if EPS fallback is needed according to support of VoNR etc [this is described clearly in 23.502]. So we think even for IDLE/INACTIVE UE, it still should be the gNB to make the decision on EPS fallback.Then for paging capacity, in LTE, CS/PS indication is included in paging, and here EPS fallback is just a similar one-bit indication, would not impact capacity much. |
| CATT | Unclear | Some issues on the below enhancements for EPS fallback is to be clarified,* **When the paging message indicates voice service, the UE sets the NR RRC establishment cause as voice instead of mt-access.**

[CATT]if paging cause is set to voice but actually the voice is VONR,UE will still set RRC establishment cause as voice, then it seems gNB will falsely treat is as EPS fallback. what is the impact?[Huawei] we are not sure we understand the comments on “gNB falsely treat as EPS fallback”, as EPS fallback can only trigger by gNB. The cause value only indicate the UE access to gNB for voice service, the gNB will determine if it will provide UE voice service via VoNR or trigger EPS fallback.* **The gNB can include EPS fallback indication in paging message, the UE selects an E-UTRA cell to establish the RRC connection, and sets the E-UTRA RRC establishment cause as voice.**

[CATT] based on EPS fallback indication in paging message ,the UE select a LTE cell and initiate RRC connection on LTE cell autonomously without involving gNB and 5GC. We are wondering whether it is still EPS fallback. EPS fallback procedure contains interaction between gNB and 5GC, and between CN network entities, according to TS23.502.[Huawei] in our solution, it is like the UE receives a NR RRC redirection message (i.e. “or AN Release via inter-system redirection to EPS” as you coted below) to E-UTRA cell. After UE accesses to E-UTRA cell, it will perform TAU which trigger EPC retrieve the UE context (including voice service) from 5GC. So we think this is consistent with the legacy 5GC-EPC interaction principle.//23.5024. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Modification Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in the case of home routed roaming scenario) via AMF with an indication that mobility due to fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s) and reports the EPS Fallback event to the PCF if PCF has subscribed to this event.5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.6. When the UE is connected to EPS, either 6a or 6b is executed |
| CMCC | Support | This is an efficient solution to reduce EPS fallback delay. |
| Apple | Unclear | We have several questions and comments on this matter:1. Does the EPS fallback indication come from gNB directly or from AMF? If it’s decided by AMF, CT1 and SA2 should be involved.

[Huawei] in this solution, the decision on triggering a EPS fallback procedure is made by gNB which is exactly same as in legacy EPS fallback via HO or RRC redirection. Thus we understand there is no/minor impact on CT1 and SA2.1. We also wonder why only MT call matters? Why not considering MO calls?

[Huawei] for MT call, the gNB can receive the paging message/DL data from CN for voice service, so that gNB can make a decision on whether to trigger EPS fallback for this paged UE. However, for MO call, if the UE is in idle/inactive, the gNB is not aware of the UE/UE’s service type unless the UE accesses to network. And after the UE enters connected state, the existing Rel-16 enhancements on EPS fallback can apply. There seems no other enhancements needed?1. We have some concerns regarding the reliability of using paging message to indicate the EPS fallback. In legacy EPS fallback procedure, UE is already in RRC connected state thus the EPS fallback indication from NW can get to UE for sure. Using CCCH channel instead without knowing in which cell the UE actually locates, might be a big concern.

[Huawei] Not sure what is the exact concern, we understand the indication is only to let UE trigger EPS fallback procedures quickly, and do faster selection to a cell for voice services. After getting the indication from the network, it can still use the measurements to find a suitable cell for access. This may need some early measurements extending to LTE frequencies in the NR cell.1. The capacity and security of using paging message to indicate EPS fallback should also be considered.

[Huawei] One additional bit is not seen critical to the capacity. We understand SA3 has discussed this in MUSIM and there seems no problem foreseen. |
| OPPO | Unclear | We understand the motivation, however, it’s not clear for us for the following aspects:1. Whether the enhancement on the paging for MUSIM can be resused by this mechinams

If 1 is confirmed, we understand the key enhancement is to enhance the paging message in from gNB to the UE, i.e., based on the paging mesage with voice indicatation, the UE can perform RRC connection to E-Utra. However, it’s not clear to us why the UE need to set the RRC establishment cause as voice when performing E-UTRA RRC establishment. [Huawei] Yes. Our intention is mainly on the paging message. In this solution, before gNB decides to use paging to trigger an EPS fallback, it needs to know the paging is triggered by voice service. Similar mechanism in MUSIM can be reused.The setting of establishment is a relatively separate part. The intention is to let LTE eNB be aware the UE is accessing for voice. This is not only for access control, but also for specific NW implementation/handling of voice service, e.g. resource reservation, performance tracking. |
| Vodafone | Unclear | We support the motivation and need for TEI-17 work to reduce EPS fallback latency/improve reliability, however, we suspect that there are ‘systems aspects’ that mean that this proposal is incomplete.[Huawei] in general we think this topic attracts interest from companies. What we would suggest is to keep the candidate solutions a bit open, study details further to reduce EPS fallback latency/improve reliability till next RAN2 meeting and then figure out a way forward at next RAN2 meeting. |
| Lenovo, Motorola Mobility | unclear | Regarding EPS fallback in inactive the RAN Paging message is used like RRC release message with redirection command to LTE/EPS. However, we wonder whether UE can trust the received paging message, e.g. in view of fake base stations or man-in-the-middle attack. Therefore, there may be security issues with this enhancement.[Huawei] please see our reply to Apple.Regarding the solution of setting the NR RRC establishment cause as voice (mo-VoiceCall) instead of mt-access, it will face the risk that the establishment request could be rejected by network.[Huawei] We understand the handling is as usual than regular admission control. Not sure whether anything specific to this solution?For the solution of EPS fallback indication, if EPS fallback indication is proposed to be included in paging message, we need to evaluate the load of current paging messgae. It may impact the current paging capacity.[Huawei] please see our reply to Apple. |
| MediaTek | Unclear | It is not so clear that how much latency could be reduced by this proposal (e.g. 1% or 10% of call setup time). We understand the connection establishment time is not so high within the total call setup time.[Huawei] Roughly, this solution can reduce 500ms from the total 1.2s in the MT side, including NR RRC setup, service request to 5GC(including SIP procedures) etc., and HO/RRC redirection from NR(may also include meas config and reporting) may be further omitted as well.It is also unclear that why the UE has to change the establishment cause from mt-access to mo-VoiceCall, is it really TRUE that networks will prioritize the mo-voiceCall over mt-access call? [Huawei] Setting establishmentCause as voice can be also benefit for NW implementation/handling of voice service, e.g. resource reservation, performance tracking. Usually voice call will take the priority.For the assistant E-UTRAN frequencies broadcasted in SI, is it up to UE implementation to selection which frequency to perform the MT call? Is the UE request to measure this neighbor frequecies before receving the paging? [Huawei] the frequency list in SIB is a potential optimization. If there are more than one LTE frequency layers, the network may set one of them as the primary layer for voice, and the UE only needs to evaluate it after receiving paging with EPS fallback indication.  |
| vivo | Support  | There is indeed a need on the reduction for the latency of EPS fallback, we think the paging enhancement for EPS fallback could help.However, regarding the first direction for EPS fallback, i.e.“ **When the paging message indicates voice service, the UE sets the NR RRC establishment cause as voice instead of mt-access**“, we think directing UE to perform early measurement when receives paging can save more time.[Huawei] we think this may be helpful to further reduce the latency and thus we are open to discuss the details further. |
| China Telecom | Support | To reduce the EPS fallback delay is important for both the network and the UE. We support to have some enhancement on this issue to make better uesr exprience. We think this solution is efficient without too much spec impact. |
| NEC | NSupport | From network point of view, it is confusing about what happens at UE side. |
| Samsung | Support | We support to discuss how to reduce the EPS fall back latency in case that UE is paged in RRC\_IDLE/INACTIVE. |
| Docomo | unclear | We share the motivation to shorten the latency of EPS fallback, but we wonder if the paging message in the proposal should be integrity-protected.[Huawei] please see our reply to Apple. |
| LG Uplus | Support | When the SA user uses the VoLTE, silence may occur due to EPS fall back delay. To avoid this situation we adapted some solution, but it is not enough to solve silence issue. So, We support how to reduce the EPS fall back latency. |
| BT | Unclear | It is unclear how this solution works, the benefits it will bring and the UE behaviour in non-updated cells which can coexist with update ones in the same TA.[Huawei] we understand in the non-updated cells the gNB pages UE in legacy way, while updated gNB can decides whether to add EPS fallback indication in paging message. It seems no other specific handling is needed. |
| Ericsson (Stefan) | NSupport | Our concern with this solution is that it is similar to a blind handover. gNB tells UE to access LTE, without any knowledge whether UE is currently in LTE coverage. The assumption seems to be that LTE coverage would always be there, but it may not always be the case. The fact that the UE camps on NR indicates there is at least NR coverage.For this reason we prefer the early measurement based solution for LTE fallback (and load distribution) presented in [R2-2111091](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_116-e/Docs//R2-2111091.zip), where the network can make the fallback decision once it gets the measurement results from the UE. For that solution some concerns regarding measurement quality has been raised, but it is anyway better than no measurements at all, as in this solution.[Huawei] we understand this solution and EMR based solution are not contradictory, but could be complementary to each other. The network can decide whether/which one to use based on NW deployment. |
| China Unicom | Support | We think it’s very beneficial for the network. Besides, we think the UE experience can be improved by this solution with less spect impacts. |
| KDDI |  | We share the motivation, but I guess we don’t have enough time to discuss under TEI17 so we may want to discuss it in Rel-18. |
| ZTE | Support, but with modification | We understanding the “voice“ indication will be added in Paging under MUSIM WI. For EPS fallback indication in paging message, we think this works only in specific scenarios, like gNB does not support VoNR, otherwise, it is hard for gNB to determine whether EPS fallback is needed or not when sending Paging message. So instead of adding indication in Paging message, we think such “network capability“ can be included in system information(SIB1), like “VoNR capable indicator”. And network can set the indicator when there is over-lapping LTE coverage.  |
| Intel | Unclear | Regarding:**The gNB can include EPS fallback indication in paging message, the UE selects an E-UTRA cell to establish the RRC connection, and sets the E-UTRA RRC establishment cause as voice.**The security aspect needs further discussion as the Paging message without security can be sent by false base station that can effectively redirect the UE to an LTE network which could be a compromised network (the issue is not about the cause value itself). In NR, we have normally prevented this kind of security risks by requiring security activation first.Access cause mt-access normally implies that network will accept the access request (as the UE would not sent the Paging message if it cannot accept the call). The consequences of changing that to mo-voice on access control also needs to better understood.  |
| Qualcomm Incorporated | unclear | 1. For 1st bulletion of P1/P2 (i.e. the UE sets the NR RRC establishment cause as voice instead of mt-access, when the paging message indicates voice service), we see some benefit and agree it can help gNB to prepare EPS fallback in advance. 2. For 2nd bulletion of P1/P2 (i.e. the UE selects an E-UTRA cell to establish the RRC connection, and sets the E-UTRA RRC establishment cause as voice), we have a question: this solution will cause that UE receiving paging in NR but responds in LTE. We are not sure whether AMF may re-paging the UE if not response is received. Proponent should clarify how to avoid this issue without cross-WG invovlement.3. We don’t support 3rd bulletin of P1 and P2 (i.e. indicate the E-UTRA frequencies in SIB). Such solution has been discussed in LTE CSFB discussion, but was not agreed because it will incur loss of network control. We tend to avoid repeating such discussion in EPS fallback. |
| T-Mobile USA | Not Support | Agree with Ericsson’s comment and the optimal fix for EPSFB is to deploy VoNR. |
| LGE | NSupport | We understannd the issue, but, according to current specifications, EPS fallback cannot be determined based on only RRC establishment cause without AMF imvolvement. If we agree the proposals, RAN3/SA2 impacts must be unavoidable.According to TS23.502,  * NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup, handover resource allocation or path switch request acknowledge as defined in TS 38.413 [10])
* Also, if the AMF decides that EPS fallback is supported (e.g. based on UE capability to support Request Type flag "handover" for PDN connectivity request during the attach procedure as defined in clause 5.17.2.3.1 of TS 23.501 [2], subscription data and local policy), the AMF shall send an indication "Redirection for EPS fallback for voice is possible" towards 5G-AN as specified in TS 38.413 [10].

