**3GPP TSG-RAN WG4 Meeting # 98-e R4-21XXXXX**

**Electronic Meeting, 25th January– 5th Febuary, 2021**

**Agenda item:** 7.19.1

**Source:** Moderator (CMCC)

**Title:** Email discussion summary for [98e] [111]\_UE transient period

**Document for:** Information

# Introduction

This email discussion includes contributions in agenda 7.19.1, the targets of email discussion based on companies’ contributions submitted in this e-meeting are as below:

* 1st round:

Provide comments on the CR and discuss the testability issues.

* 2nd round:

Discuss left open issues for 2nd round and strive to approve CR.

# Topic #1: Testability of transient period capability

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2101460**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101460.zip) | Qualcomm Incorporated | **We propose to define new EVM measurement windows that are designed specifically for each transient period. This will enable precise testing with minimum impact on the test equipment.**  |
| [**R4-2101484**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101484.zip) | Qualcomm Incorporated | **Adding the newly defined shorter transient periods. Resubmission of endorsed Draft CR R4-2011766** |
| **R4-2102629** | Huawei, HiSilicon | **Observation 1: From real channel measurements, TR 38.901 provide up to 9.9us max tap delay span for some Scenarios, which is much larger than CP length.****Observation 2: considering multi-UE scenario, gNB take the FFT window including 10% CP length(i.e. excluding 90% CP). It can ensure 90% CP used for anti-multipath delay spread and UEs’ UL transmission timing difference be considered.** **Observation 3: For Long delay spread scenario, taking FFT window with 50% CP length has much impact on UL performance caused by multi-path delay spread.** **Proposal 1: For 2us shorter transient, define the time mask as: 0.5us in left symbol and 1.5us in right symbol, i.e. the tpstart is -0.5us.** **Proposal 2: For 4us shorter transient, define the time mask as: 1us in left symbol and 3us in right symbol, i.e. the tpstart is -1us.** **Proposal 3: For 7us shorter transient, define the time mask as: 2us in left symbol and 5us in right symbol, i.e. the tpstart is -1us.** **Observation 4: Asymmetrical transient period position is already existed from Rel-15.** **Observation 5: Large power change case cannot be ignored. Further discuss on testability on large power change range issue.****Proposal 4: Values of tpstart for transient period starts before the transmission boundary for type 1 and type 2 as specified in table1 respectively. Type1 and type2 is declared by UE.****Proposal 5: EVM metric for shorter transient is [8%] for 256QAM, [10%] for 64QAM.** |
| **R4-2102684** | Huawei, HiSilicon | **Introduce tpstart as the start line of shorter transient.** |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1 CR on introduction of shorter Transient Period Capability

Issue 1-1-1

* CR on introduction of shorter Transient Period Capability
	+ Option 1: If introduce tpstart, define the value for tpstart as in R4-2102684.
	+ Option 2: Shorter transient periods for On-On time mask is introduced and current time masks are clarified that they apply to 10us transient period (From R4-2101484)
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

### Sub-topic 1-2 Testability issues for Transient period

**Issue 1-2-1: For RMS EVM over 1 symbol, how to define EVM measurement procedure in the spec**

* Proposals: defined the procedure as proposed in R4-2101460
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

**Issue 1-2-2: Whether 20dB power change can represent the maximum power change in the network, if not, whether TE can provide the test condition for the maximum power change**

* Proposals
	+ Option 1: 20 dB power step is reasonable for on-on power change.
	+ Option 2: >55dB Large power change range case cannot be ignored.
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

**Issue 1-2-4: Whether RMS EVM with DFT-OFDM measurement similar with LTE can be tested for transient period**

* Proposals
	+ For a transient period/placement that exceeds the CP length, the transient period will be longer than the CP and a similar approach with the current LTE methodology has to be used (only DFT-s-OFDM can be used and some time domain samples have to be removed) in R4-2101460.
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

 **Issue 1-2-5 How to calculate EVM for symbols in which the transient occurs**

* Proposals
	+ Option 1: Test procedure detail that needs to be discussed in RAN5.
	+ Option 2: Transient period is different for ramp up and ramp down, it should be clearly clarified.
	+ Option 3: The EVM should be measured on the last and first symbol and averaged over multiple instances. Also, EVM can be measured on all other symbols against the legacy values based on the legacy measurement windows.
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

 **Issue 1-2-6 EVM budget for symbol where the transient occurs**

* Proposals
	+ Option 1: Keeping EVM budget in square brackets. EVM values can be discussed after agreement is reached on the feasibility of testing transient periods.
	+ Option 2: EVM requirement should decide based on simulation results which can meet network performance on high order modulation. Initiate EVM simulation to evaluate network performance.
* Recommended WF
	+ TBA. Collect companies’ view in 1st round

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Issue 1-1-1: we are fine with the introduction of Type 1 which was proposed in the last meeting. We do not think it is a good idea to have two types because the base station cannot optimize the receive window for a certain type of UEs since there will be multiple UEs in the network. There is a corresponding text proposal in R4-2101460 capturing tpstart in the requirements.Option 1 and Option 2 here are not necessarily exclusive. Issue 1-2-1: This is our proposal. We believe the new measurement window should make testing very clear.Issue 1-2-2: This has been discussed for multiple meetings. We already showed multiple times that Option 2 is not a valid network configuration. The analysis in 2629 has the same flaws as previous submission from the same company. It is claimed that IBE is better than 30dB without any evidence even though the spec is a lot more relaxed than this. Also, in the example given is based on some parameters that are not always true and the noise floor is not considered. What would happen if the UE transmitting PUSCH is not so close to the base station and the SNR of the transmission is low? PUCCH SIR will be much lower than -1dB.As we already commented and shown in our papers, 20dB is reasonable from a system point of view and also is enough to ensure the functionality is properly tested.Issue 1-2-4: we support the proposal, this is the same methodology used alreadyIssue 1-2-5: with the new testing window we believe this is very clear. Option 3 should enable very clear testing of this feature.Issue 1-2-6: The values in [] in 1460 have been proposed for a long time. If there were problems, the discussion should have started a long time ago. The proposals in 2629 are too relaxed for 256QAM, this will make the feature useless. They are also based on some assumptions that are not clear, for example if a UE that has a transient of 4.3us should not claim 4us transient period if it won’t meet the requirement. We would prefer to keep the numbers in our proposal or have a mix. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2101484**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101484.zip) | Company A |
| Company B |
|  |
| **R4-2102684** | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |