**3GPP TSG-RAN WG4 Meeting # 101-Bis-e R4-220xxxx**

**Electronic Meeting, January 17 – 25, 2022**

**Agenda item:** 7.1

**Source:** Moderator (Intel Corporation)

**Title:** Email discussion summary for [101-bis-e][327] FR2\_enhTestMethods

**Document for:** Information

# Introduction

*This document covers discussions of the Enhanced Test Methods in FR2 study item.*

# Topic #1: Maintenance on objectives 1~6  (AI 7.1.1)

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200452**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200452.zip)TP to TR 38.884 on release independence applicability of test method enhancements | Apple | Text proposal to TR 38.884 to include a fourth applicability category for the applicability of release independence to FR2 test methodology enhancements. The text below is added to the General clause:"When the enhanced test methodology applies to a UE feature supported only from a specific release, the test method becomes applicable only from that release onwards." |

## Open issues summary

### Sub-topic 1-1: Text proposals for TR 38.884

**Issue 1-1: TP on applicability of release independence**

*TP R4-2200452 introduces a fourth applicability category for the applicability of release independence to FR2 test methodology enhancements.*

* Recommended WF
	+ Moderator suggests companies provide any feedback on TP R4-2200452 directly into Section **1.3.2 CRs/TPs** **comments collection**.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 1-1: TP on applicability of release independence

 Provide feedback for **TP R4-2200452** to upcoming section 1.3.2

### CRs/TPs comments collection

*Moderator suggests companies to comment directly for the CR below. in 1.3.2 CRs/TPs comment collection*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2200452**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200452.zip) | Company A |
| Company B |
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## 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 #1-1:** | **TBA** |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
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| **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

**TBA**

## Companies views’ collection for 2nd round

### Open issues

**TBA**

## Summary for 2nd round

### Open issues

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|  | **Status summary**  |
| **Issue 1-1** | **TBA** |

# Topic #2: OTA test methods for UE RF, RRM and demodulation for 52.6~71GHz  (AI 7.1.2)

## Companies’ contributions summary

|  |  |  |
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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200907**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200907.zip)On permitted test methods for demodulation in FR2-2 | Apple | Observation 1: Atmospheric attenuation has no impact on path loss at the range scales of an FR2 testing chamberObservation 2: For 71 GHz and reference range length of 0.725m the path loss is 66.7 dBObservation 3: For 71 GHz the cable loss per meter is 10.3 dBObservation 4: The values of probe antenna gain and backoff from P1dB need to be further checked with test equipment vendors to verify their applicability to band n263Observation 5: In general, a simple extension of the permitted methods up to FR2-2 does not appear to yield a system capable of achieving a sufficient SNR for demodulation testing.Proposal 1: Further discussion on how to achieve testable SNR ranges for band n263 is needed. |
| [**R4-2201873**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201873.zip)TP to TR 38.884 on extension of NR test methods to FR2-2 | Intel Corporation | Text proposal to TR 38.884 on the extension of test methods to FR2-2 covers the following:1) UE RF permitted test methods (general aspects)2) UE RF testing methodology enhancements (sub-clause headings)3) RRM testing methodology enhancements4) UE Demodulation testing methodology enhancements5) Propagation conditions |
| [**R4-2201874**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201874.zip)NR FR2-2 OTA test methods for RRM | Intel Corporation | Proposal 1: All test methods and measurement setup for FR2 RRM methodology defined in TR 38.810 [3] Clause 6 are applicable for FR2-2, except for Noc derivation (TR 38.810 - Clause 6.2.1.4.3) and Maximum SNR derivation (TR 38.810 - Annex B.2)Proposal 2: For FR2-2 RRM testing the Noc level is derived similar to the Noc level for UE demodulation test methodsProposal 3: Perform an informative assessment of testable RRM DL SNR range for FR2-2 for maximum frequency (~71GHz) using TR38.810 methodology as starting point. |
| [**R4-2201875**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201875.zip)NR FR2-2 OTA test methods for UE demodulation | Intel Corporation | Proposal 1: For analysis of FR2-2 test methodology definition for multi-path fading channels consider TDL-A channel model with RMS delay spread is in range of 5-20ns and with 3km/h UE mobility.Proposal 2: For multi-path fading channel modelling use Fsample = 2000MHz for channel bandwidth up to 2000MHz as long the value is feasible from TE implementation perspective.Proposal 3: Define Noc levels for FR2-2 UE demodulation testing only based on the following definition:* Noc (PC\_X, Band\_Y) = RESFENSPCX, BandY -10log10(SCSREFSENS x PRBREFSENS x 12) - SNRREFSENS + ∆thermal