If the UE selects an E-UTRA cell based on NG-RAN indication, we are wondering what happens to the SIP signalling generated from the network. CN will configure Paging cause=voice based on MT SIP signalling, and if this signalling is dropped, this may cause more latency for SIP retransmission from P-CSCF. |

### UL Skipping Control

UL Skipping Control

[R2-2110198](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110198.zip) Fast Control of UL Skipping NTT DOCOMO INC., Ericsson, CMCC, Verizon discussion Rel-17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NAccept | P2 has been discussed in RAN2#115 and not pursued, hence it should be excluded in this discussion.Regarding P1: Such dynamic on/off may complicate the UE behaviour because the generation of the MAC PDU may need to depend on the timing of receiving such MAC CE. For example, sudden change to skipping ON while the UE is already preparing a MAC PDU or sudden change to skipping OFF while the UE has already generated a MAC PDU. We already have a similar experience, e.g., CSI reporting considering sudden Active Time or sudden non-Active Time in DRX, which is complex even today.In addition, we don’t think the SINR situation is so dynamically change and requires very dyanmic on/off of skipping.Lastly, for false detection case, the UE ignores the received grant for the skipped transmission. So, we don’t agree with the view that the gNB will have problem with soft combining issue or the UE may use this wrong grant for UCI multiplexing. |
| Nokia | Unclear | LG’s concerns are relevant. |
| CATT | NSupport | It’s not necessary to introduce the optimization. |
| CMCC | Support |  |
| Huawei, HiSilicon | NSupport/Unclear | It is noted that the network is free to disable UL skipping in advance whenever needed, since from LTE. It is unclear whether there is any real problem for reusing this mechanism on NR. This may also lead to impact on the LCP, i.e. the feasibility for UE timing during LCP if this becomes a fast control via MAC CE. |
| OPPO | Nsupport | Currenlty the UL skipping is already supported by RRC configuration, it’s not clear why we need MAC CE based UL skipping control.  |
| Apple | NSupport | We understand the proposals might reduce complexity at the gNB side. However, the solution seems to address a corner case. A false negative (or misdetection) of a TB transmitted by UE is not necessarily related with UL skipping. A false positive detection of an UL transmission is an error at the gNB side and a corner case. It was agreed in the last RAN2 meeting not to adopt the specification for this (e.g., ‘retransmission of configured grant with empty buffer’).Moreover, we are not convinced proposal 1 is essential. The problem mitigated here is rather minor. It was discussed in last R2 meeting that the gNB can avoid UL skipping together with TB repetition as part of the scheduling. In our understanding it is sufficient to rely on RRC reconfiguration for overall configuration control, also the latency (with respect to cell edge etc.) seems sufficient. We also support the comments made by LG.Proposal 2 encompasses that the UE disables UL skipping following reception of a DCI with K>1. This is not acceptable as it requires cross-layer interaction in the time-critical period of UL grant processing. In summary, the change agreed in the last RAN2 meeting (e.g., the RRC change to consider the REPETITION\_NUMBER per the MAC spec) is sufficient in our view. |
| MediaTek | NSupport | Our concerns are on keeping the UE and the gNB in sync. LG raises a valid point on the complexities on when to apply skip/don’t skip commands, which would be similar to the issues surrounding CSI reporting in DRX. Furthermore, MAC CEs do not have the same level of reliability as RRC signaling, and a loss of the MAC CE can lead to significant interoperability issues.  |
| ZTE | Nsupport | We already have two enable flag in RRC to activate/deactivate the UL skipping |
| NTTDOCOMO | Support | Proponent. Since UL skipping does not work well in low SINR condition, it is reasonable for network to swtich off the function. Although RRC configuration based switching on/off is supported in rel-16, it is slow which may take 10~100ms. Therefore, we believe it should be enhanced with a faster mehtod e.g. MAC CE or DCI. |
| vivo | Nsupport | We are not convinced whether the miss-detection probability would indeed increase in the mentioned case. Basically, for low SINR case, the NW would schedule a UL grant with a more robust MCS (i.e. lower MCS index with lower SE), where more PRBs will be allocated for the UL grant. Then, the miss-detection probability of PUSCH DM-RS can still be guaranteed, as shown in the following simulation plots (e.g. with more PRB allocated via lower MCS index, miss-detection probability can be kept at 10^-3 level even when the SINR is decreased from -4.4dB to -7.7dB). Take one step back, with proper beam management and NW implementation (e.g. setting a reasonable detection threshold), we don’t think the radio link quality will change frequently and dramatically (also note that the miss-detection is generally a very very corner case), in this sense, there is no need to introduce MAC CE for fast control. The existing mechanism is sufficient. In conclusion, we fail to see the motivation of using MAC CE control for UL skipping enabling/disabling. |
| NEC | unclear | It is not sure how much this is critical. Is there any problem found in the field? The solution does not seem to solve the issue (at least obervation 1 which should be the main motivation). |
| Samsung | NSupport | We prefer RRC configuration based UL skipping to increase the reliabiility of network operations. L2 signaling does not guarantee the successful transmission, and we do not think more dynamic control is needed. |
| Ericsson (Zhenhua Zou) | Support (Proponent) | @LG. The timing, on when UL skipping is turned-on/turned-off after receiving the MAC CE command, can be defined clearly, for example, after the HARQ ACK is sent for the MAC CE. On the false detection (UK skips transmission but gNB detects UL transmission), gNB would send a re-tx grant1. If the previous transmission is on a dynamic grant, the UE obtains a new MAC PDU to transmit. The gNB has to soft combine noise with an actual transmission.
2. If the previous transmission is on a configured grant, the UE skips the UL grant, even if there are UCIs to be multiplexed on this UL grant. However, if there are UCIs to be multiplexed on this UL grant, per RAN1 agreements in the Rel-16 correction, the UL grant cannot be skipped.

@MediaTek. On MAC CE reliability, the network can send the MAC CE with low MCS or even repeat it multiple times.@vivo. The problem is not only mis-detection, but also false detection. A reasonable detection threshold requires a sufficiently good SINR value and it might not be true always and so the network needs to turn-off UL skipping. @NEC. The solution is to turn-off UL skipping. The current mechanism is to rely on RRC signalling, which can be slow and so the proposal is to enable a faster control in MAC/DCI. @All. The SINR can vary quickly. Otherwise, RAN1 would not introduce MCS indication, repetition number indication in the DCI command. If only relying on RRC re-configuration (which may take up-to 100 milliseconds), the network has to turn-off UL skipping even if the current SINR value is good just in case within the 100 milliseconds, the SINR would drop to a not-OK level.  |
| Verizon | Support  | ProponentThis gives NW ability to learn to use the feature along with the deployment. |
| Intel | NSupport | RRC reconfiguration (as in existing specification) is sufficient to handle the low SINR issue discussed in the contribution. |
| Qualcomm Incorporated | Not support | We are not convinced with the argument that UL skipping needs to be enabled/disabled at a time scale as short as 3ms. If companies truly believe UL skipping needs to adapt to channel conditions very dynamically, then maybe it should be done at DCI level. For UL configured grant, we are open to discuss whether to introduce RRC reconfiguration of UL skipping.  |

### SRS in Dormancy

SRS in Dormancy
Had some support in R16 but wasn't done in the end

[R2-2110836](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110836.zip) Periodic SRS in SCell dormant BWP Qualcomm Incorporated, ZTE Corporation, Futurewei discussion Rel-17

