**3GPP TSG-RAN WG4 Meeting # 96-e R4-2012742**

**Electronic Meeting, 17 – 28 Aug., 2020**

**Agenda item:** 7.18.3

**Source:** Moderator (ZTE Corporation)

**Title:** Email discussion summary for [96e][325] BS demodulation for 2-step RACH

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010283 Discussion and simulation results for BS 2-step RACH requirement | Samsung | Proposal 1: 3 DMRS can be configured for MsgA PUSCH requirementProposal 2: Define the PUSCH mapping type A in FR1 and mapping type B in FR2 for NR 2-step RACH MsgA PUSCH requirement.Proposal 3: 0.8us can be considered as the maximum timing offset for MsgA PUSCHProposal 4: MCS 0 can be selected for requirement with NR step RACH, to fulfill the targeting TBS with 56-72bits Proposal 5: Using BLER 0.1 as the test metric for requirement of MsgA PUSCHObservation 1: Similar BLER performance can be achieved with 2 DMRS and 3 DMRS configurationObservation 2: With small value of TO, the impact on BLER performance of MsgA is minor without TO compensationObservation 3: With TO larger than CP, even with TO compensation operation, large performance degradation is still existedProposal 6: Do not define the requirement with timing offset lager than CP |
| R4-2010783 Further discussion on BS demodulation performance requirements for 2-Step RACH | ZTE | Proposal 1: BS demodulation performance requirements are defined with TO compensationProposal 2: Change the lower end values for medium level TO cycling to 0µs as high level TO cycling. Proposal 3: Scaling X:∆t:Y between two different SCSs for high level TO cycling as medium level TO cyclingProposal 4: Set medium and high level TO cycling values as Table – 4 and Table – 5 respectively.Proposal 5: Specify BS demodulation performance requirements for mapping type A and type B respectively.Proposal 6: Set test metric to BLER 0.1 for BS demodulation performance requirements for 2-step RACH.Proposal 7: Specify BS demodulation performance requirements with DMRS configuration 1+1+1.Proposal 8: Specify BS demodulation performance requirements for 2-step RACH under FRC tables as Table-6 and Table-7 for FR1 and FR2 respectively. |
| R4-2010784 Draft CR for 38.104: Performance requirements for 2-Step RACH | ZTE |  |
| R4-2010785 Simulation results for 2-step RACH BS demodulation requirements | ZTE |  |
| R4-2010842 2-step RACH demodulation requirements | Ericsson | Proposal 1: Adopt option 2 (4 PRB, DM-RS 1+1, 7 symbol for FR1, 5 for FR2)Proposal 2: Include a declaration whether “medium” T0 and associated requirements are supported or alternatively “high” T0 is supported. Only one set of requirements to be applicable/tested depending on declaration.Proposal 3: 1% BLER |
| R4-2010906 2-step RACH BS demodulation simulation results | Nokia |  |
| R4-2010907 On 2-step RACH BS demodulation requirements | Nokia | Proposal 1: RAN4 not to deviate from current PUSCH applicability rules and BS needs to only comply for the mapping type declared to be supported in D.100.Observation 1: Most of the PUSCH performance requirements use SNR at 70% throughput as a test metric, which maps to 30% BLER.Observation 2: Simulation results from previous meetings show significant SNR differences when considering PUSCH performance with uncorrected TO at 10 % BLER and 70 % TPUT [4] [5] [6].Proposal 2: RAN4 for define MsgA PUSCH performance requirements using a 10% BLER metric.Observation 3: High Level TO cycling upper limit for the 30 kHz SCS test case is the most challenging one when compered to the C length.Proposal 3: RAN4 to review the upper limit of the High Level TO cycling for the 30 SCS scenario, and use (X, ∆t, Y) as (0, 0.1, 1.9).Observation 4: Medium TO level ranges and High TO ranges have similar average value.Proposal 4: RAN4 to consider TO ranges starting at zero for Medium and High TO ranges.Observation 5: 2-step RACH demodulation requirements relate mostly to the MsgA PUSCH performance, and has more relation to the existing PUSCH clauses than with the PRACH clauses.Proposal 5: RAN4 to define 2-step RACH demodulation performances as a subclause in the clauses 8.2 for PUSCH requirement in 38.141-1 [4], 38.141-2 [5], and 38.104 [6] as: -TS 38.141-1: 8.2.6 Performance requirements for MsgA PUSCH -TS 38.141-2: 8.2.6 Performance requirements for MsgA PUSCH -TS 38.104: 8.2.6 Requirements for MsgA PUSCH |
| R4-2011009 Discussion and simulation results on NR 2-step RACH BS performance requirements | Huawei | Observation 1: The performance between high level TO and medium TO level is negligible after TO compensation.Observation 2: – For 15kHz, 30kHz and 120kHz SCS, considering TO compensating or not, there is about 1~2dB performance differnece for medium level TO and about 6~7dB performance differnece for high level TO. – For 120kHz SCS, considering TO compensating or not, there is about 3~6dB performance differnece for both medium level TO and high level TO.Proposal 1: Only define high level TO cases for NR 2-step RACH.Proposal 2: Define both Type A and Type B for both FR1 and FR2 for NR 2-step RACH demodulation requirements. Only the mapping type declared to be supported in D.100 shall be tested. If both mapping type A and type B are declared to be supported, the tests shall be done for either type A or type B.Proposal 3: Define 1% BLER for 2-step RACH requirements definition.Proposal 4: Only define DMRS 1+1 for NR 2-step RACH performance definition. |
| R4-2009739 Views on BS demodulation requirements for NR 2-Step RACH | Intel | Proposal #1: Consider Post FFT time offset compensation as a baseline receive processing for requirements definition (i.e. No per UE FFT window adjustment).Proposal #2: Specify MsgA demodulation performance requirements only with medium level TO set.Proposal #3: Specify MsgA demodulation performance requirements with 1+1 DMRS configuration.Proposal #4: During the test update TO error per each RACH preamble + MsgA occasion.Proposal #5: Specify MsgA demodulation performance requirements with 1% BLER metric. |

# Topic #1: Setup for specifying BS demodulation requirements for 2-step RACH

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

## Companies’ contributions summary

## 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

*Sub-topic description: open issues on configurations*

*Open issues and candidate options before e-meeting:*

**Issue 1-1: DMRS configuration**

* Proposals
	+ Option 1: 1+1+1
	+ Option 2: 1+1
* Recommended WF
	+ Option 1?

**Issue 1-2: Mapping type**

* Proposals
	+ Option 1: both mapping type A and B for both FR1 and FR2
	+ Option 2: mapping type A for FR1, and mapping type B for FR2
* Recommended WF
	+ Option 1?

**Issue 1-3: TO compensation**

* Proposals
	+ Option 1: with TO compensation
	+ Option 2: without TO compensation
* Recommended WF
	+ Option 1?

**Issue 1-4: Starting value for medium level TO cycling**

* Proposals
	+ Option 1: set 0 µs as starting value for SCSs for medium level TO cycling
	+ Option 2: keep current starting values
* Recommended WF
	+ Option 1?

**Issue 1-5: Should maximum value for TO cycling be larger than CP?**

* Proposals
	+ Option 1: Yes
	+ Option 2: No
* Recommended WF
	+ Option 1?

**Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120k**

* Proposals
	+ Option 1: Yes
	+ Option 2: No
* Recommended WF
	+ Option 1?

**Issue 1-7: Test metric**

* Proposals
	+ Option 1: BLER = 0.1
	+ Option 2: BLER = 0.01
* Recommended WF
	+ Option 1?

**Issue 1-8: MCS**

* Proposals
	+ Option 1: keep current agreement MCS 1 for FR1 and MCS 3 for FR2
	+ Option 2: set MCS 0 for both FR1 and FR2
* Recommended WF
	+ Option 1?

**Issue 1-9: Combination of number of PRBs and number of symbols**

* Proposals
	+ Option 1: keep current agreement (2 PRBs, 14 symbols) for FR1, and (2 PRBs, 10 symbols) for FR2
	+ Option 2: (4 PRBs,7 symbols) for FR1 and (4 PRBs, 5 symbols) for FR2.
* Recommended WF
	+ Option 1?

**Issue 1-10: Should requirements for both medium and high level TO cycling be defined?**

* Proposals
	+ Option 1: Yes, keep current agreement
	+ Option 2: No, only define requirement for high level TO cycling
	+ Option 3: No, only define requirements for medium level TO cycling
* Recommended WF
	+ Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |
| Ericsson | Issue 1-1: In case 5/7 symbols would be selected, then the DM-RS should be 1+1. In case all symbols (i.e. 14/10) are selected, then 1+1+1 may make more sense because, although there is not a large performance difference 1+1+1 is the default configuration and so may be the one more often used.Issue 1-2: For FR2, Rel-15 requirements consider mapping type B only. For FR1, in case fewer than 14 symbols are used then type B may be appropriate. If 14 symbols are used, A or B with an applicability rule is OK.Issue 1-3: Our understanding is that the point of the requirement is to verify that T0 compensation is done properly (so option 1)Issue 1-4: We’re OK to start from 0 (but don’t have a strong view)Issue 1-5: This should be the difference between the “medium” and “high” T0; the “medium” is always within the CP.Issue 1-6: For the “medium” T0; this relates to CP size and should scale with the SCS. For the “high” T0, this relates to largest expected cell size, which does not scale with T0.Issue 1-7: We propose 1% BLER, since 10% probability of needing to go to 4-step RACH seems like 10% of the time missing the point of 2-step, which is rather high.Issue 1-8: No strong view, but depends on the number of PRBs and the numberof symbols. Decide after considering 1-9.Issue 1-9: Our understanding from the previous meeting was that 4 PRB would be associated with using half of the number of symbols (so that the TBS is the same for both 2 and 4 PRBs). Our simulations showed that performance could be better with 4 PRBs and half the symbols. Also, using half the symbols leaves room for T0 whilst avoiding colliding with the next slot. So we see some advantage from using 4 PRB and half the symbols, but we do not have a very strong view and would like to see the issue decided in this meeting. |
| Samsung | Issue 1-1: DMRS configurationWe prefer option 1Generally, the timing offset estimation and compensated are performed per symbol by symbol. Since the current scenario is not targeting with high speed scenario, therefore, either configure 2 DMRS or 3 DMRS configuration can fulfil the requirement. As indicated in our initial results, the similar performance can be achieved with two different DMRS configurations.In current Rel-16 NR HST WI, the related requirement for UL timing adjustment was specified, where the 3 DMRS configuration is configured. Since there is no new PHY design for NR 2 step RACH, we prefer to align with DMRS configuration for UL timing adjustment requirement.From future improve manner, configure more DMRS can benefit for Doppler or frequency offset tracking to against the high Doppler scenario. Meanwhile, based on RAN1 agreement about DMRS configuration for 2 step RACH, in case that there is no RRC configuration, the UE will apply the default value with “pos2”Again, since the number of PRB allocated is limited for msgA PUSCH, considering the target information bit. The accuracy of timing estimation can be improved with configured more DMRS symbolsIssue 1-2: Mapping typeWe prefer option 1In Rel-15 eMBB, the related with PUSCH requirement was specified for both type A and type B in FR1, and Type B for FR2. As indicated, the performance with configured mapping type A and type B is very similar. In that sense, it is not necessary to replicate the test cases defined in NR Rel-15.Again, from BS receiver processing, there should be no different for both mapping type A and type B.To reduce the test effort, only mapping type A for FR1 and mapping type B for FR2 should be fulfill the test coverage.Issue 1-3: TO compensationWith TO compensation operation, the MsgA PUSCH performance can be improved.My understanding whether TO compensation or no should be the BS implementation issue. We do not think BS should be forced to do TO compensation operation no matter what is the value of TO. Issue 1-4: Starting value for medium level TO cyclingWe are fine with option 1. 2 step TA includes both preamble detection and MsgA PUSCH detectionFor preamble detection, there is no PHY change. So the related test procedure can use the Rel-15 PRACH detection with 4 step RACH operation. Issue 1-5: Should maximum value for TO cycling be larger than CP?We prefer option 2. In our view, we should identify the useful scenario for 2 step RACH, whether larger CP is available for 2 step RACHIn RAN1, both SLS and LLS simulation are introduced for the determination of payload size and mapping designs, etc. For SLS simulation assumptions, the targeting cell size is very small with round 200m, up to 25km. With agreed link-level simulation, format A1 is applied, where the use case for A1 is targeting for small cell.Meanwhile, whether 2 step RACH or 4 step RACH applied is depending on RSRP threshold, according to 38.321 spec. The UE selected 2 –step random access type to perform random access based on this threshold. If Random Access Resources and the RSRP of the downlink pathloss reference is above *msgA-RSRP-Threshold,* UE will apply the 2-setp RACH. In that sense, 2 step-RACH is targeting with cell-centres UE, cell-edge UE will be fullback to 4 step RACH procedure.From the BS receiver aspects, the motivation introducing TO is to discriminate the practical BS implementation. Based on our initial results, there is enough performance gap existed between without TO compensation and TO compensation.2-Step RACH performance including both preamble detection and MsgA PUSCH detection. The MsgA PUSCH is detected by assuming the preamble detection is successfully. Since there is no limitation for RACH, a unified timing offset should be considered for all the preamble formats to guarantee the preamble detection During the Rel-15 PRACH test, the maximum timing offset is 0.8us,From our initial result, with the TO larger than CP, the BLER performance is still worse even with TO compensation operation, where the PUSCH detection error comes from the ISI. In that sense, it is not practical to define the requirement with high level TO cycling.Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120kWe prefer option 1Issue 1-7: Test metricWe prefer with option 1. 1% BLER is targeting with initial transmission. Since there is no HARQ transmission for MsgA PUSCH, we prefer to follow the same approach for test metric.Issue 1-8: MCSWe prefer with option 2If we need to fulfill the target TBS with 56~72bit, MCS 0 can be selected for requirement with 2 PRB, where the related TBS is 64 for 2 DMRS configuration, and 56 for 3 DMRS configurationIssue 1-9: Combination of number of PRBs and number of symbolsWe are fine with current agreement with option 1. If we apply option 2, the number of DMRS is less, the accuracy of TO estimation cannot be guaranteedIssue 1-10: Should requirements for both medium and high level TO cycling be defined?We prefer option 3, only define the requirements for medium level TO cycling, similar reason with issue 1-5. |
| Huawei | **Issue 1-1: DMRS configuration**Firstly, there is negligible performance difference between DMRS 1+1 and 1+1+1, it is no need to use DMRS 1+1+1 considering extra DMRS overhead.Secondly, DMRS 1+1 is more commonly used for all NR BS performance cases except HST scenario although DMRS pos2 is default if no RRC configuration. In HST scenario we use DMRS 1+1+1 since the huge frequency offset cannot be handled with DMRS 1+1. Therefore, we don't see any reasonable reason to use DMRS 1+1+1.**Issue 1-2: Mapping type**We prefer Option 1, i.e. both mapping type A and B for both FR1 and FR2 Or Option 3: mapping Type A and B for FR1, Type B for FR2 to align with Rel-15 requirements.**Issue 1-3: TO compensation** Option 1 to keep current agreements.**Issue 1-4: Starting value for medium level TO cycling**We are OK with Option 1. Set 0 µs as starting value for SCSs for medium level TO cycling.**Issue 1-5: Should maximum value for TO cycling be larger than CP?** As per our evaluation, the performance difference between high TO level and medium TO level is negligible after TO compensation and the performance difference is obvious between performing TO compensation or not for both high TO level and medium TO level, so it is feasible to set TO cycling larger than CP.**Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120k**We are OK with Option 1, i.e. Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120k**Issue 1-7: Test metric**We are OK with Option 2 (1% BLER). There is no discussion in RAN1 design that how much proportion is more proper for NR 2-step RACH to fall back to normal 4 step RACH. For our understanding, the purpose of using 2-step RACH is to reduce the access time for applicable scenarios while fallback procedure costs more time comparing to normal 4 step RACH. So we prefer to define stricter performance requirements to reduce fallback occurring. Also, 1% BLER can observe more errors caused by TO compensation rather than low SNR.**Issue 1-8: MCS**We are OK with the recommended WF, keep current agreements.**Issue 1-9: Combination of number of PRBs and number of symbols**We are OK with the recommended WF, keep current agreements.**Issue 1-10: Should requirements for both medium and high level TO cycling be defined?** At last meeting, an agreement is achieved that if essential difference will be observed – requirements will be defined for both. However, as per our evaluation, the performance between high TO level and medium TO level is negligible after TO compensation and the performance difference is obvious between performing TO compensation or not for both high TO level and medium TO level. So we prefer only define one set of requirements, i.e. only high TO level. |
| Nokia | Issue 1-1: DMRS configurationDepends on the outcome of Issue 1-9.For 4 PRBs and 5/7 symbols DMRS should be 1+1, with 2 PRBs and 10/14 symbols we would prefer 1+1+1. Issue 1-2: Mapping typeWe support **Option 1.** Both mapping types should have requirements which are tested based on applicability rule. Issue 1-3: TO compensationWe support **Option 1**TO compensation is expected in MA and WA BS implementations. Issue 1-4: Starting value for medium level TO cyclingWe support **Option 1**. In our view it makes more sense to use TO values starting from 0 us.Issue 1-5: Should maximum value for TO cycling be larger than CP?We support **Option 2**. The BS has the option to define RSRP threshold to limit the use of 2-step RACH for UEs that at not on the cell edge. Therefore, when considering minimum operation requirements, TOs within the CP length can already cover a significant portion of the cell area for 15 and 30 kHz SCS. Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120kWe support **Option 1**. We believe a practical BS implementation will probably configure RSRP thresholds in accordance to SCS, limiting the applicable cell area for 2-step RACH depending on the SCS. Issue 1-7: Test metricWe support **Option 1**. This option is more in line with typical PUSCH performance requirements. Issue 1-8: MCSWe support **Option 1,** but MCS should be reviewed if the outcome of issue 1-9 is 4 PRBs.Issue 1-9: Combination of number of PRBs and number of symbolsWe support **Option 2**. The larger number of PRBs and increased frequency diversity can be beneficial for MsgA demodulation. Issue 1-10: Should requirements for both medium and high level TO cycling be defined?We support **Option 3**. The Medium level TO should be enough for most of the practical deployment scenarios of 2-step RACH.  |
| Intel | **Issue 1-1: DMRS configuration**No strong preference on this issue. Based on our evaluations enough accurate TOE can be achieved even with 1+1 DMRS configuration. Configured Doppler spread during the test is too small to perform performance degradation with 1+1 DMRS. From payload point of view both configurations correspond to payload sizes which are inside or near the range of typical 2-step RACH PUSCH payload. **Issue 1-2: Mapping type** Prefer Option 3 to simply reuse Rel-15 procedure: Mapping type A and Type B for FR1 and only type B for FR2. Rel-15 requirements reflect typical configurations in that sense we do not see necessity to define requirements with mapping type A for FR2. Same time for FR1 it is typical that different BS may declare different mapping types. **Issue 1-3: TO compensation** The main motivation to define 2-step RACH performance requirements is to verify proper TOE/TOC since with wrong TOE/TOC implementation reliable performance cannot be provided. Submitted simulation results from companies can confirm this. **Issue 1-4: Starting value for medium level TO cycling** Do not see reason to test performance with zero or enough small TO values since impact of such TO values is negligible and there will be no difference between proper and wrong BS implementation. From technical perspective it leads to only increased test time to collect enough error statistic. If there is no strong motivation from companies which support Option 1, we suggest using initial range which consist of values which can impact demodulation performance: prefer Option 2.**Issue 1-5: Should maximum value for TO cycling be larger than CP?** If we correctly understand the motivation of high level TO range (emulate 2-step RACH operation for cell-edge UEs) the answer should be Yes. Same time this answer does not related to requirements definition for High TO range.**Issue 1-6: Scaling X:∆t:Y with SCSs between 15k and 30k, and between 60k and 120k**Option 1 to have unified solution for all SCSs. Medium TO range does not restrict ISD for which 2-step RACH might be applicable. **Issue 1-7: Test metric**Prefer Option 2. High Tx reliability is a main use case of 2-step RACH to reduce latency. Beside that PRACH preamble right detection requirements use 0.01 metric, in that sense since joint Preamble + PUSCH performance will be tested it is reasonable to align test metrics between PRACH preamble and PUSCH.**Issue 1-8: MCS** Slightly prefer to not revert previous agreement (Option 1), but open for further discussion**Issue 1-9: Combination of number of PRBs and number of symbols**Prefer Option 1. If we agree on Option 2, we should consider only mapping type B for FR1 to configure additional DMRS symbol. Considering our preference to have both Mapping type A and B for FR1 we support previous agreement with 14 symbols.**Issue 1-10: Should requirements for both medium and high level TO cycling be defined?** As minimum performance requirements it is enough to consider only Medium TO range for requirements definition. Based on our evaluations there is no need to use enhanced demodulation processing on such low MCS value to provide reliable performance with TO values larger than CP length. In this case it is unlikely that different BSs will declare supporting of different 2-step RACH application ranges since conventional BS implementation allows to configure 2-step RACH operation for cell-edge UEs without demodulation performance impact. Same time as we see even in RAN1 2-step RACH was discussed mainly for cell-center UEs and it will be more convenient if minimum performance requirements will also not consider High level TO range. **As way forward we suggest defining requirements only with Medium TO range but clearly capture in WF that performance requirements do not restrict applicable BS-UE distance for 2-step RACH which only depends on configured threshold (msgA-RSRP-Threshold).** |
| ZTE | **Issue 1-1 DMR Configuration**We slightly prefer Option 1 (1+1+1), which may provide more robustness and optimization.Issue 1-2 Mapping TypeWe can follow NR PUSCH: Type A and B for FR1, and Type B for FR2, or Option 2 is fine.Issue 1-3 TO compensationOption 1 (with TO compensation)Issue 1-4 Starting value for medium level TOOption 1 (starting from 0)Issue 1-5 maximum value for TO cycling For high level TO cycling, it should be larger than a CPIssue 1-6 ScalingOption 1 YesIssue 1-7 Test metricOption 1 (0.1)Issue 1-8 MCSOption 1 keep current agreementIssue 1-9 Combination of PRB# and symbol #Option 1 to keep current agreement, but no strong view, and are open to other optionsIssue 1-10 both medium and high level TO cycling be definedOption 1 and 3 are fine, but for Option 3, we need to emphasize that 2-step RACH can be used for cell-edge users depending on the network configuration |

