3GPP TSG-RAN WG2 #113-e R2-21xxxxx

Electronic Meeting, 25th Jan – 5th Feb 2021

Agenda Item: 5.4.1.1

Source: ZTE Corporation

Title: [AT113-e][004][NR15] Connection Control I (ZTE)

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT113-e][004][NR15] Connection Control I (ZTE)

Scope: Treat R2-2100551, R[2-2100552](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100552.zip), R[2-2100553](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100553.zip), R2-2100554, R[2-2100555](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100555.zip), R[2-2100556](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100556.zip), R2-2100765, R[2-2100771](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100771.zip), R[2-2101732](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2101732.zip), R2-2100557, R2-2100558, R[2-2100559](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100559.zip),

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed CRs.

Deadline: Schedule A

* Phase 1: collect companies’ view, by Friday 2021-01-29 12:00 UTC;
* Phase 2: rapporteur will share summary report based on input of phase 1 for review, by Monday 2021-02-01 12:00 UTC.

# Contact Information

|  |  |
| --- | --- |
| Company | Email |
| Huawei, HiSilicon | caozhenzhen@huawei.com |
| Google | frankwu@google.com |
| Apple | naveen.palle@apple.com |
| Nokia | amaanat.ali@nokia.com |
| MediaTek | Chun-fan.tsai@mediatek.com |
| Qualcomm | (Mouaffac) mambriss@qti.qualcomm.com |
| OPPO | [fanjiangsheng@oppo.com](mailto:fanjiangsheng@oppo.com) |
| ZTE | eswar.vutukuri@zte.com.cn |
| Ericsson (Tony) | [antonino.orsino@ericsson.com](mailto:antonino.orsino@ericsson.com) |
| Intel | [Sudeep.k.palat@intel.com](mailto:Sudeep.k.palat@intel.com) |
| NEC | hisashi.futaki@ nec.com |
| CATT | [liangjing@catt.cn](mailto:liangjing@catt.cn) |
| vivo | tingting.zhong@vivo.com |

# Discussion

Companies are requested to add their comments for each of the treated CRs of this email discussion in the boxes below.

## First Active BWP

R[2-2100551](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100551.zip) Report of Email discussion[061][NR15] Configuration of First Active BWP ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core

R2-2100552 CR on condition of SyncAndCellAdd ZTE Corporation, Sanechips, Huawei, HiSilicon CR Rel-15 38.331 15.12.0 2332 - F NR\_newRAT-Core

R[2-2100553](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100553.zip) CR on condition of SyncAndCellAdd ZTE Corporation, Sanechips, Huawei, HiSilicon CR Rel-16 38.331 16.3.1 2333 - A NR\_newRAT-Core

The first paper R2-2100551 is the outcome of email discussion [061], it mainly discussing whether the network should mandatory include firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id fields upon reconfigurationWithSync to the same SpCell. Based on the inputs, companies are quite convergent, so there is only one proposal provided in the report:

**Proposal 1: *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* should be mandatory configured upon reconfigurationWithSync to the same SpCell (i.e. intra-cell handover).**

In the corresponding CRs, it also capture the changes of in-principle agreed CR R2-2011131, which haven’t been implemented in the latest spec. Although these CRs had been discussed in email discussion [061], companies are welcome to show your views if any problem is identified.

**Q1: Do companies agree with above Proposal 1 and the changes in R2-2100552, R2-2100553?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Yes |  |
| Google | Yes |  |
| Apple | Yes |  |
| Nokia | Yes |  |
| MediaTek | Yes |  |
| OPPO | Yes |  |
| ZTE | Yes |  |
| LG | Yes |  |
| Ericsson | Yes |  |
| Intel | Yes |  |
| NEC | Yes |  |
| CATT | Yes |  |
| vivo | Yes |  |

## Scrambling ID fields

R[2-2100554](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100554.zip) Further discussion on scrambling ID fields ZTE Corporation, Sanechips, CATT discussion Rel-15 NR\_newRAT-Core

