3GPP TSG-RAN WG2 Meeting #121bis-e R2-230xxxx

e-Meeting, 17th April – 26th April 2023

Agenda Item: 7.11.2.1

Source: ZTE

Title: Summary of [AT121bis-e][603][eMBS] Service continuity and notifications (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This document is the report of the following email discussion,

* **[AT121bis-e][603][eMBS] Service continuity and notifications (ZTE)**

Scope: Treat the remaining proposals from R2-2303553

Outcome: List of proposals for offline agreement and, if needed, a list of proposals for online discussion in W2

Deadline: Report available Tuesday W2 1200 UTC, interim deadlines up to the rapporteur

Please provide your comments Monday W2 10:30 UTC UTC.

Final proposals are to be sent out on reflector around 11:00 UTC of Monday W2, if no objection is found in the next 24hours (before the report availability deadline) the proposal can be declared agreed.

# 2 Contact information

Participants are encouraged to leave their contact information in the following table.

|  |  |
| --- | --- |
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# 3 Proposals on Notification mechanism for agreement

// The proposals are not re-numbered for better indexing. Part of the summary in R2-2303553 were pasted here for reference.

Based on the feedback, the observation is companies do not have a clear view or consensus on the question (a). Without that we can not proceed on the second half. Following proposals is suggested (based on company's feedback to make it concise and clearer), to encourage companies in RAN2 to have further study per SA2 progress:

**Proposal 7: FFS whether a "special UE" identified by 5GC can be released to RRC\_INACTIVE (e.g., when the session is deactivated); and if yes, FFS how can network enable such UE to resume to RRC\_CONNECTED (e.g., upon session activation).**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

|  |  |  |  |
| --- | --- | --- | --- |
| Company | | Yes or no | Comment if any |
| LGE | | Yes | We cannot see any reason to prevent the ‘special UE’ from being transited to RRC\_INACTIVE during session de-activation. The special UE can be moved to RRC\_CONNECTED using the group paging, like Rel-17 UEs. This is rel-17 mechanism and, of course, can be applied to Rel-18 UEs.  If the PTM configuration is not provided in RRC release message when the RRC connection is suspended, even Rel-18 UE should follow this Rel-17 mechanism, i.e. RRC resume upon group paging for session activation. |
| Qualcomm | | See comment | Instead of just listing FFS, we should try to progress on this since SA2 already sent LS to RAN2 in R2-2301934 (S2-2303407), which indicated the following:   * *SA2 agrees that the* *MBS assistance information for the MBS session sent to NG-RAN consists of an indication that the UE is preferred to be kept in connected when receiving the related MBS session data.*   In general, CN gathers information on whether a particular UE is preferred to be kept in CONNECTED (aka “special UEs”) from the application function and as SA2 indicated, this will be provided to NG-RAN node by the CN.  Now, the question for RAN2 is how is such information used? Is it taken as a CN *command* that such UE may not be released to RRC\_INACTIVE, e.g. even when the MBS session is deactivated, or whether it is a *recommendation* to keep the UE in connected (where the gNB implementation can make final decision based on whatever reason or criteria).  So, in our view, the CN assistance information should be taken as *recommendation* as there can be legitimate reasons for the gNB to release the UE to RRC\_INACTIVE. So, we think the proposals should be updated to make progress instead of just listing FFS.  **Proposal 7a. RAN2 understands that MBS assistance information sent by CN to gNB indicating that the UE is preferred to be kept in connected (aka “special UE”) is a recommendation from CN for the gNB to take into account, however it is up to gNB implementation whether to release such UE to RRC\_INACTIVE.**  Now on to the second FFS in P7, i.e. how network can resume such UE, they are related to Proposal 8 and 13 from the email discussion, so see the answers below. |
| NEC | | See comment | Same view as QC that we need to clarify what “a special UE” means and the FFS part should be involved with notification mechanism as discussed below. |
| CATT | | See comment | The first FFS is not needed.it is up to NW to move any UE in CONNECTED to any other state. |
| MediaTek | | Yes | The “special UE” should be also released to RRC INACTIVE state when session deactivation. If a special UE identified by 5GC prefer to stay in RRC CONNECTED state to receive multicast, it just initiate RRC resume after receiving the group paging for session activation, and it’s network implementation to control whether to keep it in RRC CONNECTED state |
| Nokia | | Yes | Based on the current specs, the UEs can be released to RRC\_INACTIVE in case the service is deactivated.  Special UEs should be treated in way that they are ideally always brought back to RRC\_CONNECTED state, once the session gets activated. If the group paging is enhanced as in next proposal 8 (which we believe it should be), then the special UEs would need a way to identify themselves as special and come back to RRC\_CONNECTED anyway without listening such flag.  However, current proposal would depend on agreeing P8. |
| Lenovo | | See comments | The assistance information is provided by CN as a recommendation. How to use it is up to network implementation.  We tend to agree with QC’s proposal on 7a. |
| Kyocera | | Yes | We share LGE’s view, i.e., the “special UE” can be handled as Rel-17 MBS Multicast. |
| Apple | | See comments | We share QC’s view, and agree with proposal 7a provided by QC. |
| Xiaomi | | See comments | It is up to network implementation to control the RRC state transition.  We agree with proposal 7a suggested by QC. |
| CMCC | | See comments | When the session is deactivated, the gNB may move the UE to RRC\_INACTIVE state, even it’s a “special UE”, but as QC mentions, the key issue is how gNB uses the assistant information indicating a “special UE” provided by CN. |
| Rapporteur | |  | Comments to QC’s suggestion on 7a.  Firstly I want to thank QC for elaborating SA2's progress on the special UE. However if we look closely at the 5GC MBS assistance information, it is about UE's preferred state when the session is *active*.  *- SA2 agrees that the MBS assistance information for the MBS session sent to NG-RAN consists of an indication that the UE is preferred to be kept in connected when receiving the related MBS session data.*  P7 is asking instead, as explained/mentioned by LGE/MTK/Nokia, is it possible that the indicated UE is released to RRC\_INACTIVE when the session is *deactivated*? Current P7 is trying to address that:  *- Proposal 7: FFS whether a "special UE" identified by 5GC can be released to RRC\_INACTIVE (e.g., when the session is deactivated); and if yes, FFS how can network enable such UE to resume to RRC\_CONNECTED (e.g., upon session activation).*  Companies had different views in [Post121][606][eMBS]. If such UE is released, how to wake up for UE when the session is being activated based on a common group paging, per network decision mentioned by QC and companies as the possible network implementation, will be an issue.  Therefore, current Proposal 7 is suggested to be kept.  [Qualcomm-v14]: Thanks for the explanation. But I fail to see the how P7a doesn’t cover what you are explaining. Releasing to INACTIVE should be upto network, regardless of whether MBS session is *active* or not.  Further wondering what it means to *keep* P7. P7 is just FFS -- What is your view on P7a? It seems several companies are ok with P7a as resolution of the FFS of P7. |
| Sharp | | Yes | | Based on the LS from SA2, the special UE is the UE receiving multicast only in RRC\_CONNECTED state. And when there is no data or session deactivation, it should be up to NW decision whether release the UE to INACTIVE state without indicating that it can receive the session in INACTIVE. When session is activated again, UE can be notified to resume RRC connection by, for example, group paging. | |
| Samsung | | Yes but | This is not “special” It is already supported by Rel-17 multicast. |
| Huawei, HiSilicon | | See comments | We agree that the assistance information is about UE's preferred state when the session is active. So when the session is deactivated, the situation should be the same as in Rel-17, i.e., the NW can release the UE to RRC\_INACTIVE. So the first FFS is not needed.  When the session is activated, the NW should make sure the “special UE” goes to RRC\_CONNECTED for multicast reception according to the assistance information from SA2.  In this case, the purpose of NW release the “special UE” to RRC\_INACTIVE is for power saving, rather than letting the UE receive multicast in RRC/-INACTIVE. So NW wouldn’t provide PTM configuration in RRCRelease and when the UE receive group paging upon session activation, it should go to RRC\_CONNECTED naturally for multicast reception. |
| Spreadtrum | | See comments | We share QC’s view. The MBS assistance information form CN is only an input for gNB to decide which UEs should be switched to RRC inactive state. |
| Intel | | Comments | We think the assistance information from 5GC is recommendation to RAN, and it is up to network implementation whether to release UE to RRC\_INACTIVE (e.g. when session is deactivated). Proposal 7a from Qualcomm looks OK to us. |