### 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1 – FRC related and mapping type** | *Tentative agreements:** *Considering the decisions on (DMRS configuration, number of PRB, number of symbols, MCS, mapping type) together*

*Candidate options:** *Option 1: (1+1+1,2,14,2,A&B) for FR1, (1+1+1,2,10,3,B) for FR2*
* *Option 2: (1+1,4,7,0,A&B) for FR1, (1+1,4,5,0,B) for FR2*
* *~~Option 3: (1+1,2,14,2,A&B) for FR1, (1+1,2,10,3,B) for FR2~~*

*Recommendations for 2nd round:** Further discuss the above options and select one option as a baseline.
* If being justified, DMRS configuration for FR2 can be different from that for FR1 on top of the selected baseline
 |
| **Medimum and high level TO cycling** | *Tentative agreements:**Recommendations for 2nd round:** *Discuss further the implications of adopting medium only or medium/high T0 on test coverage*
 |
| **Test metric** | *Observation: Still no consensus (4 companies for 1%, 2 companies for 10%)**Tentative agreements:** *Keep it open and companies are encouraged to provide SNRs for both 1% and 10%*
 |
| **TO and TO cycling values** | *Tentative agreements:** *For TO compensation, keep the current agreement that TO compensation is assumed at BS side*
* *For TO cycling values for medium level TO (scaling between 15k and 30k SCS, and between 60k and 120k SCS, and starting from 0):*
	+ *15k SCS: [0:0.2:2], 30k SCS: [0:0.1:1]*
	+ *60k SCS: [0:0.05,0.5], 120 SCS: [0:0.025,0.25]*

*Recommendations for 2nd round:** *Review and conclude TO cycling values shown above*
 |
|  |  |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 | WF on BS demodulation requirements for 2-step RACH | ZTE |

### 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)

The logs are in a reverse chronicle order (Newest first)

[ZTE]

Thanks a lot for your careful check at the last minute, and it has been fixed now :-)

Given that no more comments are allowed, please kindly be notified that formal version of WF R4-2012705 and the draft CR R4-2012706 have been uploaded.

[Nokia]

Thanks for the updated WF.