This issue was discussed last meeting, and it was postponed because companies asked more time to check. As indicated in R2-2100554, if UE cannot support such behaviour (see below Proposal 1), then during handover procedure, delta configuration to parent fields cannot be supported, because network (e.g. target cell) has to signal the scrambling ID fields explicitly in Handover Command. By doing this, network also has to include other “mandatory” or “Need R” fields to ensure the correctness of RRC configuration, this will increase the message size of handover command. In addition, this also violates the intention of defining “Need M” for the parent fields.

So to allow delta configuration, it is proposed to confirm the UE behaviour as below:

**Proposal 1: RAN2 confirms that:**

* **For scrambling ID related fields (i.e. whose default value is defined as PCI of current serving cell). In case network does not signal the field before (e.g. UE applies default value: PCI), upon handover, if the parent field (Need M) is not included in handover command, then for those child scrambling ID fields, the UE should apply default value of “current” serving cell (i.e. PCI of target cell, not the PCI of source cell).**

Companies are welcome to show your views to above proposal.

**Q2.1: Do companies agree with above proposal? I.e. confirm UE’s behaviour of handling scrambling ID related fields.** (If answers “No”, please provide your suggestion on how to solve this issue)

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | Agree | To clarify this understanding is ok, but not sure the CR is needed. |
| Google | Yes | We have the same understanding as the proposal |
| Apple | Yes, but | May be instead of “current” we can try a better word for eg: the serving cell that is being configured? We are not very strong with our view |
| Nokia | Yes | It is clear from last time discussion that something needs to be clarified, we are open for that.  We should avoid overloading delta signalling with excess rules and the proposal fits with what is there already. However, the "current cell" is maybe OK for DAPS. |
| MediaTek | Yes | The understanding is okay |
| QCOM | Yes | We have some understanding for the spec |
| OPPO | Yes | The understanding is correct. |
| LG | Yes | Some rewording seems beneficial |
| Intel | Yes | We have the same understanding. Regarding clarification, we are not so sure to have a CR given that using the current serving cell is quite sensible assumption. (otherwise, the connection is broken with the wrong scrambling ID). |
| NEC | Yes |  |
| CATT | Yes |  |
| vivo | Yes | The understanding of “PCI of target cell, not the PCI of source cell” is ok. |

The corresponding CRs are:

R[2-2100555](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100555.zip) CR to clarify UE behaivour for scrambling ID fields ZTE Corporation, Sanechips, CATT CR Rel-15 38.331 15.12.0 2334 - F NR\_newRAT-Core

R[2-2100556](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100556.zip) CR to clarify UE behaivour for scrambling ID fields ZTE Corporation, Sanechips, CATT CR Rel-16 38.331 16.3.1 2335 - F NR\_newRAT-Core

Based on the comments received last meeting, the CRs have been updated to only modify the field description of relevant fields, clarifying the UE should apply the PCI of “current” serving cell when it is not signaled. In addition, for consistency, the need code of *hoppingId* field in *PUCCH-ConfigCommon* is changed from “Need R” to “Need S”.

Note: the Category of Rel-16 CR is not “Cat F”, because it also involves other Rel-16 fields.

**Q2.2: If the answer to Q1.1 is “Yes”, do you have any comments to the Rel15/16 CRs?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei, HiSilicon | No | The CR actually don’t change meaning of the existing specification text.   * The change from “this serving cell” to “the current serving cell” doesn’t change anything. * Adding “configured for the current serving cell” after Physical cell ID is the same, which doesn’t change the meaning of the text. * The information of “When the field is absent the UE applies the value Physical cell ID (physCellId) configured for the current serving cell” is already available in 38.211.   We suggest to just clarify the understanding in Chairman notes. |
| Google | No | We wonder if any confusion in the current wording in these field descriptions. |
| Apple | Yes | Pls see our response to Q2.1 |
| Nokia | Rel-15, Yes  Rel-16, No | For Rel-15: Since there is no DAPS in Rel-15 so less ambiguity during HO on what is “current” serving cell. But for Rel-16, not sure this works anymore, so would be best to consider that first.  For Rel-16: for DAPS, source is the “current” serving cell when the HO begins, so doesn’t this lead to wrong interpretation? We might need a discussion on how DAPS case is dealt with here. |
| MediaTek | Yes in principle | We are fine to have CR to clarify the common understanding. The current wording is acceptable but could of course be improved. In addition, the DAPS aspect mentioned by Nokia seems correct and should be updated accordingly. |
| QCOM | No | Need to consider Nokia’s comment |
| ZTE | Yes | Proponent.  We agree Nokia raised a valid comment. For DAPS, UE communicates with source cell and target cell simultaneously, and the PCIs of source and target cell are used respectively.  Maybe, the wording proposed by Apple can eliminate the ambiguity, see below:  “UE applies the value of the *physCellId* configured for the serving cell that is being configured.” |
| LG | Yes for R15 | Agree with Nokia w.r.t. DAPS HO. During DAPS HO, a current serving cell is a source cell where SRB1 is active. It seems that “the serving cell being configured” may not fully address DAPS HO case but possibly increase ambiguity, while we are struggling to suggest a better wording... |
| Intel | No | It doesn’t give so much difference to change “this serving cell” to “the current serving cell”. |
| NEC | Yes | we are fine to have the CR. For Rel-16, we understand the point raised by Nokia should be considered. |
| CATT | Yes |  |
| vivo | Yes but | The wording needs to be polished considering the DAPS case proposed by Nokia. |

## FR2 P-max

R2-2100765 Clarification on p-Max in FR2 rel-15 NTT DOCOMO, INC. CR Rel-15 38.331 15.12.0 2236 1 F NR\_newRAT-Core R2-2010530

R2-2100771 Clarification on p-Max in FR2 NTT DOCOMO, INC. CR Rel-16 38.331 16.3.1 2237 1 A NR\_newRAT-Core R2-2010531

R2-2101732 p-Max for FR2 in dedicated signalling Ericsson discussion Rel-15 NR\_newRAT-Core

This issue was discussed last meeting, but no agreement was reached on how to clarify the use of p-Max parameter for FR2 in *FrequencyInfoUL*. In R2-2101732, it is observed that the *p-Max* for FR2 is cell-specific configuration, so if RAN4 defines and introduces p-Max for FR2 in later release, network may signal the field in e.g. system information. Thus we should capture in spec that Rel-15 or Rel-16 UEs will ignore the field once received. Rapporteur thinks it makes sense.

Regarding the SPEC change, seems above papers have exactly the same changes, see below:

* Correction from NTT DOCOMO’s CR:

|  |
| --- |
| ***p-Max***  Maximum transmit power allowed in this serving cell. The maximum transmit power that the UE may use on this serving cell may be additionally limited by *p-NR-FR1* (configured for the cell group) and by *p-UE-FR1* (configured total for all serving cells operating on FR1). If absent, the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if p-Max is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. Value in dBm. |

* Correction from Ericsson’s CR (in Annex of R2-2101732):

|  |
| --- |
| ***p-Max***  Maximum transmit power allowed in this serving cell. The maximum transmit power that the UE may use on this serving cell may be additionally limited by *p-NR-FR1* (configured for the cell group) and by *p-UE-FR1* (configured total for all serving cells operating on FR1). If absent, the UE applies the maximum power according to TS 38.101-1 [15] in case of an FR1 cell or TS 38.101-2 [39] in case of an FR2 cell. In this release of the specification, if *p-Max* is present on a carrier frequency in FR2, the UE shall ignore the field and applies the maximum power according to TS 38.101-2 [39]. Value in dBm. This field is ignored by IAB-MT, the IAB-MT applies output power and emissions requirements, as specified in TS 38.174 [63]. |

Considering the changes are the same, rapporteur would suggest to discuss the individual CRs directly.