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | unclear | To us having very seldom SRS is hardly helping NW in assessing quality of the cell. But RAN1 also indicated in R16 that this could be useful. This seems quite simple addition, so we are neutral on having this if UEs are willing to send it for dormant BWP. We do not see the need to change the PHR behavior though as proposed in P3 since it should be very sporadic transmissions without impacting other cells much and no close loop power control for the dormant BWP.  |
| CATT | Support |  |
| OPPO | NSupport | It is already discussed in R16 DCCA and it is not agreed.If RAN2 wants to support it in R17 TEI. RAN1 should be involved first. I also think it is RAN1 scop to decide whehter to support it or not. |
| Lenovo, Motorola Mobility | NSupport | It has been already discussed in R16 and not agreed. |
| MediaTek | NSupport | This is one of controversial issue in R16 and R2 decided not to support this due to no consensus. We see some benefit to have SRS in dormant SCell but does not think the gain is high enough to re-discuss this again. If simple solution could be introduced, we are acceptable to this. |
| Futurewei | Support (Proponent) | During Rel-16, many companies had concern on the long wake-up delay from the dormancy. RAN1 and RAN4 acknowledged the concern and suggested long-periodic SRS in dormancy is a compromised solution to minimize the wake-up delay from dormancy while maintain low power consumption. We support to adopt this solution to reduce the transition delay when a UE is out of dormancy. |
| NEC | unclear | No strong view but we assume the main impact is in RAN1, although signaling should support in RAN2. |
| Samsung | NSupport | We believe the Dormant BWP is introduced for power saving and transmitting periodic SRSs within the dormant BWP may reduce the efficiency of power saving.  |
| Ericsson (Stefan) | unclear | Periodic SRS was discussed before, but not agreed based on UE power consumption concerns. Even if RAN1 did not see issues to support SRS with long periodicity (>100ms) for dormant SCell, it is perhaps a bit unclear how large the gains would be, compared to the increase in UE power consumption, thus we are a bit neutral to having this. |
| ZTE | Support(proponent) | Supporting SRS transmission can help network to estimate UL channel when Scell is in dormant BWP. So that network can schedule UE quickly when transits from Scell dormancy to normal BWP. During R16, companies did discussed this, and RAN1 also confirms the benefit if UE can transmit periodic SRS with long periodicity, however, due to lack of time it was not supported in R16. In our view, with long periodicity(>100ms), UE’s power consumption won‘t increase much, and Scell activation delay can be reduced. So we support this in Rel-17, and RAN2 specification change is minimal.  |
| Qualcomm Incorporated | Support | The main benefits of this feature, i.e., UE transmits periodic SRS in dormant SCell, are as follows:1. Fast SCell activation, since gNB can perform UL channel estimation based on SRS while SCell is dormant. Upon SCell activation, gNB can then begin scheduling the UE for UL transmissions as soon as possible.2. Fast SCell activation, since UL Timing Alignment (TA) with the gNB can be maintained and RACH on SCell is not needed upon activation. gNB can determine from SRS whether UE has UL TA or not and if needed can provide TA commands to the UE to correct SCell UL timing before there is UL timing misalignment.We propose that the feature be supported for TDD systems since the specification impact, as described in our contribution, is minimal. We can then discuss supporting the feature for FDD systems, if there is time available and interest among companies. |

### Skip RACH on Data Arrival

Skip RACH on Data Arrival

[R2-2111161](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111161.zip) Skipping RACH upon data arrival NTT DOCOMO, INC. discussion Rel-17

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NSupport | We have some sympathy to the intention that the network may want to poll the BSR rather than the UE by itself always trigger the BSR and consequently SR/RA. Currently, the only way to prevent BSR trigger by UE is not to allocate a LCG. However, it prevents BSR report as well because BS is reported per LCG.R2-2111171 has proposed to allow skipping RA for this case, which we don’t think is the only solution. For example, we could enhace BSR so that BSR is not triggered by UE itself. Therefore, we are open to discuss more but not limited to RA skip. |
| Nokia | Nsupport | There are already means to prevent triggering SR like logicalChannelSR-DelayTimer and logicalChannelSR-Mask |
| CATT | NSupport | It is not essential. |
| Huawei, HiSilicon | NSupport | We understand by existing mechanism, the network can configure SR mask to prevent the UE from triggering SR-RA in case it thinks SR-RA is not needed. It seems to be sufficient and a bit unclear to us why new mechanism is needed.  |
| OPPO | NSupport | It seems this contribution assumes the UE is always reacheable if the beam turns to the UE in FR2. In this case, by requesting aperiodical CSI, the UE is assumed to have the opportunity to send the BSR and even the ul data (if any).However, we think this is not always the case, because UE should be supposed to work with DRX in order for power saivng, in this case, UE is not always reachable in the case when UE is not in Active Time. Then, SR can be used to trigger the UE entering into the Active Time when UL data is available. Thus the statement in the contribution „This means that the gNB can receive UL data from the UE without interruption when the gNB requires BSRs frequently enough. In such an operation, scheduling requests can be stopped by configuring in RRC“ seems not alwasy work especially considering the DRX configuration. |
| Lenovo, Motorola Mobility | NSupport | This is presumably not good from system/ network’s perspective since due to Beam sweeping the amount of unused resources (just now put in the PDCCH to send a possible BSR) will be too high. |
| MediaTek | NSupport | As commented by Nokia and Huawei, there is already mechanism to solve this. It seems that no further enhancement is needed. |
| vivo | NSuport | In ideal case, it can save RACH procedure by transmit BSR/data using the grant that is issued for CSI MAC CE. However, it could be that the gNB does not have DL data and thus does not need CSI at all, which means that the gNB probably does not schedule the UE for CSI report. In this case, the UL data is blocked if RACH-SR is not allowed.  |
| NEC | NSupport | This goes opposite direction compared with CG. This may cause unnecessary PDCCH at every time of beam sweeping with corresponding beam for a UE. |
| Samsung | NSupport | We believe the current specification already supports RA cancellation for SR triggered for BSR. |
| Ericsson | NSupport | Some value in the motivation, but we think there are existing mechanisms to prevent SR (and the triggering) such as Mask etc that may be enough. |
| DOCOMO | Support(Proponent) | We think this proposal enables to adapt to an SR-less UL communication in FR2 beam-sweeping operation.We acknowledge valuable comments. We'd like to answer as below:*logicalChannelSR-Mask* can be used for skipping RACH - Yes, but our proposal does not need to allocate resources for SR, so more resources can be allocated for UL data. (We can allocate SRs of all UEs in the cell for the same resource and mask the SR for the sake of saving resources, but that will limit the network's flexibility to configure which UE can communicate without SR.)Unnecessary PDCCH allocated just for requiring possible BSR - No, allocation of PUSCH for BSR is only done when the gNB instructs aperiodic CSI reporting to the UE via PDCCH. We do not mean the gNB transmits additional PDCCH just for allocating PUSCH for BSR. |
| Intel | NSupport | Although we understand the intention to save PRACH procedure/SR resource, it is not clear whether it is more resource-efficient to relay on the triggering of aperiodic CSI reporting. It would depend on how frequently CSI reporting is actually required which is RAN1 scope.  If proponents really want to enhance, it might be good to look at whether the existing mechanism can be applicable e.g. BSR is not triggered for certain logical channels |
| Qualcomm Incorporated  | Nsupport  | As Huawei, Nokia, Ericsson mentioned, a mechanism is already in place to suppress the UE from triggering the SR for UL grant request (configured/dynamic). So we don’t see the additional value of introducing this new behavior, which may affect other aspects (e.g. RACH procedure).   |

### Fast RLF

Fast RLF

[R2-2110055](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110055.zip) Discu ssion on Fast RLF recovery Apple, Verizon discussion Rel-17 TEI17

[R2-2110056](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110056.zip) 38.331 CR to introduce fast RLF recovery (Option 1) Apple, Verizon draftCR Rel-17 38.331 16.6.0 B TEI17

[R2-2110057](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110057.zip) 38.331 CR to introduce fast RLF recovery (Option 2) Apple, Verizon draftCR Rel-17 38.331 16.6.0 B TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Ericsson (Tony) | NSupport | We think that this is an optimization that basically bring no benefits. With the proposed solution(s) we think that gaining e.g., around 20-30ms, is not really essential taking into account that the reestablishment procedure itself can last several second (from the moment to when is initiated to the moment in which the RRCReestblishmentRequest is sent). Therefore, we gain few milliseconds in a procedure that last several seconds.A further doubt that we have is that, sometime, the RLF may be due to a reconfiguration error and thus restoring the previous configuration it will bring yet to another RLF (in this case the proposed solutions do not help at all). On top of this, when a UE performs reestablishment, the network may also want to give a different configuration at the UE for e.g., load balancing reasons, and this will basically void the small benefits given by the proposed solutions.Also, we are wondering if the case that is describing (UE with temporary out-of-coverage) can be simply resolved by extending the timer T310 (also simply set the maximum allowed time).For all these reasons, the benefits for restoring the previous RRC configuration during reestablishment it seems to be very limited.[Apple]: Regarding the significance of latency savings, having an efficient RRC procedure to reduce unnecessary signaling and latency is always a goal worth pursuing. In case of RLF and UE returns to the same cell, there is really no need to have a RRC reconfiguration.Regarding the T10 timer, we think if UE using a longer T310 can cover some case where RLF does not need to be declared early, but it may also prevent the UE from selecting another better cell in time. Our proposal is somehow targeted a particualr scenario. But T310 is a setting which is common for all the cases. . No matter how T310 is set, as long as there is a way to reduce the signaling overhead and latency for RLF recovery, it is always better to enable it. |
| Nokia | NAccept | It is not clear if this really reduces any delay. RRC reestablishment is already supported and UE does not release RRC configuration as stated in discussion paper. It seems only aspects is to keep PSCell configuration in case of RLF but that hardly seems to bring any benefit.[Apple]: If UE does not release RRC configuraiton (altohugh we think UE does drop some RRC configuraitons, e.g. Scell and SCG configuraiton, when it enters RRC restablsihment procedure), then it should be prefectly fine for UE to use the prior configuration and have a enhanced fast RLF recovery. |
| CATT | NSupport | RRC re-establishment may be triggered due to RRC reconfiguration failure, e.g. inability to comply with *RRCReconfiguaration* message. In this case, the previous configurations cann’t be used. Thus, the benefit of fast RLF recovery is not clear.[Apple]:The proposed solution will not be used for RRC Reconfiguration failure case, we only target RLF/HOF. |
| Huawei, HiSilicon | NSupport | The proposal is apparently specific to the case when the UE re-establishes to the same cell after RLF. This is rather unlikely to occur. Besides, the CRs provided are not simple and may require a lot of discussions. Thus we are not convinced on this proposal.[Apple]: It is quite frequent for UE to experiecne the“same cell RLF“ issue here. For example, For instance, a user enters a bad coverage area (e.g, basement) and then returns back to its prior location shortly after. In such a case, the UE UE selects the same PCell as its previous serving cell during connection reestablishment.We are open for further discussion on draft CRs and suggestion to simply the CR. |
| Apple (Proponent) | Support  | We think it is quite frequent that UE will select the same PCell (which is the serving cell before the failure) during RRC Establishment procedure triggered by RLF or HOF. In this case, it is reasonable to allow UE to continue to use its prior configuration w/o let NW to reconfigure the UE. This can help reduce the signaligng overhead and latency of the recovery. We have presented two options to address this problem, one is to extend the CHO configuratuon to cover the source cell. The other is to adopt a procedure simialr to RRC resumption when the select cell is the same prior PCell. |
| Lenovo, Motorola Mobility | NSupport | If the cause of declaring RLF is T310 expiry, the network has reserved the sufficient time for recovery of channel. If the channel can not be recovered during T310, it is almost impossible that UE can reselect the same cell during T311. If the cause of declaring RLF is reconfiguration failure, the proposed solution can not work.Actually, we already have some enhanced solutions to speed up the recovery e.g fast MCG link recovery and CHO recovery.[Apple: for CHO recovery, the current R16 solution does not covert he source PCell case, so we propose to extend it to cover soruce PCell, so UE can have the same enhanced solution if UE camps back to the source cell after CHO failure. |
| MediaTek | NSupport | We understand that the proposal is to optimize the case that re-establish to the previous serving cell. We are not sure this is common scenario. As RLF should already be low possibility in normal deployment, we don’t think it is necessary to enhance on this particular case.[Apple] Please see our reply to Huawei. |
| Xiaomi | Support | RAN2 has supported UE could try HO in case selected cell is one of the CHO target cell during re-establishment. UE is expected to store the source configuration during handover. So, it follows the same logic for UE to resume RRC connection with source cell if selected during re-establishment.  |

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| Futurewei | NSupport | It is an optimizaiton useful only for an unlikely scenario, and the specs impact don’t look very straightforward.[Apple] Please see our reply to Huawei. |
| vivo | NSupport | 1. The probability that UE selects the same PCell during cell selectionWe think the time from UE judges and declares the RLF to cell selection completion before sending the RRC Reestablishment request is very short. it is with low probability for UE to select the same PCell during cell selection in such a short time. Unless the T311 is configured to a large value, e.g., the default value of T311 is the 30s. So, maybe it is better to have a specific simulation analysis to indicate it is with a very high probability. Besides, 26ms is ok, and the low latency requirement is more suitable for URLLC.2. Regarding the specific option1) Option 1We think the RACH and RRCReconfigurtionComplete may not be needed if the network does not detect UE’s RLF, considering the time for the network to detect UE’s RLF is longer than that of UE. So, if UE selects the same PCell which it was camped on prior to RLF or HO Failure, UE can restore the pre-stored configuration by implementation and the user plane data is resumed. Then the impact for the current spec is low.2) Option 2The RRC Reestablishment procedure is similar to the RRC resume procedure. According to the previous meeting and spec, for the RRCReestablishement procedure, UE can only resume SRB2 and all DRBs after receiving the RRCReconfiguration message rather than the RRCReestablisment message. We think it is not so suitable for two RRC procedures to be so similar which in fact are defined as two different procedures in the spec. [Apple] We think having an efficient RRC procedure to reduce unnecessary signaling and latency is always a goal worth pursuing. We are fine to have a simulation analysis for this problem, if companies prefer. |
| NEC | NSupport | No strong view, but if this is only within the same PCell, then may be acceptable. Firstly would like to check this point. |
| Samsung | NSupport | In our understanding, RLF declaration itself also has the time duration to check the link status such as T310, or some consecutive number of failures in RLC and RACH. If link has failed for this duration, it is thought better to find another cell. There is no need to adjust UE behavior only for the specified scenario in this Tdoc. Moreover, we wonder if the current spec prohibits the case that current Pcell can be given as candidate target cell. If this is allowed, the UE can use CHO recovery scheme for the failed cell further without proposed spec modification.[Apple] Our understanding of current RRC is that the source PCell is not allowrd tob e configured as CHO target. Therer is a NOTE in TS38.331 indicating that] |
| Google | NSupport | We understand this proposal addresses the radio link failure scenario only. However, it also complicates the UE implementation because the UE has different handlings for the radio link failure scenario and other scenarios triggerring the RRC re-establishment. In addition, the user does not perceive the time saved by the proposal. We don’t see a need to optimize it.[Apple: It can address both RLF/HOF. But it does not address some other causes for RRC reestablishment, e.g., RRC reconfiguiration failure“. |
| Verizon | Support (proponent) | RLF is always a very problematic issue that we always try to improve up on. We liked fast RLF in the past in LTE days but it wasn’t as successful as we hoped, Now we see reducing signaling is an alternative to reducing measurement. However, we are open minded to technology feasiblity and to all candidate solutions. We trust 3gpp to reach a right conclusion and we will follow it.  |
| Intel | Unclear | The primary benefit of this seems to be to avoid the release of the configuration of the PSCell during re-establishment. This solution is only valid in the same cell. The targeted scenario seems to be when the UE is in out of coverage for extended period of time in the same cell such as “in a lift” scenario. For handling same cell extended out of coverage, it could be sufficient to use long T310. The potential issue of long T310 is that if the UE was having RLF due to HO failure, UE is forced to stay in the same cell but this limitation was overcome by the use of T312. So it is possible to use a short T312 for HO failure case and long T310 for the in-cell out- of-coverage case. With this, UE will not declare RLF for the “in a lift” scenario and hence not release the PSCell configuration.The benefit of this proposal against such configuration options should be discussed.[Apple]: We are fine to furthe evalute our options againgst "long T310+short T312“ option. However, we want to emphasize that the timer settings are applicable to all scenarios, which may have challange to be finely tuned by NW deployment. Our solutuon is more precisely targered to a particualr case, i.e. UE returns tot he same cell.  |
| Qualomm Incorporated  | Support  | We prefer option 2. We observe RLF followed by reselection to the orginal Pcell in the field and it is not a rare event.  |
| LGE | Nsupport | The intended gain can occur in limited cases, but the required specification impacts are significant. So we are not convinced if this optimization is worth doing.  |

### Idle / Inactive Measurements w SUL

Measurements

[R2-2109773](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109773.zip) Idle/Inactive state measurement enhancement for UEs supporting SUL OPPO, Spreadtrum Communications, Qualcomm discussion Rel-17 TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | NSupport | This would bring at most negligible UE power saving gain for SUL UEs if any. And setting this parameter and optimizing it for NW will be challenging.  |
| Huawei, HiSilicon | NSupport/ unclear | It is unclear how much gains we can get from such enhancements, considering large number of existing UEs, we think the gain is marginal. |
| Apple | Nsupport | Generally speaking, the configuration on those parameters would not be that extreme low, otherwise the mobility performance may get compromised. |
| OPPO | Support (proponent) | Having separate measurement start threshold for SUL capable UEs can help these UEs to save power, i.e. these UEs only need to perform neighbour cell measurement when they are near the SUL‘s coverage edge, which is different from NUL’s coverage edge. |
| Lenovo, Motorola Mobility | Nsupport | It might be good if proponents provide some quantitative analysis on the gains wrt UE power consumption that can be achieved with the proposed enhancement. |
| MediaTek | NSupport | We understand the intention is for power saving. Although the proposal is acceptable to us, we doubt that network vendor will really configure this parameter. As mentioned by Nokia, it will request some study on how to set the value properly. We thus that think the enactment is not a must. |

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| Futurewei | NSupport | The potential gain is not clear, while the impact on network implementation may no be trivial. |
| NEC | NSupport | We do not see benefit which can justify undesirable complexity and overhead. |
| Samsung | NSupport | In order to modify SIntraSearchP and SnonIntraSearchP in SIB2, the SUL UE’s large power consumption due to existing parameter values must be studied and verified first. |
| Ericsson (Stefan) | NSupport | Same view as Nokia. |
| Intel | Nsupport | We understand the intention of the proposal. However, the justification of the gain needs further study. |
| Qualcomm Incorporated | Support | One of proponent. We think this solution is simple and can address the issue in IDLE measurement in SUL. |

### RMSI alignment and HARQ granularity

Miscellaneous

[R2-2110558](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110558.zip) RMSI alignment and HARQ granularity Nokia, Nokia Shanghai Bell discussion Rel-17 TEI17, NR\_unlic-Core

Note that this document has two proposals that should be considered individually:

**RMTC:** Enhance RMTC-Config to allow RSSI measurements to be contained in gNB idle periods.

**HARQ:** Allow more granular configuration of PDSCH HARQ processes for UE in Rel-17.

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| --- | --- | --- |
| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | Support both (proponent) |  |
| CATT | For RMTC, unclearFor HARQ，unclear | For RMTC and HARQ, from the view of Ran2, we are fine to accept it, but we think the RMTC part should be discussed in RAN4 firstly, since it relate to a more meaningful measurement in idle time of every Nth gNB FFP, the benefits shoudl be confirmed by RAN4. The HARQ part should be discussed in RAN1 to see whether it has the potential impact to HARQ procedure and the UE chip. |
| Huawei, HiSilicon | NSupport /unclear | It is a bit unclear what the issue 1 is, and hence not clear what is needed to be done. For issue 2, sensible UE implementation already takes care of the HARQ buffer management, and it has been acknowledged by the UE vendors. In this sense, not sure any enhancement is needed. |
| Apple | For RMSI unclear | Regarding RMTC one, so far we don’t see a clear motivation yet. Besides, we are wondering would it be possible to use RSRQ by network implementation to derive RSSI? e.g., use SSB based RSRQ but indicate the RSSI symbol locations, and then use RSRP divided by RSRQ network may still get rough RSSI during certain symbol level period (not exactly the LBT BW). It’s not so starightforward like RMTC configuration, but I think it still can work roughly.  |
| OPPO | Nsupport | We agree the issue may exist, but the impact can be limited especially when a smart UE uses a proper algorithm. To me, it is not very essential, there is no need to enhance RMTC-Config at this late stage. |
| MediaTek | RMSI – UnclearHARQ – No strong view | For RMSI, we are not so sure about the motivation and it looks more like a R4 Topic. |
| vivo | NSupport | Both proposals are like optimizations.Regarding HARQ: more granular configuration of PDSCH HARQ processes is not essential. Current granularity {n2, n4, n6, n10, n12, n16} is enough. |
| NEC | NSupport | For HARQ one, it is acceptable. |
| Samsung | NSupport | Although the first proposal makes some sense, we beilieve that the existing RMTC-config already covers the scneario (mostly). For the second issue, we understand that RAN2 already discussed and concluded that allocation of 16 HARQ processes from the UE side is not an issue (as in Rel-15 and Rel-16). |
| Ericsson | NSupport | RMSI proposal will most likely improve interference measurement, but we do not see the need to improve this in Rel17. For HARQ, we do not see a need to increase granularity, further this is affected by the extension to 32 HARQ process introduced in NR NTN WI. |
| Qualcomm Incorporated | Support | We support both proposals. For RMTC, we can first agree to support allowing RSSI measurements in FFP Idle periods. The signaling details can be discussed later.  |