There is a clear support to legacy group paging (1/22) or its enhancement (17/22), on how to enable UE to stay in RRC\_INACTIVE but start monitoring the G-RNTI upon session activation/data transmission resumed. And there are supports to other solution: 1 for option 1 (PTM config availability) from Intel, 1 for option 3 (MCCH) from Ericsson (which supported both option 2/3 for different scenarios), and 1 for option 4 (RRC Release) from LGE.

The group paging solution is consistent with our previous agreement, and also consistent with Rel-17 UE behaviour. Therefore in the draft proposal, let's try to agree on group paging solution first, and then go FFS on how to enhance group paging (e.g., to indicate what). The final solution is actually coupled with Q9/12, therefore for now it is better to keep it open.

On whether we shall consider the case "data transmission resumed", in current TS 38.300, there is indeed description on related scenarios: TS 38.300/16.10.5.2 "When there is temporarily no data to be sent to the UEs for a multicast session that is active, the gNB may move the UE to RRC\_INACTIVE state." I put it here in the draft proposal of this question and the following ones. Further comments are welcome. The same applies for other proposals.

**Proposal 8: (17/22) Rel-18 UE can stay in RRC\_INACTIVE and start monitoring corresponding G-RNTI upon an enhanced group paging (e.g., upon session activation or data transmission resumed). FFS how to enhance group paging (e.g., flag to indicate UE behaviour on monitoring of G-RNTI, UE's RRC state or session state).**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