**Q3: Do companies agree with above SPEC change (R**[**2-2100765**](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100765.zip)**, R**[**2-2100771**](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100771.zip)**)?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei | Agree | Ok with the change.  If there is a concern from the UE side, we are also fine with an ambiguous wording like “this field is not used in this release of the specification”, which would be information for both UE and network. |
| Google | Partially Yes | We prefer to clarify that this field is not used in this release of the specification rather than that the UE ignores this field. |
| Apple | Partially Yes | Same view as Google |
| Nokia | Yes | Changes are fine for us. |
| MediaTek | Partial | This is already been discussed in last meeting. We prefer the wording from Huawei or Google to avoid unnecessary UE requirement on ignoring useless parameter.  We also suggest to make decision together with DCCA related proposal in R[2-2101092](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2101092.zip)/R[2-2101016](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2101016.zip) (offline #221). For dedicate configuration in dedicate message, we think the “UE shall ignore” requirement should be avoided. While in common configuration in dedicate message, it may be acceptable to have UE ignore. |
| QCOM | Partially Yes | Carry the same view as Google and Huawei |
| OPPO | Partial | Agree Huawei and Google. |
| ZTE | Yes | Changes are fine for us. |
| LG | No | Even if the field is a common parameter, we think network can avoid signaling this parameter because this field in frequencyInfoUL is signaled in a dedicated manner.  However, only if companies think it is still beneficial to have a consistent presence/absence of the field between SIB1 and dedicated signaling, we are fine with having any wording, “UE ignores” or “this field is not used…” - we do not see real difference of tem from UE perspective, and just in case we introducing a capability bit on p-Max support for later versions of R15/16 UEs, we anyway need to introduce changes on the text, whatever we take here. |
| Ericsson | Yes | Proponent |
| Intel | Partial | We also agree that the suggestion from Huawei/Google seems more clear. |
| NEC | Partially Yes | agree with Google and others |
| CATT | Yes | Changes are fine for us, if the majority support to clarify this field is not used in this release of the specification, we can also agree. |
| vivo | Partially Yes | Agree with Huawei. |

## Release of last DRB

R[2-2100557](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100557.zip) Clarification on procedure of DRB release ZTE Corporation, Sanechips discussion Rel-15 NR\_newRAT-Core

In current TS 38.331, it defines the following network behaviour if network wants to release all the DRBs.

|  |
| --- |
| *From TS 38.331 section 5.3.1.1 RRC connection controls*  A configuration with SRB2 without DRB or with DRB without SRB2 is not supported (i.e., SRB2 and at least one DRB must be configured in the same RRC Reconfiguration message, and it is not allowed to release all the DRBs without releasing the RRC Connection). |

In this paper, it is observed that that IoT problem may happen when network directly triggers RRCRelease when releasing the last DRB (e.g. interpretation-1).

To solve the problem, the paper has provided three alternative solutions:

* **Solution 1: Network can only trigger RRCRelease, but network can delay the transmission of RRCRelease message for a few seconds;**
* **Solution 2: Allow network to first release all DRBs via RRCReconfiguration firstly, and then triggers RRCRelease soon after (i.e. revise RAN2 spec to support Interpretation-2);**
* **Solution 3: Send LS to CT1, inform CT1 that RAN2 has specified network will trigger RRCRelease when releasing the last DRB, and let CT1 to determine if any change is needed among CN entities.**

However, for solution 1, the paper also indicates it may cause other issues that need further discussion (see below):

|  |
| --- |
| Issue 1: It is unclear how UE behaves when PDU session is released from NAS perspective while keeping DRB from AS perspective.  Issue 2: Whether/when network should stop DL/UL transmission of DRBs, and whether stopping transmission will cause other failure, e.g. UE still has buffered UL data, and reaches maximum SR retransmission times?  Issue 3: Whether network can trigger handover if measurement report is received? |

So the first proposal of this paper is to discuss which solutions should be adopted in this case.