### UE assistance information configuration in RRCResume

Miscellaneous

[R2-2109474](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109474.zip) UE assistance information configuration in RRCResume message OPPO discussion Rel-17 TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | NSupport | If we understand correctly this would allow to send *otherConfig* in resume message without needing separate RRC reconfiguration message. So this could save one RRC message in case where the delay is not really issue so hard to see motivation for this change. |
| CATT | NSupport | It is not urgent to report UE assistance information to the network when the UE transfer from RRC\_INACTIVE to RRC\_CONNECTED. |
| Huawei, HiSilicon | NSupport | We understand this is an enhancement for UAI configuration to reduce one more RRCReconfiguration message. But we are not sure if it really reduces the signaling overhead, the NW may still need to send RRCReconfiguration message for other configurations in addition to UAI configuration. So we don’t think this enhancement is essential. |
| Apple | Neutral | We think this is good to have but no strong opinion.  |
| OPPO | Support | Proponent |
| Lenovo, Motorola Mobility | NSupport | We think that this is a minor optimization. |
| MediaTek | NSupport | We understand there is no urgency to provide *OtherConfig*. The proposal is just a minor optimization.  |

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| Futurewei | NSupport | This seems a very minor optimzation, compared to other enhancements for consideration. |
| NEC | NSupport | We do not see any need of this optimization. |
| Samsung | NSupport | The proposal to include otherConfig IE in RRCResume msg is not a necessary modification. |
| Intel | NSupport | The proposal of including UAI configuration in Resume is a simple change and could be useful. However, implementations may already have used 2 message based solution, and this small optimisation can then be seen as a second optional implementation. Then the benefit may not be worth it for implementations to consider this. |
| Qualcomm Incorporated | Not support | This is a minor optimization so don’t see the need to change the specifications. |

### Efficient UL pre-scheduling

[R2-2110759](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110759.zip) Efficient UL pre-scheduling operation MediaTek Inc., Qualcomm Inc. discussion Rel-17 TEI17 R2-2109019

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| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NSupport | We wonder why the network provides such useless UL grant axcessively. More safe and helpful way would be to report BSR=0 in this case so that the network does not provide more UL grant until the UE requests so.  |
| Nokia | NSupport | Agree with LG. Also, this cannot be introduced as mandatory behaviour for backward compatibility reasons (with legacy gNBs). Explicit configuration of the feature will be required and overall operation will still have to rely on smart gNBs. |
| CATT | NSupport | P1 can be a vast topic and, in our understanding, is part of R18 XR scope.P2 requires that the MAC entity is configured with *enhancedSkipUplinkTxConfigured* and the problem is that if the UE receives a dynamic grant for new transmission, it starts the CGT, so it cannot go to sleep as it may receive a dynamic grant for a ReTx. So the issue raised by LG in R2-2111170 should be addressed first. |
| Huawei, HiSilicon | NSupport /unclear | We are not sure about the complexity for checking LCP result whenever handling the inactivity timer, and felt the potential benefit is marginal. |
| OPPO | unclear | We understand the motivation of the proposals. From UE’s perspective, it would be beneficial for UE power saving if UL pre-scheduled grant is unused due to no UL data at UE side. However, we are not sure whether this intensive UL pre-scheduling operation is widely used in real field, maybe we need to check with NW vendor. |
| Lenovo, Motorola Mobility | NSupport | For P1 “**Introduce assistance information to indicate that whether current UE application requires low latency transmissions**”: We think the need should not arise since due to QoS negotiation and information available at gNB (from CN) it would know what latency requirement is for a DRB; and secondly, the proposal can be misused by UEs.For P2 “**Support of** **enhanced DRX inactivity timer operation** **to reduce power consumption when UE has no UL data to transmit“**: Drx-inactivitytimer is directing UE to go to ActiveTime for reception of DL and UL DCI. Even though UE may not have UL data, there may be still DL data for the UE pending. Furthermore, gNB may also ask for e.g. aperiod CSI etc. Therefore, we don’t think that this is a good solution. |
| Apple | Support the intention / Unclear | **1)** We do not think P1 is required. The network should know whether there is any DRB with a low latency requirement, and BSR is available as well.**2)** We are ok to discuss P2/P3 in Rel-17 and think changes to address this problem can be useful. However, we do not agree to taking the earlier QC proposal as baseline (P4) at this stage. **3)** We also support the view from OPPO. |
| ZTE | Nsupport | 1. For proposal 1, we also have no idea why NW will pre-schedule the UL grant for a UE when there is no any SR/BSR received, in our understanding , NW always schedule UL grant according to the SR or BSR. Assuming NW’d like to do some pre-schedule things, UL skipping can be utilized.
2. We tend to agree with lenovo, the drx-inactivityTimer is not only used for burst coming data but also for UE to receive the DL transmission.
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| vivo | NSupport | Our concern is that this optimization will increase the risk of DRX misalignment between UE and gNB and complicate UE and NW implementation with limited power saving gains.To address the misalignment, new mechanisms will be evaluated and introduced. However, from the perspective of service QoS guarantee and system efficiency, UE should start/restart inactivity timer upon UL grants reception.If further power saving effect should be pursued in this scenario, some implementation solutions can be considered, e.g. configuration of a shorter inactivity timer.  |
| NEC | unclear | Looking at TP, it changes the legacy behaviour (by mistake?). We are open for discussions but would like to confirm some aspects:1. no impact to legacy2. how NW can manage the assistance information on whether current UE application requires low latency transmissions, when multiple DRBs are configured? |
| Samsung | NSupport | Regarding P1, it seems not essential, as SPS/CG is already utilized without having such assistance even today.Regarding P2-4, we still think that it is not needed as discussed in Rel-16. Since network already knows the UE behavior from the specification, (sensible) network should refrain providing such unsolicited UL grants if it configures DRX to the UE. |
| Ericsson (Zhenhua Zou) | NSupport/Unclear | On P1, if the UE wants low latency it can request the corresponding QCI when setting up the bearer. Low latency is a QoS thing and not something which should be negotiated in RRC.On P2-P4, we have a question on what the expected power saving would be. |
| MediaTek | Support (proponent) | Please see some responses to the comments above:*Why are pre-scheduled grants provided, and is it commonly used (LG, Nokia, Oppo, ZTE, Samsung)?*The specs have been written with the assumption of a reactive gNB behaviour wrt UL grants. However, this is not necessarily the behaviour we see in the field deployments today. Very often, proactively pre-scheduled UL grants are used in place of reactive SR/BSR based UL grants, to work alongside latency sensitive services such as gaming. We want to ensure that the specifications also take such deployments into account. *Is this mandatory for gNBs, or is it configurable (Nokia)? Does this affect legacy behaviour (NEC)?*This should definitely be configurable for gNBs. We just want to ensure that deployments that currently rely on pre-scheduling have a means to operate in a power efficient way. This does not force a gNB or UE to change, as it would be a new configurable feature.*Dependency of CGT (CATT)*We are addressing a dynamic UL grant for new transmissions in this paper. Retransmission grants for CG is not the usecase we’re trying to address.*Dependency on DL data or CSI reports (Lenovo, ZTE)*DL data based DRX triggers are unchanged here. This is only related to UL grant behaviour. We are open to solutions that ensure that a CSI report can go through.*Expected power savings (Ericsson)*The power savings are significant when shorter DRX cycles are in use. Shorter DRX cycles are used often as they work well with popular end-user scenarios such as gaming. |
| Intel | NSupport | Regarding assistance information for pre-scheduling, gNB is aware of the QoS requirements (including latency) of all QoS flows established. Therefore it can be left to gNB whether it turn on/off prescheduling e.g. based on QoS or any existing overheating indication. In addition, it is not sure about the power saving gain in turning off pre-scheduling compared to existing overheating indications to reduce CC, BW, MIMO layer etc. Regarding DRX inactivity timer enhancement, it was proposed in Rel-16 and was not agreed. It is an optimization and may have some issues. The potential DRX state misalignment between UE and gNB is in the ambiguity period between supposed UE Tx time and gNB detection time, since gNB does not know whether UE starts drx-InactivityTimer until gNB detects whether a transmission is performed or not.  |
| Qualcomm Incorporated | Support | We are one of the sourcing companies.  |

### Multi-TB CGs on licensed bands

[R2-2109652](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109652.zip) Enabling Multi-TB CGs on licensed bands CATT discussion TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NSupport | Using HARQ formula when cg-RT is not configured but multi-TB CG is configured, it will allocates the same HPID to all HARQ processes within the CG period. In unlicensed, it is of not problem because the intention was to allow pending data transmission by using the same HPID. However, for licensed, retransmission of pending data is not an issue. If multi-TB CG is for transmitting new data in licensed, different HPID needs to be allocated, which we think is a specification impact. Also, multiple CG configuraiton would provide similar CG occasions, hence see not much need to support multi-TB CG in licensed.  |
| Nokia | NSupport | This was discussed in RAN1 in Rel-16 NR-U WI and concluded as not supported for licensed. |
| CATT | Support(Proponent) | To LG: Note that even without this proposal, multi-TB CGs are already currently supported when *cg-RetransmissionTimer* is not configured, since it is allowed, in R17 to not configure *cg-RetransmissionTimer* in shared spectrum. In other words, multi-TB CGs are already supported when the same HPID is allocated to all CGs within the CG periodicity.And that does not raise any problem, on the contrary it can serve other IIOT purposes such as addressing traffic jitter as discussed in above contribution.So the intention here is just to extend this behavior to licensed bands, because, if the mechanism works in UCE (w/o CGRT configured), there is no technical reason to prevent it from being used in licensed bands as well. |
| Huawei, HiSilicon | unclear | Is it RAN1-led or RAN2-led?[CATT] The point of discussing this in RAN2 is that the HPID allocation procedure (UE-selected or time-based) is a RAN2 procedure, which seems to be the contention point as it makes the multi-TB usage different (but still advantageous) from that in NR-U. Since there is no technical issue in MAC from using multi-TB feature when CGRT is not configured (which is already possible since CGRT is no longer mandatory in shared spectrum in R17), we can make this decision in RAN2 and tell RAN1 about it. |
| OPPO | Unclear | In unlicensed band, we understand the reason to introduce multi-TB CG is to increase the transmission opportunity when the UE occupies the channel, however, it’s not clear the motivation to introduce Multi-TB CG on licensed band, thus we think there is no need to copy the unlicensed mechanisms to licensed band. |
| Apple | NSupport | In our understanding multi-TB scheduling is only considered useful when LBT-failures can happen (i.e., when cg-RetransmissionTimer is configured). We are also not convinced an extension of multi-TB transmissions to licensed bands has no additional specification impact.[CATT] We haven’t identified any so far. |
| MediaTek | NAccept | We do not find a strong justification for this change. It is suggested that this is a means to deal with jitter for IIoT traffic. However, we have repetitions available as a solution to deal with jitter since Rel-15. The NW can configure the UE to use any of the individual repetition occasions for initial transmission.[CATT] The repetition scheme is designed to address the reliability of the transmission and although a repetition can start on any CGO of the bundle, it will keep repeating on other CGOs of the bundle. This is not what we want to address with traffic jitter, that is, such traffic may not require to be repeated to increase its reliability. The point of the multi-TB feature precisely is that the CGOs are independent of each other and can nicely address the jitter without a need to repeat transmitting the TB across CGOs (although multi-TB with repetition is also possible). And that’s a low hanging fruit without specification impact (except capability extension).  |
| ZTE | Nsurppot | As per the intention mentioned in contribution, we think multiple CG is introduced for dealing with jitter issue. We do not see any more enhancements for improving the same issue.[CATT] We agree that, at the moment, the only way to address jitter is to configure multiple CG configurations offset from each other, but that requires spending as many CG configurations as offsets, which is not efficient considering the limited number of CG configurations. |
| Futurewei | NSupport | Should this be discussed in RAN1 first?[CATT] See asnwer to Huawei |
| vivo | NSupport | In NRU, it is beneficial to use multiple slot scheduling since UL DL switch means additional LBT and could suffer losing of channel occupation. However, in licensed carrier, there is no such issue. Multiple TB CG could hard to match the varity of the burst size. Its pros and cons needs to be investigated. |
| NEC | NSupport | Actually there is no strong motivation to apply this in lincensed spectrum. |
| Samsung | NSupport | We do not see a strong motivation of Multi-TB CGs for lincensed band. In the licensed band, multiple CG configurations can be used.[CATT] Same answer as to ZTE. |
| Ericsson (Zhenhua Zou) | Not support | The proposal is conditioned on one interpretation of how multi-TB CG would work in licensed band, if allowed. This interpretation needs confirmation and more importantly, the intention to address traffic jitter can be achieved by allocating multiple parallel CGs with the same periodicity and a timing offset among each other. This has been heavily discussed in RAN1 Rel-15/Rel-16. [CATT] Same answer as to ZTE. |
| Intel | unclear | We understand the motivation, and we are open to discuss and better understand what implication/spec impact this may have, and whether any RAN1 work is needed. |
| Qualcomm Incorporated | Unclear | We can see some benefit for traffic with jitter using CG in licensed spectrum. However, the issue should be discussed in Rel-17 URLLC WI which includes CG harmonization as part of the objective. This change should also be confirmed by RAN1. |