 I just noticed that the table on slide 11 does not reflect the TO step we agreed upon on slide 5.

15k SCS: [0:0.4:2], 30k SCS: [0:0.2:1]

60k SCS: [0:0.1,0.5], 120 SCS: [0:0.05,0.25]

[ZTE]

As required by the meeting arrangement, formal WF should be ready within a couple of hours. Please kindly find the updated WF reflecting the latest discussions at:

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r5.pptx

Except the open issue left for DMRS configuration for FR1, we agree all other parameters related to FRC and mapping type. Though not settling all the open issues, we still made a substantiate progress in this meeting. Thank you all for your efforts.

Another open issue is high level TO cycling, we will continue to discuss and decide in the next meeting.

A kind reminder that if you have more comments on the draft WF, please share them by 11pm UTC within about one hours.

And for the draft CR R4-2012706, we are not going to pursue it since there are still two open issues. We will discuss all CRs together in the next meeting.

[Ericsson]

To clarify my comment, the number of resource elements is the same in both cases; in case (i) there are some REs used for carrying a 3rd DM-RS whereas in case (ii) the same REs are used for carrying the encoded padding bits.

Regarding the coding rate, the coding rate may be lower, but there are additional padding bits in the payload implying additional energy needed to decode the payload. My understanding is that the SNR is pretty much the same in both cases.

Regarding the usual DM-RS setting, it is worth to note that the DM-RS configuration is set specifically for 2-step RACH. So even if the network uses the 1+1 for most cases, it could still skip signaling the DM-RS position for 2-step RACH and get the default pos3. Again I don’t fully understand in this circumstance why it would be better for the network to signal pos2 for the step RACH (since it makes no difference to the resource usage or SNR), even if for general connected mode PUSCH it uses 1+1.

[ZTE]

Padding bits are wasted bits before coding. In the current two options, DMRS configuration 1+1+1 will require 8 bits padding bits, which means we will waste 8 bits at payload anyway. But DMRS configuration 1+1 will require 16 bits padding bits, which means we will waste 16 bits at payload. So what you are insisting is to have 16 wasted payload bits instead of 8 wasted payload bits. But you were asking "How can padding bits be used as reference symbol and how can those reference symbols be used". You are the first one to raise this distractive question. No one would propose to use padding bits as reference symbol. That's why I were saying that you distracted the discussion.

Now it is crystal clear that two options are a matter of how many wasted payload bits we would go for. As the only proponent of wasting 16 payload bits, please share your technical concerns on why we need to waste 16 payload bits, not 8 payload bits.

Furthermore, Tom's question makes sense as well. Why we need to waste signaling to configure a UE with 1+1 but waste more payload bits with this configuration? Could you respond to this?

Regarding your code rate concern, on one hand,  there are 16 information bits wasted, and on the other hand, DMRS 1+1+1 may provide better channel estimation than DMRS 1+1. With this, we may expect trivial performance difference due to one more DMRS symbol.

[Huawei]

Regarding “you are distracting the discussion by mixing padding bits and reference symbols. Padding bits are wasting bits before coding, nothing to do with reference symbols.”, such issue or question is not raised by us. Actually it is our question. What does the proponent mean by arguing padding bits vs reference symbols or selection of DMRS configuration? In our view there is no relation. We welcome the clarification.

What we can understand is that 1+1 DMRS will lead to lower coding rate and thus compensate the channel estimation accuracy to result in the same demodulation performance. So from performance perspective, there is no difference between 1+1 and 1+1+1. But 1+1 DMRS is a typical use case in the real network, since all the existing BS PUSCH demodulation performance requirements are based on 1+1 DMRS. If we had to choose one set of DMRS configuration, we prefer to select the typical case.

 [ZTE]
I am a bit surprised that you are distracting the discussion by mixing padding bits and reference symbols. Padding bits are wasting bits before coding, nothing to do with reference symbols. What you insist is to waste 8 bits more.

Can you share what you think of your Tom's question?

I don't see any other valid technical argument from you, and you just keep ignoring the arguments on the othe side and the fact that we have compromised to what you want for FR2.

And if we cannot reach a consensus in this meeting, the consequence for is that the WID may not be able to be completed in time considering that there is only one meeting left according to the plan.

[Huawei]

We do think padding bits are irrelevant to the discussion for demodulation performance requirements. In our view, padding is conducted before LDPC coding. Then we have no idea about “otherwise unused padding bits are used as an additional reference symbol“. How can padding bits be used as reference symbol and how can those reference symbols be used? Do you mean channel estimation? The discussion about padding bits is confusing to us.

If you are talking about the coding rate, we can understand, for 1+1+1 DMRS the coding rate is higher than 1+1 DMRS for a given information bit number, e.g., 56bits. Then 1+1 DMRS seems better than 1+1+1 DMRS in terms of coding rate.

In our view, 1+1 DMRS is more typical use case, since all the BS PUSCH requirements except for high speed train are based on 1+1 DMRS. We should guarantee the performance for typical use case.

[Nokia]

I would like to reiterate Nokia’s preference for the 1+1+1 configuration in FR1.

In our opinion, based on the analysis in Ericsson’s email, it is more logical to use less padding bits in exchange of an additional DM-RS symbol.

[ZTE]

First of all, overhead of DMRS is not an issue at all, and I think you won't disagree about this.

Secondly, it is a matter of 8 "waste bits" or 16 "waste bits", so it is not a technical issue at all now.

Thirdly, it is only you who want DMRS 1+1 for FR1, whereas all the others would go for DMRS 1+1+1. Do you think that only ZTE compromises to 1+1 may resolve this open issue?

Finally, we have compromised to DMRS 1+1 for FR2 as you wished.

Under such circumstances, could you give a last try to rethink of this? Or do you have any other technical concerns?

[Ericsson]

Looking at this discussion about the DM-RS, as I understand it we are suggesting that the network vendor would have 2 choices:

Use the default configuration of 1+1+1 DM-RS. Then there would be 8 unused padding bits

Signal a configuration 1+1 DM-RS. Then there would be 16 unused padding bits

So the difference between (i) and (ii) is that for (i) some of the otherwise unused padding bits are used as an additional reference symbol and no signaling of a different configuration to the default is needed. Even if the baseband receiver implementation would not want to use the additional DM-RS symbol, it could always just choose to ignore it and nothing would be lost.

Then I don’t understand, why would a network choose to do (ii) ? Just necessitates additional signaling with no gain ?

[ZTE]

First of all, overhead of DMRS is not an issue at all, and I think you won't disagree about this.

Secondly, it is a matter of 8 "waste bits" or 16 "waste bits", so it is not a technical issue at all now.

Thirdly, it is only you who want DMRS 1+1 for FR1, whereas all the others would go for DMRS 1+1+1. Do you think that only ZTE compromises to 1+1 may resolve this open issue?

Finally, we have compromised to DMRS 1+1 for FR2 as you wished.

Under such circumstances, could you give a last try to rethink of this? Or do you have any other technical concerns?

[Huawei]

As I said in last email, 8 or 16 bits have no essential difference, in cases of 8 bits padding, you configured one additional DMRS overhead to occupy those additional resource that lead to less padding bits;  16 bits padding comes from less DMRS overhead.

To move forward, could you give your compromise?

[ZTE]

Good that we have the same calculation that under the current assumptions, DMRS 1+1+1 gives 8 padding bits, and DMRS 1+1 gives 16 padding bits.

In this case, why would we need to spend time on discussing more expected "waste bits"? Even as you said, padding can happen in reality, but in this topic, it is in different siutation, we already know for sure that there is at least 8 "waste bits", whereas you insist to have at least 16 "waste bits". Could you please share your real concern and let's see what we can do?

[Nokia]

Thanks for reconsidering my suggestions on TBS.

About the DM-RS, I would like to state that our opinion is that as 1+1+1 DM-RS is the default configuration, and it is technically feasible even with very low MCS.

Therefore we would prefer 1+1+1 for the FR1 configuration. 1+1 could be used for the FR2 as a compromise.

 [Huawei]

We have the same calculation results as yours. To move forward we can compromise to use MCS 2 for FR2.

For FR1, we do not think the number of padding bits is an critical issue, no essential difference between 8 bits or 16 bits, in real network, any number of padding bits is possible, so we still prefer to use DMRS 1+1 for FR1.

Hope you can take our comments into account.