**Proposal 1: To discuss which solution should be adopted when gNB is commanded to release the last DRB:**

Companies are welcome to show your views to above solutions. If solution 1 is preferred, please also provide your views on above issue 1~3.

**Q4.1: When gNB is commanded to release the last DRB, which solution is preferred to release the last DRB in Uu interface?** (If solution 1 is selected, please also provide your views on above issue 1~3)

|  |  |  |
| --- | --- | --- |
| Company | Preferred solution? | Comments |
| Huawei | Solution 2 | Our understanding is that even current specification allow the network to first release all DRBs and then release RRC connection. Otherwise, there is no point in the wording of “it is not allowed to release all the DRBs without releasing the RRC Connection”, as if RRC connection is released, DRBs don’t need to be explicitly released at all. |
| Google | Solution 1 | When the airplane mode is switched on, the UE just directly performs the de-registration procedure without the need to perform the PDU session release procedure. We don’t see why the UE needs to perform the PDU session release procedure first and then perform the de-registration.  [ZTE] We agree it makes more sense that UE performs de-registration directly, but based on our test, UEs (maybe not all) do trigger PDU session release firstly.  Our understanding on that sentence is that the network is not allowed to release all DRBs but keep SRBs because there is no use case to do so. We don’t see any problem with that sentence. It is up to the network to decide when to release the RRC connection. However, in a good network implementation, the network should release the RRC connection ASAP to save the UE’s power. |
| Apple | Solution 1 | We think it is up to NW implementation to determine when to send RRCRelease if the release if triggered from NW side, and do not need specify solutions for issue 2 and 3.  [ZTE] Since solution 1 requires UE to stay in a mismatch state for a while (i.e. PDU is released from NAS perspective, but AS resources are not released yet). We need to make it clear what kind of NW implementation won’t cause problem. Does the comment mean network can either stop or continue scheduling before sending RRCRelease?  If the release of last DRB is triggered by UE (e.g., airplane mode), then UE implentation will be able to handle the issue 1 (for example, UE can simply send detach and release the context locally) |
| Nokia | - Solution 1 works normally,  - Solution 2 should not be required but where spec says that network cannot do two step release? | We don’t see an issue here: In figure 3, Step 7 is wrong.  The PDU SESSION RELEASE COMPLETE message is a 5GSM message (which is exchanged between UE and SMF) and the DEREGISTRATION REQUEST message is a 5GMM message (which is exchanged between UE and AMF). 5GSM messages are transparent to the AMF. I.e. although the SMF is still waiting for the PDU SESSION RELEASE COMPLETE message, that is nothing to do with the AMF and if the DEREGISTRATION REQUEST message is sent to the AMF, the AMF processes the message.  What happens from Step 7 should be as follows:  - Step 7: The AMF responds with the DEREGISTRATION ACCEPT message.  [ZTE] Unfortunately, during our test, the AMF did not respond as what you described. So that is why it goes into the infinite loop.  Indeed there can be PDU session status mismatch, but that will be resolved when the UE switches off the airplane mode and registers back to a PLMN. |
| MediaTek | Solution 1 or none | We don’t understand why there is an issue here. It seem that this could be solved by network completely. Why we don’t have this issue in LTE?  Solution 1 is one way to do in gNB side. On the other hand, take Figure 3 in R[2-2100557](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100557.zip) for example, the CN could trigger 3b first and wait for the confirm before sending step 3a. Or it should expect the complete message after release both UE and gNB. We may have to discuss with CT1 on whether this is a real issue.  [ZTE] The figure is drafted based on the issue identified in the field. |
| QCOM | Solution-1 | **preferred solution 1 as it’s aligned with the current spec.**  Since the trigger of this call flow is the “airplane” mode, expected behavior of the UE is to start the PDN clean up call flow by sending a “De-registration Request” rather “PDU Session Release Request” which will prevent us from going into this infinite loop.  [ZTE] We agree it makes more sense that UE performs de-registration directly, but based on our test, UEs (maybe not all) do trigger PDU session release firstly. |
| OPPO | Solution-1 | Network implementation is sufficient, this is not a NR specific issue. |
| ZTE | Solution-2 | From network perspective, Solution-1 is more complicated and may cause other problems. So we are wondering whether it really works.  While Solution-2 is simpler and won’t cause temporarily NAS/AS mismatch at UE side. |
| LG | Solution 1 | We think solution 1 is in line with our specifications and our understanding.  We wonder if the signaling storm mentioned in R2-2100557 is a really identified problem. If this is a real problem, we think this should be further checked by CT1. |
| Intel | Any | Solution 1 and 3 should be feasible from network side. Regarding solution 1, PDU sessions and DRB related release signalling can be done independently and UE and network should be able to handle that. Feasibility of solution 3 should be confirmed by CT1.  Solution 2 depends on current UE implementation as it is not aligned with current UE requirements and may not be backward compatible. Consensus on UE implementations is needed. |
| NEC | Solution 2 (unless current spec prohibit), otherwise Solution 1 | solution 1 can work normally, while solution 2 is more flexible for NW to handle case by case. We have the same question as Nokia, where the text says the solution 2 is not allowed? Should “*it is not allowed to release all the DRBs without releasing the RRC Connection*” be already interpreted as such? |
| CATT | Solution 2 | Solution-2 is simpler and won’t cause temporarily NAS/AS mismatch at UE side. |
| vivo | None | Firstly, we think the network can use the RRCRelease message to release the DRBs and RRC connection simultaneously because it is consistent with the agreement that “it is not allowed to release all the DRBs without releasing the RRC Connection”.  Secondly, we do not think the signaling storm exists in Figure 3. Step 5 should be achieved by performing the initial access and entering the RRCConnected state, i.e., Step 5 can be achieved before Step 6 “De-registration request”. |