### Pending empty PDUs

[R2-2109651](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109651.zip) Handling of pending empty PDUs after UCI multiplexing CATT, Lenovo, Motorola Mobility discussion TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | NSupport | We have symphathy to the intention and are open to discuss. However, flushing the buffer is not sufficient because CGT is started and transmission using this CG will be blocked until CG expiry. We think CGT and CGRT should not be started for this empty PDU and HARQ process status should be kept as not pending regardless of LBT failure indication.  |
| Nokia | unclear | We are fine with the intention but current text impacts legacy behaviour. New behaviour must be limited to the cases where Rel-16 features like autoTx, CG retx timer or Rel-16 UL skipping is/are configured. |
| CATT | Support(Proponent) | We acknowledge the LG’s observation regarding CGT (and BTW, we support your proposal), but we think it is another problem: we address the useless continuation of the retransmission attempts of this empty PDU while you address the blocking of the HP associated with this transmission by the CGT.  |
| OPPO | NSupport | So the scenario described in the contribution is that when UCI mutlipexing is performed due to overlapping between PUSCH and PUCCH, the UE may transmit the MAC PDU multiplexed with UCI in the PUSCH even if the MAC PDU is empty. Then, it’s not necesasry to perform retransmission due to the empty MAC PDU. We think keeping the MAC PDU in the buffer does not casue any issue because network is not aware there the MAC PDU is empty or not, by flushing the buffer does not save any UL grant resources. Thus we don’t think it is an critial issue to be resolved.. |
| Lenovo, Motorola Mobility | Support (Proponent) | The main point of the proposal is to avoid autonomous retransmissions of an empty MAC PDU. Regarding LG’s comment, we would be open to discuss the starting of CGT/CGRT timer. |
| Apple | Support the intention | Autonomous transmission/retransmission does not make sense for an empty MAC PDU. We agree to the problem and the general approach to flush the HARQ process or to stop the CGT/CGRT. We are okay to even add a fix in Rel-16, however, as this was not agreed in R2#115e we can address a solution in Rel-17. If companies are willing to tackle the problem, then solutions can be discussed (there are multiple ways to address this problem). At this stage we do not agree to the changes proposed, but we are fine to address / evaluate the problem / find ways to avoid autonomous transmission for empty MAC PDUs.  |
| MediaTek | NSupport | It is unclear how the NW will deal with retransmissions in this case. If the UE has flushed the HARQ process and then receives a retransmission grant from the NW, the UE sends new data to the NW – which can cause issues with soft-combining at the NW side.[CATT] We have a different understanding: when receiving the retansmission grant, the UE ignores it if the HARQ buffer of the identified HARQ process is empty. So the UE will not use this grant to transmit new data. On its side, gNB performs DTX detection and understands no data was transmitted on this UL grant. |
| ZTE | Nsupport in TEI17, discuss in R17 NRIIOT instead. | We can understand the intention here. The padding PDU will occupy another one transmission occasion so that new transmission is blocked due to the previous transmission with UCI is failed. However, the R17 NRIIOT (e.g URLLC/NRIIOT) is still under discussion for rel-17, we understand this issue is somewhat in the scope of the R17 NRIIOT since any possible outcome from this issue may cause some potential impacts on the ongoing discussion. |
| vivo | NSupport | Although the MAC PDU carries pure pending bits, the gNB does not know whether there are data carried by the PUSCH. If the gNB has not decoded the PUSCH correctly, it is natural that the gNB shall schedule the corresponding retransmissions. If the UE flushes the HARQ buffer, the retransmission procedure cannot continue and the gNB will continue schedule further retransmisions, which consumes more resources, and cause negative link adaptation behaviors in gNB.[CATT] gNB performs DTX detection on the UL transmission associated with the retransmission grant and understands no data was transmitted on this UL grant. gNB DTX detection is of normal use in NR since R15 with UL skipping for both CG and DG.  |
| Samsung | NSupport | We believe that retransmission of UCI-only TB can be allowed and there’s nothing broken. Also this issue was discussed during Rel-16. |
| Ericsson (Zhenhua Zou) | Not support | 1. This was discussed in the Rel-16 correction and concluded non-essential. The summary document is R2-2109057 and “many companies think it’s not an essential correction but optimization for Rel-16.” (13 out of 17 companies).

The solution does not work. The gNB may detect the UL transmission but cannot successfully decode it. The gNB then sends a retransmission grant and performs HARQ buffer soft combine, expecting a retransmission of a previous data. By the proposal, the UE transmits a new data and so the new data would not be decodable since it would soft-combine with the previous transmission.[CATT] See answer to MediaTek |
| Intel | NSupport | Our understanding is that the proposal is an optimization for aperiodic traffic. If traffice is periodic, anyway empty MAC PDU is not generated for the CG in the first place. For aperiodic traffic, typically latency requirement is not extrememly tight. In addition, the deprioritized MAC PDU might be served by dynamic grant so that it won’t block the new data. In summary, we think it is an optimization and not essential to support, just as in Rel-16.  |
| Qualcomm Incorporated | Not support | We think the argument may not be true, because if a TB is depritized, it has low prioritiy so it won't block high priority Tx; for periodic CSI and HARQ feedback, reTx is still useful. So the TB should still be considered. |

### QoS Flow to DRB Mapping for MDBV Enforcement

[R2-2109851](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109851.zip) Adaptation of QoS Flow to DRB Mapping for MDBV Enforcement Futurewei discussion Rel-17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | unclear | Agree with the issue (challenges with MDBV enforcement) but would prefer controlling the bit rate where the bits are allocated for transmission i.e. during LCP. |
| CATT | NSupport | Dynamic flow to DRB mapping (switching) depending on whether MDBV is met/not met. It is unclear which entity controls the switch. Sounds like a big change for TEI. Could be discussed in R18 (XR)? |
| OPPO | Unclear | We understand the QoS parameters for signled 5QI will only be transmitted to gNB, UE may not be aware of the related QoS parameters inlcuding MDBV and PDB of the signalled 5QI. The proposal shows that SDAP can perform dynamic switching between two configured DRBs for a QoS flow based on the MDBV requirement, we wonder how UE switch the DRB without knowing MDBV. |
| Apple | NSupport | Some tools to utilize shorter latency techniques already exist. For example, the network can reconfigure LCP mapping restrictions via RRC, configure type 2 CGs to be used on demand, rely on DGs. We think that more evaluation would be needed, thus we’d prefer to analyze this in Rel-18. Besides the current 5G QoS framework cannot support mapping a single QoS flow to multiple DRBs, although it could be said that each QoS flow continues to be mapped to a single DRB at a time. |
| MediaTek | NSupport | We do not find a strong enough justification to introduce such a complicated method to enforce MDBV. QoS has always been enforced by MAC in the RAN (with the leaky bucket concept) and introducing further QoS mechanisms in PDCP is undesirable from our point of view. |
| ZTE | NSurppot | Implementation based solution seems sufficient. The reflective QoS can be used to enable the dynamic mapping between DRB and QoS flow |
| Futurewei | Support (Proponent) | @Nokia, Apple, MediaTek – MAC/LCP based schemes to enforce MDBV were discussed in Rel-16, yet there were concerns on their efficay as follows –1. Adjusting operating parameters dynamically can be challenging, as LCP task is performed under tight processing timeline; and
2. These enhancements work only for the special case when a single QoS flow is mapped to a DRB, but not in general scenarios when multiple QoS flows are mapped onto a DRB.