[ZTE]

Thanks for pointing out this issue. I agree that we need accommodate a longer RRC message, i.e., 72 bits in MsgA. Let's wrap up calculations below:

1) For FR1, assuming 2 PRBs, 14 symbols allocated,

     - MCS0, DMRS 1+1+1, --> 56 bits

     - MCS1, DMRS 1+1+1, --> 80 bits

     - MCS0, DMRS 1+1, --> 64 bits

     - MCS1, DMRS 1+1, --> 88 bits

    If we need to consider 72 bits as TB size, then we need to go for MCS1 anyway, no matter DMRS configuration is 1+1+1 or 1+1. Padding bits are already needed, (80-72) = 8bits, (88-72)=16 bits.

2) For FR2, assuming 2 PRBs, 10 symbols allocated and DMRS 1+1:

    - MCS0, --> 40 bits

    - MCS1, --> 56 bits

    - MCS2, --> 72 bits

   So we need to go for MCS2 for FR2.

With the updated calculation that MCS is 1 for FR1, and RRC message size 72 bits, where both DMRS 1+1+1 and 1+1 requires 8 and 16 padding bits respectively, can you check the above calculation and re-think your position on DMRS configuration for FR1?  We all know that we need to close this issue in this meeting for further progress. Thanks.

[Nokia]

I was checking the MCS calculations, and I think there is a problem on the calculations.

The assumption we had for payload was that MsgA carries typically small RRC control messages of 56 bits, e.g. RRCRequest, RRCReestablishmentRequest, and RRCResumeRequest with short I-RNTI, or 72 bits, e.g.  RRCResumeRequest with Long I-RNTI.

The 56 bits or 72 bits is information + MAC header, but does not include CRC.

Therefore, in our view the calculations should consider at least 56+16 bits.

[Huawei]

Although there are several options on (DMRS configuration, number of PRB, number of symbols, MCS, mapping type), as if you just tried to ask us to compromise without any technical justification. We can compromise to other test parameters except the DMRS configuration considering that we have very reasonable technical concern and sufficient evaluation to support our concern. If you cannot compromise our comments to move forward, please keep it open for this meeting.

[ZTE]

Please also find the initial draft according to the current discussion at: https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draftR4-2012706%20Draft%20CR%20to%20TS%2038.104%20BS%20demodulation%20requirements%20for%202-step%20RACH-r0.docx

Your further comments are welcome.

[ZTE]

For FR2, MCS0 gives a TBS 40bits, and MCS1 56bits. Yes, we need to use MCS 1 for FR2. Thank you for your careful check.

Yes, the power offset between preamble and MsgA can be configurable, and it is exactly where the potential issue could be. Suppose the required SNR for decoding MsgA part at 1% BLER is too high compared with that of preamble, e.g., out of the representation scope of the configured power offset signalling (I haven't check in details for the time being), then there could be an issue. But if this concern turns out not an issue, then we are fine with 1%.

As stated before, the understanding on the performance concern on 1+1+1 and 1+1 is well aligned in this group, which is your main argument. But as other colleagues mentioned, there are also arguments to have 1+1+1 for FR1 (just list two of them here):

1) default configuration is 1+1+1;

2) padding bits: MCS0, 1+1 gives TBS 64bits, 1+1+1 gives TBS 56 bits, for a message size of 56bits, 1+1 needs to add 8 padding bits.

In addition, DMRS configuration for FR2 is 1+1 as you wished. You insistence on DMRS 1+1 for FR1 seems not a compromise. Could you please re-think about it for the sake of progress and for the concerns on the other side as listed above?

An updated version of WF has already been uploaded with a slight correction of MCS from 0 to 1 for FR2:

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r4.pptx

[Huawei]

We still think that it is not necessary to configure DMRS 1+1+1 considering it is not for HST and negligible performance difference between DMRS 1+1 and DMRS 1+1+1, it will bring additional overheads with any benefits, so our compromise is as following：

Option 3: (1+1, 2, 14, 1, A&B) for FR1, and (1+1,2,10,1, B) for FR2

[Samsung]

Thanks for your effort, just one correction for option 3: (1+1,2,10,0, B) for FR2-> (1+1,2,10,1, B) for FR2, where TBS is 56 for the later

[ZTE]

Please find the updated WF at https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r3.pptx

And the corresponding summary file is available at https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/DraftR4-2012742%20Email%20discussion%20%5B96e%5D%5B325%5D%20BS%20demodulation%20requirements%20for%202-step%20RACH\_v2.3.docx with our responses.

Here are some highlights:

(1) As we all agree that we need to make a decision on FRC configuration in this meeting, and it seems that we got aligned with calculations, Option 3 seems a good compromise, can we go for this?

    Option 3: (1+1+1, 2, 14, 0, A&B) for FR1, and (1+1,2,10,0, B) for FR2

        --> To Tricia, could you consider this compromise where FR2 DMRS has 1+1 configuration? Anyway, removing one symbol of DMRS does not make much sense for the case where padding bits are in need.

(2) For the BLER, in our views, when we perform simulation and obtain SNRs at BLER 1%, we may get SNRs at BLER 10% at the same time without any additional simulation time. The reason we would like to check is if SNRs at BLER 1% is too high compared with a working point of its precedent preamble, then there would be a too big power jump between the preamble and MsgA part. But for the sake of progress, we could compromise to set BLER 1% as a baseline, and we can check if there is any issue provided SNRs at both 1% and 10%.

So could everyone accept the option: set BLER=0.01 as a baseline, and encourage companies to provide SNRs for both 1% and 10% for further check?

[ZTE]

I found that our calculation is almost the same except that I treated 56 bits as 16 CRC bits included, thus I got 56 - 16 = 40 bits for TBS. But actually, 56 bits does not include CRC bits. Therefore, we are aligned now on the calculation :-)

 [Samsung]

We have double check, with FR1: 1+1+1, 2 PRBs, 14 symbols, MCS 0, the TBS is 56, with 16 bit CRC (considering the number of TBS is smaller then 3824), the information bit is 72. TBS should be decided the number of RE and coding rate. Highly appreciate you can double check.

 [Samsung]

Based on your calculation, we wonder whether you applied the MCS table 3 (LSE) for TBS calculation. Before making decision, we can further double check

 [ZTE]

Regarding the options on Slide 4, I have similar views. However, my calculation is slightly different:

 FR1: 1+1+1, 2 PRBs, 14 symbols, MCS 0 --> TBS (excluding CRC bits) is 40, but if we change to MCS 1, then TBS is 64.

 FR2: 1+1, 2 PRBs, 10 Symbols, MCS 0 --> TBS (excluding CRC bits) is 24, but if we change to MCS 1, then TBS is 40, and MCS 2, TBS is 56.

For both FR1 and FR2, MCS 0 seems not enough.

So can we go for the following option?

Option 4: Option 3: (1+1+1, 2, 14, 1, A&B) for FR1,  (1+1, 2, 10, 2, B) for FR2

For increased steps in TO cycling on slide 5, it is fine with us.

For slide 6, I add a new option indicating your position.

For CR work split, as we discussed before, we are focusing on the open issues now, and if the progress is not enough in this meeting for drafting CRs, then we will submit CRs in the next meeting.

The updated WF is available at:

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r2.pptx

[Samsung]

Samsung's comments have been updated in

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/DraftR4-2012742%20Email%20discussion%20%5B96e%5D%5B325%5D%20BS%20demodulation%20requirements%20for%202-step%20RACH\_v2.0%20Eri\_Samsung.docx

[ZTE]

I upload a revised version of the WF according to you comments at https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r1.pptx  with the following updates:

- Remove duplicated slide 10.

- Add an Option 3 on slide 7.

For the two options on slide 4, the number of REs including data and DMRS are the same (e.g., 14 symbols x 2 RBs Vs 7 symbols x 4 RBs for FR1), but the overhead for DMRS and MCS of Option 2 is lower than that of Option 1. In my understanding, this may explain a better performance of Option 2.

If this is the case, we might lower the MCS level in Option 1, e.g, MCS from 2 to 1 for FR1, 3 to 2 for FR2, then the performance concern can be addressed?

[Ericsson]

I find it a bit easier to follow the discussion when it is embedded into a document, so I have added a few comments in section 1.5 and uploaded:

 [ZTE]

This is to trigger the second discussion on BS demodulation requirements for 2-step RACH.