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| --- | --- | --- |
| Company | Yes or no | Comment if any |
| LGE | Comment | The group paging doesn’t need to be enhanced to enable Rel-18 UE to keep RRC\_INACTIVE upon session activation. The tmgi list in the existing group paging means the corresponding multicast sessions are activated. When the session is activated, Rel-17 UE and Rel-18 UE having no PTM configuration should resume RRC connection because they cannot receive the multicast in RRC\_INACTIVE. Rel-18 UE having the PTM configuration can stay RRC\_INACTIVE upon receiving the legacy group paging.  The group paging needs to be enhanced if we need to make Rel-18 UEs having the PTM configuration resume RRC connection upon receiving the group paging, e.g. session release or RAN congestion is over. For these purposes, new tmgi list needs to be added in the group paging (because the existing tmgi list only can be signaled when the session is activated).  Rapporteur's understanding:  - LGE is suggesting using legacy to notify session activation, i.e., UE with pre-configured PTM config stays in RRC\_INACTIVE; UE w/o pre-config goes to RRC\_CONNECTED.  - with enhanced group paging, UE goes to RRC\_CONNECTED even with pre-configured PTM config.  Rapporteur's observation based on companies' inputs:  - the PTM config in RRCRelease is agreed as only optional ("If network finds it useful") which is true;  - a pre-config can not handle the dynamic in the real network environment, as companies commented during the post meeting email discussion and in below input. |
| Qualcomm | Comment | The first part is ok. And even the FFS is ok.  Regarding the FFS, if progress is desired, we have explained in R2-2303049 section 3.2.1 why **there is indeed need of some enhancements to group paging to handle some** cases and scenarios. See also comment in Proposal 13 below.  To LGE: In essence it seems like what LGE is explaining is somewhat similar to our thinking, but key difference is LG seems to think:   * upon receiving Rel-17 group paging, Rel-18 should stay in INACTIVE while Rel-18 UE goes to CONNECTED, * Rel-18 group paging (Rel-17 plus 1 bit) moves the Rel-18 UE to CONNECTED.   This can create some compatibility issues (e.g. Rel-17 network with Rel-18 UEs).  But we think:   * Rel-17 group paging without enhancement should mean all Rel-17 and Rel-18 UEs move back to CONNECTED. (Same behavior for all UES between releases) * Rel-18 group paging (i.e. Rel-17 with 1 bit enh to say capable UEs stay in INACTIVE) should mean Rel-18 UEs can stay in INACTIVE if the bit is present and the UE has valid PTM config etc. (Rel-17 UEs go to back CONNECTED following Rel-17 behavior) |
| NEC | Yes | To our understanding, only the valid PTM configuration is not enough as even for a UE who is provided with PTM configuration in RRCRelease, it is up to gNB implementation that whether transit this UE back to RRC\_CONNECTED, e.g., congestion is alleviated.  Thus we think Rel-18 group paging with some indication for preferred RRC state is needed. |
| CATT | Yes | Can keep the FFS as simple as possible. e.g., FFS the details  Rapporteur's understanding:  - the intention was to progress, e.g., list possible options.  - OK if other companies want the simplify. |
| MediaTek | Partially | We have the similar view with LGE and we suggest to use the “~~enhanced~~ group paging” and put the enhancement to FFS before we discuss whether/what need to be enhanced in the legacy group paging.  From our understanding, the legacy group paging is enough for the session activation for Rel-18 multicast. The UE which has valid PTM configuration can stay in RRC INACTIVE, and the UE without it need to resume. If network indicates one UE can stay in INACTIVE state but UE do not have PTM configuration, it still needs to initiate RRC resumption to obtain the PTM configuration.  Regarding the scenario in proposal 13, one bit is enough for indicating whether the multicast session is allowed to be received in RRC INACTIVE, to differentiate the scenario of session activation and switching all UEs back.  Rapporteur's understanding:  - please kindly check above comments to LGE. |
| Nokia, NSB | Yes | Enhanced group paging should be defined, as we already agreed to notify the UEs about session activation via group paging:   * As a baseline, group paging can be used to inform Rel-18 UE(s) about the session activation (Details FFS, e.g., UE behavior when receiving such group notification).   There should be a flag to keep the UEs in RRC\_INACTIVE, so that the UEs do not come back to RRC\_CONNECTED but just receives the data in RRC\_INACTIVE. Otherwise, all UEs would come back to RRC\_CONNECTED. Also, having the PTM configuration via RRC release is not sufficient condition to not come back to RRC\_CONNECTED, as the UE may perform cell reselection and not have the configuration for that particular cell! |
| Lenovo | Yes | The decision on whether a UE can receive the multicast session in RRC\_INACTIVE should be a dynamic decision. For example, the gNB makes the decision according to the latest load status and the load status would be different time to time. The network should have the flexibility to indicate the UEs whether stay in RRC\_INACTIVE or enter RRC\_CONNECTED state for reception of a multicast session . |
| Kyocera | Yes | We think the UE monitors POs even during the multicast session is deactivated, so it’s efficient to use the group paging for multicast activation notification.  We have a similar view as Qualcomm that the current group paging makes all the UEs to wake-up as Rel-17 behaviour, i.e., the compatibility issue, so we think some enhancements are certainly needed for Rel-18 group paging.  In addition, the PTM configuration is provided (i.e., with RRC Release) in advance of multicast session activation, (i.e., when the group paging is sent). In the time-gap (i.e., the time after RRC Release and before the group paging for activation), the condition (e.g., NW congestion) may be changed. Depending on the up-to-date condition, the gNB may want either to make all the UEs to transition to Connected (like Rel-17), to make all the UE to stay in INACTIVE for the multicast reception (e.g., by an enhanced group paging), or to make a subset of UEs to stay in INACTIVE while another subset to transition to Connected (i.e., the selective paging as RAN2 agreed). |
| Apple | Yes | We share the view from QC, CATT, Nokia and Lenovo. Without group paging enhancement, there is no way to indicate whether R18 UE should keep in INACTIVE setate or back to CONNECTED upon receiving the paging notification for multicast session activation. |
| Xiaomi | Yes | We share the same view that the group paging needs to be enhanced in such case.  In R18, for UEs configured with PTM configuration for multicast reception in RRC\_INACTIVE, they can stay in RRC\_INACTIVE to receive the activated multicast session. However, in some cases, the network may reconsider the UE's RRC state for multicast reception based on the current cell load. In this case, to provide flexible network control, when the multicast session is activated, UE is indicated by group paging whether it can receive the multicast session in RRC\_INACTIVE or not. |
| CMCC | Yes | It’s gNB’s decision whether a session can be received in RRC\_INACTIVE or a UE can receive multicast in RRC\_INACTIVE state, and the decision could be dynamic, it should not be limited to the pre-configured PTM configuration to UE. It’s better to indicate UEs’ multicast reception state with enhanced group paging. |
| Sharp | Yes | The need of enhancement is because even if UE is configured to receive multicast in INACTIVE, the NW may want to notify such UE go back to RRC\_INACTIVE when the congestion is alleviate. |
| Samsung | Yes | P8 is ok  For FFS, we agree with CATT, i.e. “FFS detail” |
| Huawei, HiSilicon | Yes with comments | Agree that ordinary UEs provided with PTM configuration should decide whether to resume based on the flag in the group paging.  But we need also consider the “special UE” mentioned in Proposal 7 which should go into RRC\_CONNECTED upon receiving the group paging regardless of the flag in the group paging. |
| Spreadtrum | Yes | gNB is able to decide which UEs should come back to RRC connected state and which UEs can stay in RRC inactive state when the multicast session is activated. A reception RRC state indication contained in group paging message can be used for a subgroup of UEs. |
| Intel | Comments | We share the similar view as LGE and MediaTek that the combination of Rel-17 group paging and the availability of PTM configuration is sufficient to handle session activation. But for progress, we’re also OK to accept Proposal 8 if it is majority view. |