@Oppo – the QoS flow to DRB mapping/switching is configured by gNB, and gNB can set parameters according to the MDBV/PDB received in the QoS flow’s QoS profile. UE just needs to follow the configured threshold for switching of QoS flow to DRB mapping.@ZTE – not sure an implementation can rely on the condition that DL user packets happen to arrive at the time that UL QoS flow to DRB mapping should be switched.  |
| vivo | Unclear | Perhaps relying on the bit rate control based on NW scheduling.  |
| Samsung | Unclear | The proposed dynamic QoS flow to DRP mapping method could already be possible via SDAP implementation. |
| Ericsson | NSupport | This would make the receiver handling/reordering of flows complex. The proposal introduces new functionality in SDAP (e.g. like buffering) and possibly other locations with also data volume estimation per mapped flow. If a QoS flow has burstiness so that it “violates” MDBV then it should rather have it’s own DRB rather than have complex combined “switched” DRBs. |
| Intel | NSupport | It is difficult to guarantee in order delivery of one QoS flow which is mapped to multiple DRBs given that reordering is performed per DRB |
| Qualcomm Incorporated | Not support | This proposal has been discussed in the past two releases and each time the conclusion was not agreed. As no issue has been observed in the field and no new use case has been identified, we do not think we need to revisit this topic in R17. |
| LG | NSupport | We wonder whether there is any benefit to map one QoS flow to two DRBs. Even if mapping to two DRBs are supported, the exact switching mechanism can be left up to UE implementation. |

### Activation/Deactivation of QoS Flow to DRB Mapping for SMBR Enforcement

[R2-2109852](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109852.zip) Activation/Deactivation of QoS Flow to DRB Mapping for SMBR Enforcement Futurewei discussion Rel-17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | unclear | If any bit rate enforcement enhancement is needed for SMBR, it should take place in the gNB and impact LCP in the UE. |
| CATT | NSupport | Dynamic "hold" on delivering SDAP PDUs to associated DRB when the aggregated bitrate across all GBR and Non-GBR QoS flows belonging to the PDU sessions associated with a network slice exceeds the UE-Slice-MBR.One first issue is what to do with these PDUs if they are not delivered? Discard? Buffered?Here again SDAP enhancements are likely to be discussed in the context of the R18 XR WI. We prefer to address those at that time. |
| OPPO | NSupport | There was a discussion on whether UE related enhancement is needed for SMBR in the slicing session, and finally, it is ruled out, since most companies thought it is sufficient to rely on gNB implementation. To us, it is not an essential issue and no need for further enhancement. |
| Lenovo, Motorola Mobility | unclear | We tend to agree that there might be limitations of enforcing UL SMBR but think a more detailed study is required. |
| Apple | NSupport | This area was discussed in Rel-17 RAN slicing, it should not come back in TEI17. During the earlier RAN2 R17 discussion, the understanding was that the RAN node is responsible for Slice MBR enforcement. This is also reflected in the running stage-2 CR for the RAN slicing WI. It is our understanding that allowedServingCells can support SMBR enforcement for higher number (more than two) of slices. All the QoS flows in a DRB belong to the same PDU session which can belong to only one slice, we don’t see the difficulty with LCP.  |
| MediaTek | NAccept | The justification for such a change is weak. To start with, is the UE expected to be connected to multiple NW slices simultaneously? If so, such a mechanism could end up requiring the UE to now report slice-specific capabilities, which is highly undesirable. |
| ZTE | Nsupport | gNB can handle this. |
| Futurewei | Support (Proponent) | @Nokia, Oppo, Apple, ZTE - RAN2's view is that SMBR enforcement can be provided by configuring different resources per slice. A solution for support of the UL SMBR without different resources will require further study in RAN2. Limitations are identified when UE-Slice-MBR is enforced by resource separation using logical channel mapping restriction - logical channel mapping restriction can’t support resource separation for more than two network slices, and would result in poor radio efficiency due to the loss of multiplexing gain from sharing an UL grant among multiple logical channels. RAN2 conclusion is that RAN can target at enforcing average SMBR in a relatively longer-term, not rigorously in short-term as intended by SA2 specification, if different radio resources can’t be configured/reserved per slice. @MediaTek – UE being simultaneously connected to multiple network slices is not a proposal of this contribution. Instead, it is required/assumed in the network slicing feature from Rel-15. And it is not an AS capability issue. This contribution just discusses the enforcement in RAN the requirement (specified by SA2) that “The RAN shall ensure that the aggregated bitrate across all GBR and Non-GBR QoS Flows belonging to those PDU Sessions is not exceeding the UE-Slice-MBR, while always guaranteeing the GFBR of every GBR QoS Flow of those PDU Sessions as described in clause 5.7.2.5.” (TS 23.501). |
| vivo | unclear | There seems previous discussions on this issue in RAN slicing session, and finally no enhancment was identified as needed at that time. |
| NEC | NSupport | This might be started from some study at some point in time (in future), if really necessary. |
| Samsung | NSupport | UL UE-Slice-MBR enforcement was already discussed under Rel-17 RAN slicing WI and there were views that UL SMBR enforcement can be supported based on NW implementation, with or without separate resource configurations. |
| Ericsson | NSupport | Also here new SDAP functionality is needed with unclear end result. This seems similar to adding flow-control to SDAP based on volume/bit-rate information from lower layers (or in SDAP). One could also assume there are other means to handle MBR with less protocol impact. |
| Intel | Nsupport/unclear | There is no CR provided with it and the full impact is unclear. While this can provide another means of SMBR enforcement in the UE, the benefit over existing mechanism of using UL grant and logical channel restriction is not clear/signficant. Normally, the application itself should follow the SMBR and this kind of enforcement should be an exception where the UE application violates this. Hence the existing mechanism seems sufficient without this enhancement.  |
| Qualcomm Incorporated | Not support | SDAP is not supposed to buffer data. We don't want to change this principle in R17. |
| LG | NSupport | It can be left up to gNB implementation. |

### Stopping CGT for ignored or skipped UL grant

[R2-2111170](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111170.zip) Stopping CGT for ignored or skipped UL grant LG Electronics Inc. discussion TEI17

[R2-2111172](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111172.zip) CR to 38321 on stopping CGT for ignored or skipped UL grant LG Electronics Inc. CR Rel-17 38.321 16.6.0 1177 - F TEI17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| LG | Support (Proponent) | Last meeting, companies understanding was that CGT is started at the gNB side when dynamic UL grant is skipped or ignored. However, for CG, neither CGT nore the CGRT starts. Therefore, we believe that even for dynamic UL grant, if it is ignored or skipped, the netowkr would not start CGT and CGRT. With this understanding, starting it only the UE side causes unsynchronized state of CGT and CGRT, which was the concern from the companies. So, rather than jumping into P3 for the suggested change, we would like to hear more on P1 and P2. |
| Nokia | NSupport | This is NBC. When the CG timer is running, it prevents the UE from using the process for CG, but network can still schedule dynamic grant for that process. Stopping the timer would cause problem at NW side since it creates misalignment. |
| CATT | Support | P1: OKP2: Not sure. This assumes NW correctly detects DTX. Anyways, if UE is assumed to keep the timer running, NW should also do so, to keep in sync, irrespective of DTX detection.Nor for P3, the difference between CG and DG is that, for the CG, the CGT is not started upfront by the DCI. And the problem is if the NW mis-detects the DTX, it will schedule a dynamic ReTx, and if, per Proposal 3, the CGT was stopped at the UE, UE may use that HARQ process to send new data (e.g. on a CG). That being said:1) no data was transmitted in first place, so it is unlikely that now UE suddenly has new data to send, immediately after that2) even if the UE ignores the dynamic ReTx, it is no big deal as the initial transmission didn't happen hence no data is lost.So we think we can indeed align the CGT behavior of DGs to that of CGs. |
| Huawei, HiSilicon | Support the intention | We acknowledge it is a bug in the spec but the NBC issue raised by Nokia may need to be investigated further. |
| OPPO | Nsupport | This is a legacy issue, we prefer to keep the spec as it is. |
| Apple | NSupport | This issue was discussed at the last RAN2 meeting and companies did not agree. We have a similar view as Nokia. |
| MediaTek | NSupport | This was discussed for Rel-16 and had no support as this was seen as an optimization. The issue being resolved is that a HARQ process is blocked from CG use for a period of time when the UE has no more data to send. But if the UE doesn’t have data to send, it doesn’t really matter if a HARQ process is blocked for a short while. |
| ZTE | Nsupport | Have been discussed before, no consensus is reached |
| vivo | Nsupport | Frankly, the proposed optimization can incur de-synchronization between the operation of the CGT at the NW and UE sides (i.e. the NW cannot preciously know whether UL skipping is performed at the UE side), which generally is not expected. Anyway, the NW can schedule a dynamic UL grant (which can be fully overlapped with a CG PUSCH) for potential data transmission without wasting the already CG PUSCH resource. In this sense, we fail to see the benefit of this optimization. |
| Samsung | NAccept | This Release 17 CR has an backward-compatiblity issue, since Rel-16 gNB does not understand the proposed behaivor. Even if it is agreed, the CR will be more complicated for sure.Technically, we do not agree with the motivation why we have to stop the timer.- If a dynamic grant assignment starts the timer, the running CGT does not harm. Since the HPI is reserved by the dynamic grant, gNB can continue to use this for dynamic grant allocation.- If a retransmission by CS-RNTI starts the timer, it is very clear that gNB understands there was a transmission in the original CG occasion. In this case, UE shall not stop the timer, which will give more confusion at the gNB side.In short, considering gain and pain, this CR is not nessary. |
| Ericsson (Zhenhua Zou) | Not Support | Agree with Nokia. The proposal introduces NBC. *Additionally, the same proposal has been discussed in Rel-16 correction* but not agreed*, see summary R2-2109084.*  |
| Intel | unclear | Seems not critical issues to address. Those skipped CGs typically don't have tight latency requirements. |
| Qualcomm Incorporated | Not support | This issues was discussed at the last meeting as a R16 CR but no company supported the proposal. Companies were concerned that this change could lead to UE/NW mislaignment on CGT. We think the concern is still valid in R17 and hence do not support the proposal. |

## Added after kick-off

### Secondary DRX

Added 2021-11-04 1430 UTC in v04

[R2-2111460](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116-e/Inbox/R2-2111460.zip) Secondary DRX enhancements Verizon, Ericsson, Qualcomm Inc, T-Mobile USA Inc discussion Rel-17 TEI17

**Proposal 1**: Start *drx-inactivityTimer* of the secondary DRX group when an SCell of the secondary DRX group is activated and the secondary DRX group is outside Active Time.