The initial summary has been uploaded to:

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/DraftR4-2012742%20Email%20discussion%20%5B96e%5D%5B325%5D%20BS%20demodulation%20requirements%20for%202-step%20RACH\_v2.0.docx

As usual, you can use this file for your further commenting, or just email within this thread and I will take care of minuting the discussions.

As a kind reminder, the focus of the second discussion is:

|  |  |  |
| --- | --- | --- |
|  | WF/LS t-doc Title | Assigned Company,WF or LS lead |
| #1 | Draft CR to TS 38.104 BS demodulation requirements for 2-step RACH   (Section 8.2.6 and Annex) |  ZTE  |
| #2 | Draft CR to TS   38.141-1 BS demodulation requirements for 2-step RACH (Section 8.2.6) | Ericsson |
| #3 | Draft CR to TS   38.104 BS demodulation requirements for 2-step RACH (Section 11.2.1 and   11.2.2) | Huawei |
| #4 | Draft CR to TS   38.141-1 BS demodulation requirements for 2-step RACH (Annex) | Nokia |
| #5 | Draft CR to TS   38.141-2 BS demodulation requirements for 2-step RACH (Section 8.2.6) | Samsung |
| #6 | Draft CR to TS   38.141-2 BS demodulation requirements for 2-step RACH (Annex) | Intel |
| #7 | WF on BS demodulation requirements for 2-step RACH | ZTE   |

And for these newly advised draft CRs (#2-#6), due to my mistake of advising in a wrong subsection, the Tdoc numbers are not assigned yet for the time being, but I have already asked Haijie to assign Tdoc numbers, so please go ahead with preparing drafts and we can focus on the contents.

Ericsson comments to WF:

Slide 4: Regarding the PRB and symbol number, option 2 seems to give a better performance and leaves space for timing misalignment, so we see that as slightly better. We do not have a strong view though since option 1 with all symbols may also have some reasoning.

Slide 7: Our proposal is option 3: Test either the medium T0 *or* the high T0 (but never both) depending on vendor declaration.

Our reasoning is: If T0 compensation is only performed up to the CP and cannot be extended further then there will be a performance loss if a UE further than the minimum CP would be operated. Unlike the situation with the RAN preamble, in this case it is not reasonable to assume that an algorithm that can compensate up to the CP length would also compensate for larger T0, since the implementation may be limited (whereas for the preamble, such limits are not expected),

We think the easiest way is the declaration; otherwise we would need to state something in the spec like the requirements are defined for distances corresponding to T0 up to the CP length, and where the 2-step RACH is operated for larger distances, the RAN4 requirement and test does not guarantee performance (or something similar)

Slide 10 is a copy of slide 8.

[Moderator]: I upload a revised version of the WF according to you comments at https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r1.pptx with the following updates:

- Remove duplicated slide 10.

- Add an Option 3 on slide 7.

For the two options on slide 4, the number of REs including data and DMRS are the same (e.g., 14 symbols x 2 RBs Vs 7 symbols x 4 RBs for FR1), but the overhead for DMRS and MCS of Option 2 is lower than that of Option 1. In my understanding, this may explain a better performance of Option 2.

If this is the case, we might lower the MCS level in Option 1, e.g, MCS from 2 to 1 for FR1, 3 to 2 for FR2, then the performance concern can be addressed?

Samsung comments to WF:

Slide 4:

Regarding with DMRS configuration, we still prefer to discuss for FR1 and FR2 separately. We agree that 3 DMRS configuration is default, if no RRC configuration.

For FR1, we are ok with 3 DMRS

As for FR2, based on the current assumption, it is not targeting for high speed scenario, we do not think the necessary to define requirement with 3 DMRS. Meanwhile, in Rel-15 eMBB, only 2 DMRS is configured

To compact the test cases with different BS receiver processing with and without RRC configuration

Therefore, we prefer to define requirement with 1+1+1 DMRS for FR1, and 1+1 for FR2

Regarding the number of PRB, number of symbols, and MCS, if my understanding is correctly, the number of CRC bits is not included within the targeting TBS of 56bit~72bits. In that sense, based on current configuration, the TBS is 96 for MCS 2 with 2 PRB and 14 OFDM under 3 DMRS configuration, and the TBS is 104 for MCS 2 with 2 PRB and 14 OFDM under 3 DMRS configuration.

Based our calculation, the TBS is 56 for (MCS 0, 2 PRB, 14 OFDM and 3 DMRS), and 64 for (MCS 0, 2 PRB, 14 OFDM and 2 DMRS) for FR1, and 56 for (MCS 0, 2PRB, 10 OFDM and 2 DMRS)

As for option2, 56 bit for (MCS 0, 4 PRB, 7 OFDM and 2 DMRS) and 32 bit for (MCS 0, 4 PRB, 5 OFDM and 2 DMRS)

Based on above analysis, we prefer option 3

Option 3: (1+1+1, [2], [14], [0], A&B) for FR1, (1+1, [2], [10], [0], B) for FR2

Slide 5: we are ok with medium level TO, while there are still some unclear issues to clarify

Based on our initial results, the performance gap with small TO cycling size (for example, 0.2us, total 11 TO values), is minor, thus, should will still need to define the requirement with small TO step size? We do not see the need to define the requirement with very small TO value step size

To reduce the test effort, maybe the following TO is preferred

15 KHz SCS: [0:0.4:2]

30 KHz SCS: [0:0.2:1];

60 KHz SCS: [0:0.1:0.5];

120 KHz SCS: [0:0.05:0.25]

Regarding the SNR requirement for targeting, based on these value, if my understanding is correctly, we need to introduce 11 test cases with different timing offset in the core spec (104), then derive the SNR requirement for each timing offset.

Slide 6: As commented in 1st round, we do not think high level TO cycling TO offset is realistic scenario for 2 step RACH

Whether 2 step RACH or 4 step RACH applied is depending on RSRP threshold, according to 38.321 spec. The UE selected 2 –step random access type to perform random access based on this threshold. If Random Access Resources and the RSRP of the downlink path loss reference is above msgA-RSRP-Threshold, UE will apply the 2-setp RACH. In that sense, 2 step-RACH is targeting with cell-centers UE, cell-edge UE will be fullback to 4 step RACH procedure. With cell edge-UE, it can only apply 4 step RACH

Therefore, we are not ok to define requirement with high level TO cycling values. Meanwhile, the value in 30 KHz is large then the cell coverage calculated by CP of PRACH preamble, it is not valid.

Slide 7: we prefer option1, as mentioned, we do not prefer to define requirement with high level cycling TO

Slide 10: we are ok with CR work split. Based on guidance of Chairman, considering there is still open issues for test parameters, it may not proper to provide the draft CR in the 2nd round discussion. We suggest to focus on the discussion of open issue in 2nd round. Companies can provide the draft CR in the next meeting.

As for section title, although this requirement is targeting for 2 step RACH, only MsgA PUSCH requirement is specified, there is no additional requirement for preamble detection. Therefore, it may be more proper with changing title as

Requirements for MagA PUSCH

Regarding the section number, as commented in 1st round, it should be reserved for other WIs to avoid the collision, such as URLLC, which the structure also is under discussion

[Moderator]: Regarding the options on Slide 4, I have similar views. However, my calculation is slightly different:

 FR1: 1+1+1, 2 PRBs, 14 symbols, MCS 0 --> TBS (excluding CRC bits) is 40, but if we change to MCS 1, then TBS is 64.

 FR2: 1+1, 2 PRBs, 10 Symbols, MCS 0 --> TBS (excluding CRC bits) is 24, but if we change to MCS 1, then TBS is 40, and MCS 2, TBS is 56.

For both FR1 and FR2, MCS 0 seems not enough.

So can we go for the following option?

Option 4: (1+1+1, 2, 14, 1, A&B) for FR1, (1+1, 2, 10, 2, B) for FR2

 [ZTE]: After confirmation, we get aligned calculation as Samsung, so Option 3 seems a good compromise, and we need to make a decision in this meeting.

 Option 3: (1+1+1, [2], [14], [0], A&B) for FR1, (1+1, [2], [10], [0], B) for FR2

For increased steps in TO cycling on slide 5, it is fine with us.

For slide 6, I add a new option indicating your position.

For CR work split, as we discussed before, we are focusing on the open issues now, and if the progress is not enough in this meeting for drafting CRs, then we will submit CRs in the next meeting.