For solution 2, the corresponding CRs are provided as below:

R[2-2100558](file:///E:\3GPP文档\2021\RAN2%20113e\R2-2100558.zip) CR to clarify the procedure of DRB release ZTE Corporation, Sanechips CR Rel-15 38.331 15.12.0 2336 - F NR\_newRAT-Core

R2-2100559 CR to clarify the procedure of DRB release ZTE Corporation, Sanechips CR Rel-16 38.331 16.3.1 2337 - A NR\_newRAT-Core

For your convenience, the correction is copied below:

|  |
| --- |
| A configuration with SRB2 without DRB or with DRB without SRB2 is not supported (i.e., SRB2 and at least one DRB must be configured in the same RRC Reconfiguration message, and it is not allowed to release all the DRBs without releasing the RRC Connection – i.e. in order to release the last DRB, the network may either use the RRC Reconfiguration procedure to release the last DRB, followed by an *RRCRelease* message or send an *RRCRelease* message directly). |

**Q4.2: If solution 2 is preferred, do companies agree with above SPEC change (R2-2100558, R2-2100559)?**

|  |  |  |
| --- | --- | --- |
| Company | Agree?  (Yes or No) | Comments |
| Huawei | Agree | Ok with the clarification |
| Google | No |  |
| Nokia | No | We cannot immediately agree on any CRs until we have enough clarity in RAN2 followed by CT1. |
| MediaTek | No | Common understanding on what is the real issue is needed before discussing on the CR. |
| QCOM | No |  |
| OPPO | No | See answer in Q4.1 |
| ZTE | Yes | Proponent |
| NEC |  | if go for Sol2, fine |
| CATT | Yes | Ok with the clarification |
| vivo | No | See our answer in Q4.1 |

# Conclusion

TBD

# References

[1]