**Proposal 2**: Introduce *preferredDRX-InactivityTimer* for the secondary DRX group.

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| Company | Support / NSupport / NAccept / unclear | Comments |
| Nokia | Support BUT… | If there is already an activated cell in the group, there is no need to start the timer (since the gNB can already schedule that cell and by doing so, restart the timer – as for pDRX group).Besides, not sure how fast-activation would impact the proposal since without fast-activation, the inactivity timer could be expired already before the SCell is actually activated thus wouldn’t help. |
| CATT | Partly | P1 would be OK to us.But P2 has been discussed already and we don’t see the need for it. NW can derive/estimate a suitable *DRX-InactivityTimer* of each DRX group from the single *preferredDRX-InactivityTimer*. |
| Huawei, HiSilicon | NSupport |  This first proposal significantly change the principle that both DRX groups are ensured to operate separately and hence it cannot be pursed in TEI. Actually that is the root why we agreed not to combine cross-carrier scheduling with sec DRX group. So if it is the case, we believe the sensible implementation would be to enable cross-carrier scheduling rather than this optimization with considerable UE complexity. For the second proposal, it has been discussed over several times and we still see no benefit to introduce another UE capability.  |
| Apple | Support | We support both proposals, since they can provide the benefit on the service latency reduction and UE power reduction.  |
| MediaTek | NSupport | For proposal 1, does it imply that the NW will activate a SCell while it is already in activated state? We think the motivation for proposal 1 is not sufficient. The intention is to reduce data latency. In that case, why not put delay sensitive data in first DRX cell group? If we want to have fast activation/deactivation for a SCell, instead of putting the SCell in long DRX, why not put it in dormant state? For proposal 2, we don’t see too much benefit on this. |
| ZTE | Nsupport | 1：Since the drx-inactivityTimer for FR1 serving cell is still running, we do not see any urgency to start the drx-inactiveTimer for FR2 serving cells. In addition, the intention for introducing the second DRX group is for additional power saving, is there any reason for us to add power non-saving mechanism here？If the delay issue is really concerned , NW can handle this issue for the coming data burst (i.e more DCI scheduling)2: In our understanding, NW can estimate the ideal configuration of drx-inacitiveTimer for FR2 DRX group based on the one of main DRX group, no more assistance information is needed. |
| Ericsson | Support (proponent) | When there is a new data burst and FR2 is sleeping, the latency and throughput is improved, when FR2 can be woken up from FR1.@Nokia: the use case is when all the cells in the secondary cell group are sleeping. Due to a short inactivity timer in the secondary DRX group, the secondary cell group serving cell typically fall asleep first. @HW: We do not propose to introduce cross carrier scheduling with secondary DRX, which is more complex and would impact other WGs. @MDTK: yes, as in legacy the UE may receive SCell activation MAC CE in deactivated and activated state to restart *sCellDeactivationTimer* timer. The point is to retain the power saving gains, but improve the latency/throughput.@ZTE: 1: Similar comment was made by MDTK, but the point is to retain the power saving gains with a (very) short inactivity timer for the secondary DRX, but enable a quick wake-up when there is a new data burst. |
| Verizon | Support | (proponent)We found FR2 Scells behave quite differently – both in terms of traffic and its association with the FR1 PCell. Having a more flexible 2nd DRX is very desirable. Also we think since similar proposal has been floating around for a long time, some obvious implications likely have been taken in early product considerations, so we think it is the right time to take this step now. |
| Intel | Support |  |
| Qualcomm Incorporated | Support | Proponent. See our response to some of the comments above.@Nokia: being able to switch the DRX state of an activated SCell allows network to configure a more aggressive DRX inactivity timer, without worrying about the latency caused by DRX off time. DRX inactivity timer is started when A SCell is activated, not when the activation MAC CE is received.@HW: PDCCH load can be a concern if FR2 cells have to be scheduled by SpCell. @MTK: dormant BWP switch does not bring a SCell out of DRX inactive time. @ZTE: This enhancement is useful when a large data burst arrives and FR2 cells are needed to offline them quickly. As a result, network can configure longer DRX cycle and shorter DRX inactivity timer (i.e. more power savings) without worrying about increased scheduling latency. @LG: If an activated SCell and the associated DRX group is in DRX off time, UE is not able to receive PDCCH msg on any SCell in that DRX group. |
| T-Mobile USA | Support | (Proponent)Agree with Verizon’s comment |
| Vivo | NSupport | For P1: this is an optimization, which we didnot find much motivation. As the inactivityTimer for FR1 is running, it is not critical to start inactivityTimer for FR2, which would also introduce additional power consumption. For P2: it was discussed in Rel-16, but which has not been agreed. The situation doesn’t change since Rel-16.  |
| Deutsche Telekom | Support | We agree with Verizon’s comment. |
| LG | Unclear/Nsupport | If one SCell was already activated in the secondary DRX group, there would be no problem because the activation command can be received via the activated SCell and this scheduling starts drx-InactivityTimer for the secondary DRX group. So, it seems that the issue is only when there is no activated SCell in the secondary DRX group and one is activated for the first time via the primary DRX group.In this case, it seems that we have a bit different understanding on the DRX state used right after the SCell is activated. If DRX is configured, our assumption is that the MAC monitors the PDCCH continuously until it starts a DRX cycle operation and the DRX cycle is started when either drx-InactivityTimer expires or DRX command MAC CE is received. With this assumption, it seems possible to schedule the SCell in secondary DRX group right after the SCell is activated. Even if it is assumed that MAC starts using DRX cycle immediately after SCell activation, we tend to agree with others that it wouldn’t be essential given that FR1 is still viable.   |

### Early identification of Emergency Call and MPS

Added 2021-11-07 2230 UTC in v23

[R2-2111193](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111193.zip) Discussion on early identification of Emergency Call RadiSys, Reliance JIO discussion Rel-17

=> revised in R2-2111269

[R2-2111269](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111269.zip) Discussion on early identification of Emergency Call and MPS Radisys, Reliance JIO, Verizon, Peraton Labs discussion Rel-17

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| Company | Support / NSupport / NAccept / unclear | Comments |
| R2 Chair |  | The proposals need to be corrected (e.g. to only include RACH indication partitioning), but even if this is done, such proposal may require significant discussion.  |
| Lenovo, Motorola Mobility | unclear | Topic should be discussed in RAN3 first.For emergency call the AC2 is used. So, if gNB-DU is overloaded wouldn’t it send an indication to gNB-CU so that it would configure UAC barring parameters for the other ACs accordingly?For AI1 (MPS) the RACH access can be already prioritized by setting the ra-PrioritizationForAccessIdentity-r16 in RACH-ConfigCommon. We wonder why dedicated RACH resources for MPS are needed. |
| Huawei, HiSilicon | Not a RAN2-led TEI | This seems a RAN3-led topic and need to be first discussed in RAN3. |
| Intel | Unclear | As we understand, the proposal in the updated document seems to be to provide resources for RACH. We already have mechanisms to provide initial RACH resources for high priority service using Access class barring. Then, the relationship with CU-DU seems unclear in the document. Msg 3 can be processed by the DU before contacting the CU. In any case, this aspect should be discussed in RAN3. |
| T-Mobile USA | Nsupport | Existing prioritation mechanisms cover this case.  |
| Qualcomm | Unclear | Existing UAC provides sufficient flexibility to handle Uu congestion before access attempt. If further control/enhancements are needed at the DU, agree with others that RAN3 can discuss signaling enhancements for F1. |
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### UPIP

Added 2021-11-07 2230 UTC in v23

In the below document, only the first proposal on IP

[R2-2109951](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2109951.zip) User Plane Improvements Nokia, Nokia Shanghai Bell discussion Rel-17 TEI17

**Proposal**: allow a mode of operation where only a subset of PDCP SDUs is IPed.

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| Company | Support / NSupport / NAccept / unclear | Comments |
| NEC | unclear | this is interesting proposal and we are open for discussion but firstly this will need SA3 guidance?  |
| Ericsson | Unclear | Should be checked by SA3 first. If it is possible to only integrity protect only some of the SDUs, will this really save UE processing for one transport block? If TBS is small, will there be more than one PDCP SDU in a TB? Seems like limited use case. |
| Nokia | Support | Naturally this should be checked with SA3 first. Note that this targets very high bit rate with more than one PDCP PDU in a TB.In response to some of the comments: our understanding is that it would not be possible for an attacker to inject bits within a TB and thus integrity protection of more than one PDU in a TB offers no additional protection when it is performed in the same physical entity. SA3 should of course confirm this first.From an implementation viewpoint, no need to make it more complex than it should. It would be enough that the first PDU in the PDCP buffer is IPed whenever a new grant is received. This only sets a minimum requirement. If a UE can do more, it can. |
| Huawei, HiSilicon | NSupport | Not sure whether this is consistent with the intention to mandate UE supporting UPIP at any rate in Rel-16. We understand such relaxed requirements should be first discussed in SA3. |
| Apple | NAccept | This looks a bit complicated. We do not want a tight link between MAC and PDCP. Questions1. Based on which policy should the UE decide which SDUs to integrity protect and which ones not?
2. What is meant by the same sender? UE, App, IP layer, DRB, etc? Which layer identifies the sender?
3. And how can the receiver identify all packets are from the same sender? (The same TB may carry PDUs from different senders, and the receiver may not know.)
4. We don’t understand what is meant by “it is enough for one PDCP SDU to be IPed in a TB for integrity protection to cover the whole content of the TB”

Does this meana) One of the PDCP SDUs in every TB is IPed?b) One PDCP PDU in the TB contains the IP calculated over all the PDCP SDUs in the TB?If (a), then this proposal defeats the purpose of introducing UPIP, as it leaves the other packets susceptible to the attacks that required the addition of UPIP, it goes against the intent of GSMA. If (b), then it seems to complicate UE implementation considerably since at the PDCP layer we cannot predict which PDU will end up in which TB.It looks like the introduction of such a scheme would require changes to the PDCP header to indicate if the PDU is IP protected.  |
| Intel | NSupport/ unclear | Firstly, RAN2 recently agreed to support UPIP at the full data rate supported by the UE. The benefit and motivation of this is then unclear – UE still has to capable of supporting IP at full rate and cannot depend on this configuration. It might reduce network processing but that is not a good enough reason to reduce security.Further, the suggestion that it is sufficient to only IP one PDCP PDU in a TB is unclear. In theory, a man in the middle attack can manipulate any of the PDCP PDUs and IPing just one PDU cannot provide sufficient protection.In terms of implementation, it also seems a bit complex in terms of MAC and PDCP interaction. One possible implementation model to avoid this could be to have both the IPed and non-IPed packets PDUs in the MAC layer to pick which ones to include in the TB but even this is quite complex considering also RLC handling.  |
| T-Mobile USA | Nsupport | Existing prioritation mechanisms cover this use case.  |
| Qualcomm | Nsupport | Full rate UPIP is already mandatory and this came as a requirement from SA3. Partial IP will be breaking this and any changes should be discussed in SA3 first. Also agree that this is a very complicated mechanism.  |
| Vivo | Nsupport | It is better to discuss this in SA3 firstly.  |
| LG | Support | We agree that applying the IP to all PDCP packets would be a big burden from UE power consumtion and computing perspective. Thus, we are open for further discussion.  |

# Conclusion

TBD