The updated WF is available at:

https://www.3gpp.org/ftp/tsg\_ran/WG4\_Radio/TSGR4\_96\_e/Inbox/Drafts/%5B325%5D%20NR\_2step\_RACH\_Demod/Round2/draft%20R4-2012705%20WF%20on%20BS%20demodulation%20requirements%20for%202-step%20RACH%20-%20r2.pptx

**Nokia’s comments to the WF -r2**:

Slide 4: We prefer Option 2, since it leaves more headroom with guardband symbols and more frequency diversity for the DMRS. However, we don’t have a strong view, and can compromise to Option 4.

Slide 5: We are ok with TO start at 0, and increase of TO step suggested by Samsung.
One sidenote on something that maybe is confusing for others. Our understanding is that the TO cycling means that one only SNR point is derived covering the different TO values but not a SNR value for every TO value that is defined.

Slide 6: Our preference is still Option 2.

Slide 7: Our first preference is Option 1. If the High level TO range is decided to be defined we would be fine with Option 3 suggested by Ericsson above.

Slide 8: Question to the moderator: So the intention is to bring next meeting 2 sets of results right? I was confused on whether we should decide on 1% vrs 10% now.

 [ZTE]: In our views, when we perform simulation and obtain SNRs at BLER 1%, we may get SNRs at BLER 10% at the same time without any additional simulation time. The reason we would like to check is if SNRs at BLER 1% is too high compared with a working point of its precedent preamble, then there would be a too big power jump between the preamble and MsgA part. But for the sake of progress, we could compromise to set BLER 1% as a baseline, and we can check if there is any issue provided SNRs at both 1% and 10%.

Slide 9: The PRACH preamble and PUSCH are not expected to be in the same slot, as the configuration of RACH opportunity and PUSCH opportunity for 2-step RACH expects at least 1 slot separation. Therefore, I suggest changing this text:

* The TO error is assumed to be the same on slot with PRACH preamble and MsgA

By that one:

* The TO error is assumed to be the same for a MsgA-PRACH preamble and MsgA-PUSCH pair

[ZTE]: It is fine to us.

Huawei’s comments on r1 version:

Slide#4:

We shared all our technical concerns on selection of DMRS 1+1+1 by email in the 1st round, we copied here for convenience:

As per the submitted results, almost all companies observed that there is negligible performance difference between DMRS configuration of 1+1 and 1+1+1, we really can’t understand why additional useless DMRS symbol is configured, it will bring additional overhead without performance gain.

As per the DM-RS configuration for NR Rel-15 PUSCH performance requirements, DM-RS 1+1 is configured for normal PUSCH performance requirements, DMRS 1+1 is more often used, DMRS 1+1+1 is only considered for high speed train to support higher Doppler shift. The agreed UL TA requirements for scenario Y and Z are also for high speed train instead of for normal scenario.

Our option is added in the WF: Option 3: (1+1,2,14,2,A&B) for FR1, (1+1,2,10,3,B) for FR2

Slide#6 and Slide#7:

Considering no performance difference after TO compensation for either medium or high level TO, we think it is enough to only test requirements for high level TO cycling to reduce the number of test cases.

Option 1 in slide#7 is same the newly added option 2 in slide#6, we do think that Option 2 in Slide#6 is needed, Slide#7 is for the high level TO cycling values clarification instead of test coverage.

 [ZTE]: We fix this after resolving slide 4.

Slide#8:

SNR for both 1% and 10% are encouraged to provide for the next meeting, we would like to know what is the principle to decide which one to be selected for final performance requirements definition? Otherwise still diverge views on the test metric.

 [ZTE]: As replying to Nokia with the same concern, we would like to compromise to set 1% as a baseline.

Slide#10:

Thanks for the CR work split.

As moderator suggested in the email body to encourage company to draft CR during this week, considering the upcoming deadline for comment on open issues, we do not think that it is feasible to do this work during this meeting, we also suggest to focus on the open issues discussion.

Slide#11:

The options for test parameters of MCS level, number of symbols, number of PRBs, DMRS and TO values should be aligned with Slide#4

Ericsson further comments:

Regarding the number of symbols, PRB etc., the number of options is growing. It would be good to nail these parameters in this meeting, otherwise with so many options then lots of simulations will be needed (or simulations will be done with different options by different companies).

 [ZTE] Agree and thanks for the compromise.

Regarding option 2; like Nokia we have a slight preference as it can show better performance, but it is not a big deal. We could compromise to option 4 (or some option like Huawei’s with 2 DM-RS depending on discussion below).

Regarding the number of DM-RS, there are valid arguments either way:

There is little performance difference between the two. If we will use 14 symbols, 2 PRBs and send the same transport block size anyhow then does it actually matter ?

1+1+1 is the default configuration, which implies it could be more likely to be used, but of course vendors do not have to choose the default.

We do not see any compelling argument either way and are fine either way, but are keen to narrow down to one option in this meeting.

So to make progress we suggest assume all symbols used and 2 PRB, and check how strong views are and how we can compromise for the DM-RS in this meeting.

Nokia further comments:

On slide 4:
We are also fine to exclude the option with 4 PRBs in order to get progress.

 [ZTE] thanks for the compromise.

Given that 1+1+1 is the default configuration, I see very little sense in using 1+1. For the payload we are discussing, 1 extra DM-RS symbol does not even change the MCS.

Intel’s comments:

Slide 4: Both option 3 and 4 are fine for us and we agree with Ericsson that we need to move forward on this issue on this meeting. Can proponent companies can compromise?

Slide 6-7: We prefer to define requirements only for one TO set and as minimum performance requirements medium TO set is enough.

Slide 8: We also share concerns that it is difficult to resolve this issue based on simulation results since pros/cons do not based on performance. We still do not see any benefits to use 10% BLER, can proponent companies can clarify it?

 [ZTE]: As replying to Nokia with the same concern.

Slide 9: Support wording proposed by Nokia

## 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”* |
| R4-2012705 | *Agreeable.* *Might be revised if a consensus can be reached in GTW session Friday* |
| R4-2012706 | *Noted.* |

# Topic #2: Declaration and test aspects

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

## Companies’ contributions summary

## 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 2-1

*Sub-topic description: Declaration item(s) for BS demodulation for 2-step RACH*

*Open issues and candidate options before e-meeting:*

**Issue 2-1-1: Should be the support of medium or high level TO cycling declared?**

* Proposals
	+ Option 1: Yes, either support of medium or high level TO cycling should be declared
	+ Option 2: Yes, only the support of high level TO cycling should be declared. Support of medium level TO cycling is mandatory
	+ Option 3: Yes, only the support of medium level TO cycling should be declared. Support of high level TO cycling is mandatory
	+ Option 4: No, both medium and high level TO cycling should be mandatory
* Recommended WF
	+ Option 1?

### Sub-topic 2-2

*Sub-topic description: test aspects for BS demodulation for 2-step RACH*

*Open issues and candidate options before e-meeting:*

**Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**

* Proposals
	+ Option 1: Yes
	+ Option 2: No
* Recommended WF
	+ Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1: ….Others: |
| Ericsson | Issue 2-1-1: Our understanding, and looking at results from Intel is that if the T0 is larger than the CP and timing compensation is not done correctly then performance is degraded. If the requirement would be set considering medium T0 only, then that would mean that a BS claiming to cover the whole cell with 2-step RACH could achieve the requirement but have incorrectly implemented timing compensation and have a performance loss outside of the CP area. If on the other hand only the high T0 would be used, then all BS would be forced to implement the timing compensation for high T0, which may include some re-sampling. To ensure correct requirement coverage whilst not forcing any implementation, we think the best approach is to declare whether medium or high T0 is met; i.e. option 1.Issue 2-2: Our understanding is that what is meant is “Apply the same T0 to both PRACH preamble and msgA”. If this is correct, we would like to update the wording of the option for clarity, and can agree with it. |
| Samsung | **Issue 2-1-1: Should be the support of medium or high level TO cycling declared?**This issue depends on whether to define the requirement for both medium and high level TO cycling.Firstly, UE supported 2 step RACH is optional with capability signaling. Therefore, the requirement with MsgA PUSCH is optional, based on BS declaration. As mentioned, we do not prefer to define requirement with High level TO cycling considering the useful scenario for 2 step RACH. **Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**We are fine with option 1, we have the similar view with Ericsson, and the wording should be further clarified Regarding the timing offset, the following is agreed in RAN1

|  |
| --- |
| * The timing for MsgA PRACH and PUSCH transmission should be both assumed as N\_TA =0.
 |