(20/22) think it is reasonable to have: Upon session activation/data transmission resumed, if PTM configuration is not available to UE, UE need to resume RRC connection. One company think a network implementation does not allow so. However it may be good to have it clarified in case a mis-configuration is issued. A few think network may configure UE in RRC Release, therefore it is modified as below:

**Proposal 9: (20/22) Upon events like session activation/data transmission resumed, if PTM configuration is not available to UE, UE initiates RRC connection resumption.**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

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| --- | --- | --- |
| Company | Yes or no | Comment if any |
| LGE | Yes | NW should be able to select UE that can receive the multicast in RRC\_CONNECTED only, at least for the special UE in P7. So we are OK for UE to decide whether to resume RRC connection based on the received PTM configuration, but only PTM configuration received via DCCH should be applied. |
| Qualcomm | - | Ok with intent but also agree with Nokia’s comment from email discussion. |
| NEC | Yes with comment | Since the current PTM configuration is not available or valid, UE can initiates RRCResumeRequest. But there is also need to discuss whether Resume Cause or RRCRelease can be used for such a case.  Thus we prefer adding a FFS that: “FFS the procedure of how UE acquires the new PTM through RRC connection resumption”. |
| CATT | Comments | Need clarification, is it for the case that NW indicate the session can be received in INACTIVE? If it is, why NW does not provide the PTM configuration to UE? |
| MediaTek | Yes |  |
| Nokia | Yes | If session is activated, then the UE should be able to find the PTM configuration in MCCH, if the intention is to provide service in RRC\_INACTIVE state UEs. Providing activation information (e.g., via group paging with a stay in RRC\_INACTIVE indication) and not having the configuration in MCCH would be just wrong network implementation.  But UE should also come back to RRC\_CONNECTED if the session is active and UE cannot find the PTM configuration in MCCH. This is another reason why we would need a session status (active/deactive) in MCCH. |
| Lenovo | Yes |  |
| Kyocera | Yes | We think the UE behaviour in P9 is the same with Rel-17. |
| Apple | Yes |  |
| Xiaomi | Yes |  |
| CMCC | Yes |  |
| Sharp | Yes |  |
| Samsung | Yes but | It does not require any new procedure. Depending on P8, if the UE is asked to RRC\_CONNECTED by group paging, the UE can initiate RRC resumption. |
| Huawei, HiSilicon | Yes | This can be regarded as the solution of “FFS how can network enable such UE to resume to RRC\_CONNECTED” in Proposal 7 by not providing PTM configuration in RRCRelease to such UE by NW implementation. |
| Spreadtrum | Yes |  |
| Intel | Yes |  |

(22/22) suggest to have such enhancement; one further suggest in such case no need to monitor MCCH either, which however can be of later discussion.

**Proposal 10: (22/22) For one UE already in RRC\_INACTIVE, it can stay in RRC\_INACTIVE and stop monitoring corresponding G-RNTI upon events like session deactivation/temporary no data.**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

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| --- | --- | --- |
| Company | Yes or no | Comment if any |
| LGE | Yes, but | It is NW implementation whether to inform UE of the de-activation/temporary no data, so it seems better to change the wording to ‘, if session deactivation/temp no data is indicated by NW’.  Rapporteur's understanding:  - session deactivation/temp no data is only part of the scenarios, session deactivation/temp no data might not be known to UE, based on companies inputs. this part is open for now as in FFS of P8.  - therefore the original wording is preferred. |
| Qualcomm | Yes |  |
| NEC | Yes |  |
| CATT | Yes |  |
| MediaTek | Yes |  |
| Nokia | Yes | We are fine with current wording. It is not yet sure if we such a indication as LG indicates (but it should be discussed in future) |
| Lenovo | Yes |  |
| Kyocera | Yes | We think it can save UE power consumption. |
| Apple | Yes |  |
| Xiaomi | Yes |  |
| CMCC | Yes |  |
| Sharp | Yes |  |
| Samsung | Yes | We think P10 is needed for power consumption. |
| Huawei, HiSilicon | Yes |  |
| Spreadtrum | Yes |  |
| Intel | Yes |  |

Magically we have two camps with equal support on which solution to notify UE to stay in RRC\_INACTIVE/stop monitoring G-RNTI, upon session deactivation/temporary no data.

* **Option 2 (9/22) Group paging.** This camp thinks,
  + a unified solution and no extra load (1 bit info may be enough?). it may be strange to have different solutions for session state change. if group paging can be used to indicate session activation, it can be used for session deactivation as well. if we go other way, it makes things unnecessarily complicated.
  + MCCH method may increase the frequency for one UE to monitor MCCH. (CATT, with the assumption that PTM config removal wont trigger MCCH change notification)
  + if MCCH is not always available, then option 2 shall be defined. (Apple)
* **Option 3 (9/22) MCCH**. This camp says,
  + The UE anyway reads MCCH, and deactivation is not as urgent as activation, simple to include the deactivation status of the multicast session on MCCH
  + session state change is a part of PTM config change, therefore it is natural to reuse MCCH. (QC)
  + on how to MCCH is undetermined: indicating session state in MCCH per MTCH, or DCI to indicate, though.

On the one hand, it is good to have a unified solution (group paging for both session activation/deactivation); on the other hand, MCCH is already there for UE to monitor, especially when session is deactivated (which further is seen as MCCH change). We drop the other solutions which is short of support for now. And moderator suggests to have this during online discussion:

**Proposal 11: (Need online decision) Consider the following two options: enhanced group paging (9/22) or enhanced MCCH (9/22), to enable Rel-18 UE to stay in RRC\_INACTIVE and stop monitoring corresponding G-RNTI upon events like session deactivation/temporary no data.**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