Based on RAN1 agreement, at least gNB will assume the same transmission timing for UE with MsgA PRACH and PUSCH to process preamble for timing and use that information for MsgA PUSCH demodulation. Therefore, it is reasonable to have the same TO for preamble and MsgA PUSCH. |
| Huawei | **Issue 2-1-1: Should be the support of medium or high level TO cycling declared?** We prefer only define one TO level and there is no declaration issue. If finally two TO levels are defined, the corresponding applicability rule should be defined, i.e. medium level cases are not applicable to BS that has passed high level TO case. Therefore, only one declaration about TO level need to be specified with the choice of either medium or high.**Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**We are OK with the recommended WF. |
| Nokia | Issue 2-1-1: Should be the support of medium or high level TO cycling declared?The decision on this issue should depend on the decision on Issue 1-10. Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?I also share the confusion on the wording for this issue. We agree that MsgA PRACH and MsgA PUSCH should be sent with the same TO, which is how we understand **Option 1**.  |
| Intel | **Issue 2-1-1: Should be the support of medium or high level TO cycling declared?**Same views as Samsung, that requirements should be optional. Based on our view on Issue 1-10 prefer to define requirements and corresponding declaration only for Medium TO range.**Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**Sorry for confusion from our side – obviously, wording should be updated. |
| ZTE | **Issue 2-1-1: Should be the support of medium or high level TO cycling declared?**We are OK with Option 2 and 4.**Issue 2-2: Should TO error be updated per each RACH preamble+MsgA occasion during the test?**Option 1 yes. |

### 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1****Declaration** | *Tentative agreements:**Candidate options:**Discuss further whether lack of test coverage for large cell operation is OK**Recommendations for 2nd round:** Conclude this issue
 |
| **TO error update** | *Tentative agreements:**Recommendations for 2nd round:** *Finalize wording*
 |

*Suggestion 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 provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **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”* |

# Topic #3: CRs

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

## Companies’ contributions summary

## 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 3-1

*Sub-topic description: CR for TS 38.104*

*Open issues and candidate options before e-meeting:*

**Issue 3-1: Add a new section 8.2.6 to capture the requirements of BS demodulation for 2-step RACH in TS 38.104**

* Proposals
	+ Option 1: Yes
	+ Option 2: Other options not precluded
* Recommended WF
	+ Option 1?

### Sub-topic 3-2

*Sub-topic description: CR for TS 38.141-1*

*Open issues and candidate options before e-meeting:*

**Issue 3-2: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-1**

* Proposals
	+ Option 1: Yes
	+ Option 2: Other options not precluded
* Recommended WF
	+ Option 1?

### Sub-topic 3-3

*Sub-topic description: CR for TS 38.141-2*

*Open issues and candidate options before e-meeting:*

**Issue 3-3: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-2**

* Proposals
	+ Option 1: Yes
	+ Option 2: Other options not precluded
* Recommended WF
	+ Option 1?

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1: ….Others: |
| Ericsson | OK to add new sections; should we do a CR split ? (We can volunteer for one CR) |
| Samsung | **Issue 3-1: Add a new section 8.2.6 to capture the requirements of BS demodulation for 2-step RACH in TS 38.104**Generally, we are ok to add new sections.We think new sections included both FR1 and FR2 should be added. As for the section number, my understanding it should be aligned with other WIs related BS demodulation, i.e, Rel-16 URLLC.The current spec structure is also under discussion. Considering the test parameters for MsgA PUSCH is not stable, we prefer to focus the details test parameters finalization in this meeting. Regarding the CR itself, if we do a CR split, we also can volunteer for one CR**Issue 3-2: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-1**Similar comment with issue 3-1**Issue 3-3: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-2**Similar comment with issue 3-1 |
| Huawei | **Issue 3-1/2/3**Ok with the recommended WF. Additionally the new sections for FR2 should also be added in section 11.2.1 and section 11.2.2 of TS 38.104.For CR split, we can also volunteer for one CR. |
| Nokia | Issue 3-1: Add a new section 8.2.6 to capture the requirements of BS demodulation for 2-step RACH in TS 38.104We agree to **Option 1**, and we volunteer for one CR when we do the CR split. Issue 3-2: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-1We agree to **Option 1**, and we volunteer for one CR when we do the CR split. Issue 3-3: Add a new section 8.2.6 to capture the requirement test of BS demodulation for 2-step RACH in TS 38.141-2We agree to **Option 1**, and we volunteer for one CR when we do the CR split.  |
| Intel | **Issue 3-1/2/3**Agree with Option 1 and can also volunteer for one CR. |
| ZTE | **Issue 3-1/2/3**The total CR drafting may consist of:1. Section 8.2.6 in TS 38.104
2. Section 11.2.1 in TS 38.104
3. Section 11.2.2 in TS 38.104
4. FRC Annex in TS 38.104
5. Section 8.2.6 in TS 38.141-1
6. FRC Annex in TS 38.141-1
7. Section 8.2.6 in TS 38.141-2
8. FRC Annex in TS 38.141-2

We propose to perform a CR split as:ZTE: (1) (4)Ericsson: (5)Huawei: (2) (3)Nokia: (6)Samsung: (7)Intel: (8) |

### 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2010784 Draft CR for 38.104 | Company A |
| Company B |
|  |
| YYY | 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.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**CR work split:*ZTE: Section 8.2.6 in TS 38.104, FRC Annex in TS 38.104Ericsson: Section 8.2.6 in TS 38.141-1Huawei: Section 11.2.1 in TS 38.104 and Section 11.2.2 in TS 38.104Nokia: FRC Annex in TS 38.141-1Samsung: Section 8.2.6 in TS 38.141-2 Intel: FRC Annex in TS 38.141-2*Candidate options:**Recommendations for 2nd round:** Drafting CRs according to the CR work split and agreements on FRC configurations.
 |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 | Draft CR to TS 38.104 BS demodulation requirements for 2-step RACH (Section 8.2.6 and Annex) | ZTE |
| #2 | Draft CR to TS 38.141-1 BS demodulation requirements for 2-step RACH (Section 8.2.6) | Ericsson |
| #3 | Draft CR to TS 38.104 BS demodulation requirements for 2-step RACH (Section 11.2.1 and 11.2.2) | Huawei |
| #4 | Draft CR to TS 38.141-1 BS demodulation requirements for 2-step RACH (Annex) | Nokia |
| #5 | Draft CR to TS 38.141-2 BS demodulation requirements for 2-step RACH (Section 8.2.6) | Samsung |
| #6 | Draft CR to TS 38.141-2 BS demodulation requirements for 2-step RACH (Annex) | Intel |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| R4-2010784 Draft CR for 38.104 | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”**To be revised to proposed assignment #1 in Section 3.4.1* |

## Discussion on 2nd round (if applicable)

**Nokia’s comments to R4-2010784**:

General comment:

From our agreements during RAN4 #95-e, we agreed to adopt "2-step RA type" instead of 2-step RACH on the specifications, as adopted in RAN4 in the RRM discussions and by RAN2.

I suggest that the titles of the clauses and the text reflect the use of that term.

Clause 8.2.6.1 and 11.2.2.4.1

I suggest to replace the following text:

*The performance requirements assume that the precedent preamble of MsgA is correctly detected in a 2-step RACH procedure, and no HARQ retransmissions.*

by

*The performance requirements assume that the MsgA-preamble is correctly detected in a 2-step RA type procedure, and no HARQ retransmissions of MsgA-PUSCH.*

Table 8.2.6-1

* Some of the types are TAC and others TAC+left for the values’ column. I suggest using all TAC as in other parts of the spec for the column containing the values.
* The TO line on that table is not clear. I believe either a note or some explanation on the main body of the text clarifying the use of the values like: 0:0.2:2 is necessary.
* The same table as an empty line. Was that supposed to contain a note? Please check if the empty line and a not is needed, otherwise I suggest to remove it.

## 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”* |

# Topic #4: Simulation results

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

## Companies’ contributions summary

## Open issues summary

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

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | ….Others: |

### 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.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

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

*Suggestion 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 provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **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”* |