|  |  |  |
| --- | --- | --- |
| Company | Yes or no | Comment if any |
| LGE | Prefer group paging | MCCH is subject to the modification period and it brings delayed notification. |
| Qualcomm | Prefer MCCH | The current wording of proposal includes both options, so not sure what it means to ask whether it is ‘agreeable’ or not. It is agreeable to us, but we should choose one from those two for progress.  At the risk of repeating our response from email discussion: While both group paging and MCCH-based options are possible to indicate deactivation of multicast session while UE is in RRC\_INACTIVE. Since RAN2 previously agreed that MCCH is used to indicate PTM configuration change while the UE is in RRC\_INACTIVE, similarly, deactivation of the session can be indicated by MCCH. So, the proposal should be updated to  **Proposal 11. For UEs receiving multicast in RRC\_INACTIVE, deactivation/temporary no data of the multicast session is indicated by MCCH to enable Rel-18 UE to stay in RRC\_INACTIVE and stop monitoring corresponding G-RNTI upon such events.**  Rapporteur's understanding:  - thanks for the reminder. the aim is to collect views to try to break the tie. in the final proposal, it can be group paging or MCCH if we see majority view emerging.  - this proposal is to be discussed online if we have time.  - Otherwise, it will be suggested as FFS for next meeting.  [Qualcomm-v14] Thanks for the clarification. |
| NEC | Prefer group paging | The original purpose for MCCH is to provide the updated PTM which is not frequent, thus maybe we can have some mechanisms to avoid unnecessary MCCH monitoring. But If notification is also put into MCCH, the frequency of MCCH monitoring may increase, UE probably needs to always monitor MCCH…  Compared with group paging, UE anyway needs to monitor paging and group paging is already per-TMGI (session) configuration. If notification is put into MCCH, it will cause unnecessary “**double monitoring**”, i.e., both paging occasions and MCCH occasions. Therefore putting notification in Group paging is more sufficient than MCCH.  BTW why we need a separate mechanism for this notification mechanism?  Furthermore, if MCCH is not always available, then group paging shall be defined. |
| CATT | Prefer group paging | Activation and deactivation should not be discussed separately. Group paging is already used for session activation notification, so it is natural to also use it for session deactivation notification. Furthermore, if MCCH-like solution is used, it will cause a lot of extra MCCH changes and increase the UE power consumption. |
| MediaTek | Yes (MCCH) | UE receiving multicast in RRC\_INACTIVE need to monitor multicast MCCH, so it can be used to carry the information for session deactivation. Similar to the configuration change notification, UE can be notified by DCI that something is changed (due to deactivation). The short delay will bring no harm for the deactivation behavior. |
| Nokia, NSB | Yes (but prefer to remove option for enhanced group paging for this purpose – see comment) | The UEs may miss the group paging when coming from a different cell where the service is not provided (so that the UE still thinks the session is active or has no idea whether the session is active). For that reason, you would need periodic group paging with deactivation at least for those UEs. So that does not seem to be very attractive option.    This is the reason why, at least MCCH could be used to indicate whether the session is active/deactive.  In addition, using paging message for deactivation seems bit of overkill engineering – what is hurry to indicate deactivation via paging?.  Session status (whether it is active or deactive) is anyway needed in the MCCH. Otherwise, an RRC\_INACTIVE UE that reselected a cell and cannot find PTM configuration for a TMGI in MCCH cannot understand whether it should reconnect (because session is provided only to RRC\_CONNECTED UEs) or not (because session is deactivated).  So in summary we don’t think group paging solution (at least alone) will work. |
| Lenovo | Prefer MCCH | **Group paging based solution has backwards compatible impact on Rel-17 UEs:**  When receives the group paging with the indication, the rel-17 UE cannot understand the indication and will perform the legacy group paging i.e., returning into RRC\_CONNECTED state. It will cause the Rel-17 returning RRC\_CONNECTED state unnecessarily for MC session deactivation.  Considering the MC session deactivation is triggered not frequently, MCCH based solution is more acceptable than other two solutions, in which the additional MCCH change is not so frequently and thus the UE power consumption is acceptable.  Rapporteur's understanding:  - the concern is about a group paging for deactivation will wake up legacy UE, which is seen as not needed and result in backward-compatibility issue.  - for one legacy UE (e.g., Rel-17 UE) that has been released to RRC\_INACTIVE or RRC\_IDLE, it can be assumed that session deactivation or the event "session deactivation/temporarily no data" may have been happened and notified to UE in RRC\_INACTIVE already (there is no need to notified again, to mislead legacy UE)  - therefore the above scenario (with backward compatibility) may not exist. |
| Kyocera | Prefer MAC CE (otherwise, group paging) | We still think, although it’s excluded from P11, MAC CE is the most efficient, in terms of the shortest delay, the minimum monitoring activity and the already well-known solution (i.e., it’s in LTE SC-PTM).  Otherwise, the group paging is acceptable since it has better delay performance than MCCH. We think in LTE, there had been already the method to remove PTM configuration from MCCH to notify the UE about the session stop. But it was identified that it was not efficient for UE power consumption, especially for eMTC and NB-IoT although it was mainly related to the repetition due to CE. Considering NR MBS supports RedCap UEs, we think the UE power saving should be one of key aspects to be taken into account.  Rapporteur:  - thanks. |
| Apple | Prefer group paging | We prefer unified solution for multicast activation and deactivation.  In addition, we think the main purpose of MCCH is to provide the PTM configuration when it’s changed in current serving cell. We donot think the PTM configuration will be changed frequently. Based on our understanding, it seems not a power efficient way for UE to periodically monitor and receive MCCH if there is no PTM configuration change. |
| Xiaomi | Prefer group paging | For option1, it requires for the mandatory of multicast MCCH scheduling. However, in some cases, the PTM configuration may only be provided in dedicated signaling and there may be no MCCH scheduling in the cell due to security concerns or other reasons.  To provide a common solution to cover all cases, we prefer to use the enhanced group paging for the notification of session deactivation/temporary no data. |
| CMCC | Prefer MCCH | UE need to monitor MCCH to avoid the refreshed PTM configuration once it is in RRC\_INACIVE, so the session deactivation information can be delivered via R17 broadcast MCCH change notification similar approach. |
| Sharp | Prefer group paging | Unified solution is preferred, and it may not power efficient for UE configured with PTM configuration in RRCRelease message to check the deactivation of the session via monitor MCCH. |
| Samsung | Prefer group paging | We are fine to preclude other mechanisms with less supports.  Among group paging and MCCH, we prefer group paging, since UE anyway has to always monitor group paging. It’s sufficient. |
| Huawei, HiSilicon | Prefer MCCH | UE in RRC\_INACTIVE anyway needs to monitor MCCH. So it is simpler to indicate the UE about the session deactivation via MCCH. If we use group paging , we have to design a new paging list to avoid impact to Rel-17 UEs, which is complex and will cause extra overhead. |
| Spreadtrum | Prefer group paging | We prefer to use same message for multicast session activation and deactivation. For MCCH solution, it will bring extra delay and more UE power consumption. |
| Intel | Prefer MCCH | UE anyway needs to monitor MCCH for the update of PTM configuration. Using MCCH is actually more flexible than group paging from delay’s perspective considering that MCCH modification period (defined for broadcast) can be as low as 20 ms. |

Most does not see the necessity to enhance for case of session release. (18/22) do not think enhancement is needed, it is shown that one UE that is expecting NAS PDU or unicast data will eventually resume RRC connection. Indicating UE the session state but not finishing the NAS procedure may be problematic. Therefore it is suggested the following proposal:

**Proposal 12. (18/22) No additional enhancement is needed specifically for enabling UE to stay in RRC\_INACTIVE and stop monitoring corresponding G-RNTI upon session release.**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

|  |  |  |  |
| --- | --- | --- | --- |
| Company | | Yes or no | Comment if any |
| LGE | | Yes | We think no special enhancement is needed only for session release case. However, NW should be able to move all UEs (though it has a valid PTM configuration) to RRC\_CONNTED using group paging, and such enhanced group paging can be used widely, e.g. when the RAN congestion is over, or when session is released. |
| Question | | Yes but | This one goes together with P11, i.e. no ‘additional enhancements’ for ‘release’ is wrt enhancements from previous proposal on ‘deactivation/temp no data’.  Rapporteur's understanding:  - correct. We will try to group P8/11 with this. |
| NEC | | No strong view | Since session release means the configuration need to be removed from UE and currently this is done when UE in RRC\_CONNNECTED. We are open for whether we need an enhancement on this part. |
| CATT | | Yes | The solution in P11 can also serve for this prupose. |
| MediaTek | | Yes | Moving all UE to CONNECTED state is discussed in the following proposal. |
| Nokia | | Yes |  |
| Lenovo | | Yes |  |
| Kyocera | | Yes |  |
| Apple | | Yes |  |
| Xiaomi | | Yes |  |
| CMCC | | Yes |  |
| Sharp | | Yes | |  | |
| Samsung | | Yes |  |
| Huawei, HiSilicon | | Yes |  |
| Spreadtrum | | Yes |  |
| Intel | | Yes |  |

There is a clear majority support (16/22) to option 1, i.e., a legacy group paging resumes UE's RRC connection, good to see legacy mechanism still works! Option 4 with (13/22) support definitely works, and we did not intent to enhance unicast paging. While there is only one support for option 5 and three supports for option 3.

**Proposal 13: (16/22) Legacy group paging (Rel-17) or legacy per UE paging are used to resume UE to RRC\_CONNECTED state.**

Is it agreeable, and if not, any suggestions to the proposals are welcome (to make it agreeable)

|  |  |  |
| --- | --- | --- |
| Company | Yes or no | Comment if any |
| LGE | Comment | As mentioned in P8 and P12, the group paging needs to be enhanced to indicate ‘to resume RRC connection though PTM configuration is available’.  Rapporteur's understanding:  - this is related to P8, I think we will eventually go through P8 first. |
| Qualcomm | No | The proposal as it stands is confusing and even unclear what it is trying to add to progress. It should not be disputed that (either group paging or per UE paging) is used to resume UE to RRC\_CONNECTED. So, we should try to be more specific.  First, it is not clear whether this proposal is about some *specific* UEs*,* or *ALL* UEs’ that should transition to RRC\_CONNECTED. There are following 3 cases when multicast session is activated/resumed from temp no data while the UEs are in INACTIVE:   * 1. ALL applicable UEs continue to receive the service in RRC\_INACTIVE, or   2. ALL applicable UEs move to RRC\_CONNECTED, or   3. Specific UEs move to RRC\_CONNECTED to receive the service (in accordance with the agreement in RAN2#119e)   First the legacy group paging cannot disambiguate between cases a and b. Case b is legacy Rel-17 behavior. So, one bit flag is needed to differentiate case a from b.  Then, the legacy Rel-17 **group paging** cannot unambiguously support both cases b and c. I.e., it is not possible to indicate only a subset of UEs receiving a certain session/TMGI to move back to RRC\_CONNECTED if it is also used to move ALL the UEs receiving a certain session/TMGI back to RRC\_CONNECTED.  So, our proposal is to use legacy group paging with 1-bit enhancement to disambiguate between cases a and b, and use legacy per UE paging to handle case c.  **Proposal 13a. Add a per-TMGI flag in Rel-18 group paging to indicate whether all UEs (that have valid PTM configuration) continue to receive the service associated with the TMGI in RRC\_INACTIVE (absence of the indication means legacy Rel-17 group paging behavior, i.e. all UEs should move to RRC\_CONNECTED).**  Rapporteur's understanding:  - Maybe we can try on the common part between P13 and P13a above "absence of the indication means legacy Rel-17 group paging behavior, i.e. all UEs should move to RRC\_CONNECTED)" first. how to indicate, the flag design  - on 13b, it is a good idea to discuss the priority of the per UE and per session indication. we can try it or we can come back to this at a later stage.  my suggestion is to split it into two (and of course group paging is to notify a group of UE, and legacy per UE paging is for one specific UE):  **- P13a. If P8 is agreed, Legacy group paging (Rel-17) can be used to resume UE to RRC\_CONNECTED state.**  **- P13b. Legacy per UE paging can be used to resume UE to RRC\_CONNECTED state.**  **Proposal 13b. UE-specific paging (i.e. PagingRecordList) can be (re)used to move specific UE(s) to RRC\_CONNECTED. This overrides the per-TMGI flag in the group paging for the specific UE(s).**  Now, going back to the FFS from proposal 7 above regarding moving of ‘special UE’ back to RRC\_CONNECTED mode: the above proposals 13a and 13b apply and cover all the UEs (including the special UEs), i.e. special UEs can also be moved back to RRC\_CONNECTED mode using legacy UE-specific paging. So, no additional special handling would be needed.  **Proposal 13c. No additional enhancements are needed specifically for moving ‘special UEs’ back to RRC\_CONNECTED.**  Rapporteur's understanding:  - this is related to discussion in P7. please kindly check the comments provided above.  [Qualcomm-v14] thanks, but modified p13a/13b are still unclear. E.g. 13b should be clear it is about moving ‘specific’ UEs? If we are not ready to agree it already, there should be FFS about priority of per-UE vs group paging if both are applicable for a certain UE. |
| NEC | No | Same view as QC. This proposal is a little bit confusing. The difference between group paging and unicast paging need to be clarified, that is to say per-session and per-UE notification should not be discussed together.  For per-session notification (i.e., whether to enter RRC\_CONNECTED or RRC\_INACTIVE), group paging with enhancement can be used.  For per-UE notification, unicast paging without any enhancement can be used.  Rapporteur's understanding:  - please kindly check the comments to QC. |
| CATT | Yes | The expected behavior of R18 UE when it is paged for transiting to CONNECTED to continue the multicast reception is same as that for R17 UE, so the R17 group paging can be reused without enhancement. And if gNB only wants to address a subset of all the Ues,it can chose to send the group paging message on subset of the available POs.  Besides, legacy individual paging can also be used to move certain multicast receiving UE(s) from RRC\_INACTIVE to RRC\_CONNECTED. |
| MediaTek | Comment | This proposal is related to P8 for session activation.  From our understanding, For P13, one bit can be add to group paging to indicate whether the multicast session can be received in RRC INACTIVE, and UE can decide whether to switch back to CONNECTED state or stay in RRC INACTIVE based on the indication and the presence of PTM configuration.  Rapporteur's understanding:  - yes they are related, the plan is to have P8 discussed first. one possibility is to have P8 as an condition here. |
| Nokia, NSB | Yes | UE should also come back to RRC\_CONNECTED if the session is active and UE cannot find the PTM configuration in MCCH. This is another reason why we would need a session status (active/deactive) in MCCH. |
| Lenovo | No | Similar view with QC. We think that one bit indication in group paging could be needed to distinguish that  a. ALL applicable UEs continue to receive the service in RRC\_INACTIVE, or  b. ALL applicable UEs move to RRC\_CONNECTED.  For the special UE, the legacy unicast paging can be used.  Rapporteur's understanding:  - please kindly check the comments to QC. |
| Kyocera | Comment | We have a similar concern as Qualcomm. We think the legacy per-UE paging can page a subset of UEs individually, but it does not tell the multicast session activation. The legacy group paging can notify the multicast session activation, but it does not have the selectivity of a subset of UEs. So, currently (i.e., as Rel-17), both pages need to be sent to the UE, but the outcome is just to make all the UE to transition to Connected at the end, so it does not fulfill the Rel-18 requirement, i.e., a subset of UEs is receiving multicast in INACTIVE while another subset transitions to Connected. So, we think at least some enhancement is needed as in P8 above (e.g., at least either the flag or the new UE behaviour upon reception of group paging).  Additionally, we think the current paging message (i.e., in Rel-17) can include both UE-ID list (i.e., *PagingRecordList*) and TMGI list (i.e., *PagingGroupList*) simultaneously, i.e., one paging message can page individual UEs and notify multicast session activation at the same time. If RAN2 considers Rel-18 paging message works as such, we think further enhancement would be needed in the paging message (e.g., to add another UE-ID list for UEs to stay in INACTIVE).  Rapporteur's understanding:  - please kindly check the comments to QC. |
| Apple | Comment | We have the same understanding as MTK.  Rapporteur's understanding:  - please kindly check the comments to MTK. |
| Xiaomi | Yes | In our understanding, that may be another story different from the session activation.  The intention of reusing the legacy group paging is to resume all UE to CONNECTED mode even if the session is activated. |
| CMCC | Yes | If R18 UE is paged by R17 group paging, it transits to RRC\_CONNECTED as R17 behavior, while if it is paged by R18 group paging, it can stay in RRC\_INACTIVE as indicated. Since the group paging is per session granularity, once the network only wants to switch a subset of UEs to RRC\_CONNECTED, unicast paging can be used.  [Qualcomm-v14]: Thanks. We tend to agree with this explanation, but wondering what is the differentiating factor between R17 (legacy) group paging and R18 (new) group paging in this explanation? |
| Samsung | Yes | In Rel-17, when the UE receives a group paging or UE specific paging, the UE transits to RRC\_CONNECTED. We can simply reuse this. |
| Huawei, HiSilicon | Yes | If the flag is absent from the group paging, it is legacy group paging. And all UEs should resume just as Rel-17. |
| Spreadtrum | Comment | We think the R18 group paging can also be used to resume all UEs to come back to RRC\_CONNECTED state if it indicates the RRC connected state for multicast reception.  It is unnecessary to reuse the Legacy group paging (Rel-17). |
| Intel | Yes with comments | This is related to Proposal 8. If the enhancement in Proposal 8 is not used, legacy behavior applies. |

# 4 Conclusions

TBD