Proposal 4: Consider parameters from Table 2 for Noc level definition.Proposal 5: Consider DNF, DFF, and IFF test methods and 100, 400, 1600, and 2000 MHz CBWs for maximum testable SNR derivation. Proposal 6: Ask inputs from TE vendors on the following test system parameters to derive max testable SNR: * TE amplifier 1dB compression, dBm;
* Backoff from 1dB compression, dB;
* Cable loss, dB;
* Free space path loss, dB;
* TE DL absolute power setting uncertainty, dB;
* Probe antenna gain, dB;
* Beam peak search procedure/measurement error, dB.
 |
| [**R4-2201921**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201921.zip)On Vehicular UEs | Keysight Technologies UK Ltd | Proposal 1: Avoid developing a standardized ground plane for FR2 vehicular UEs as part of this SIProposal 2: Consider the optional ground plane designed and manufactured by the OEM an integral part of the FR2 vehicular UE DUT submitted for conformance testing.Proposal 3: Pending feedback from vehicular UE OEMs, consider battery and AC/DC powered operation acceptable for FR2 vehicular UEs and request manufacturers to provide proper guidance on cable routings. |
| [**R4-2201927**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201927.zip)UE types and permitted methods for FR2-2 | Intel Corporation | *UE types*Observation 1: Measurement uncertainty analysis will focus on handheld UEs in Rel-17 and further discussion on its array size is needed before starting the analysis. *PC3 antenna array*Observation 2: For handheld UE in FR2-1, core requirements assumed a baseline 4x1 array, while the testability/MU analyses used an 8x2 array. For FR2-2, array size discussions for core requirements are currently ongoing and may result in a larger sized array.Proposal 1: RAN4 should discuss feasible worst-case array sizes for both an 8-element and 16-element array assumption.Proposal 2: If no conclusion is found for the array size of PC3 in this meeting, derive MU based on two worst-case sizes.*Applicability of permitted test methods*Observation 3: Besides updating frequency-dependent parameters and relevant assumptions, the permitted RF test methods (clause 5.2) can be extended to FR2-2.Proposal 3: Unless otherwise stated, FR2-2 will follow the baseline UE RF methodology detailed in TR 38.810. MU assessment will be revised to reflect proper frequency-dependent parameters and worst-case array size.*Applicability of test methodology enhancements*Observation 4: Some methodology enhancement techniques for test time reduction (Objective 5) can be extended to FR2-2. Objective 3 should be postponed until these core requirements are discussed and defined. Objectives 1 and 4 need more discussion.Proposal 4: Applicability of methodology enhancements of three methods in Objective 5 can be extended to FR2-2. Objective 3 discussions should be postponed until core requirements are discussed. Lastly, we should further discuss the remaining objectives. |
| [**R4-2201990**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201990.zip)Issues with MIMO EVM Measurement Using the Pseudo-Inverse | Lenovo, Motorola Mobility | Proposal 1: If H ̃ has full rank, then G\_ZF=H ̃^(-1). If H ̃ has does not have full rank, the two layers cannot be separated and the EVM requirement is failed.A text proposal for Section 5.2.3.1.1.2 of TR38.884-120 implementing **Proposal 1** for Method 1 MIMO equalization is given in the Appendix below.**Proposal 2:** Agree to the text proposal for Section 5.2.3.1.1.2 of TR38.884-120 in the Appendix. |

## Open issues summary

### Sub-topic 2-1: UE types

**Issue 2-1a: Vehicular UE – ground plane**

*In RAN4 #101e, a vehicular UE was defined to be the combination of OBU/TCU + antenna + optional ground plane [R4-2120767]. Discussions for this UE type included UE architecture and ground plane details, and companies were encouraged to share their views in this meeting.*

* Proposal 1: Avoid developing a standardized ground plane for FR2 vehicular UEs as part of this SI (Keysight, R4-2201921)
* Proposal 2: Consider the optional ground plane designed and manufactured by the OEM an integral part of the FR2 vehicular UE DUT submitted for conformance testing. (Keysight, R4-2201921)
* Recommended WF
	+ Moderator suggests companies share their views on whether Proposal 1 and Proposal 2 are agreeable. Additional feedback on ground plane is welcomed.

**Issue 2-1b: Vehicular UE – power supply and routings**

* Proposal 3: Pending feedback from vehicular UE OEMs, consider battery and AC/DC powered operation acceptable for FR2 vehicular UEs and request manufacturers to provide proper guidance on cable routings. (Keysight, R4-2201921)
* Recommended WF
	+ Moderator suggests companies provide their views on Proposal 3 and give guidance on cable routings.

**Issue 2-1c: Handheld UE – worst-case antenna array size**

*FR2-2 array size discussions for PC3 core requirements are currently ongoing and may result in a larger sized array than the baseline 4x1 used in FR2-1. Currently, the array sizes being considered include: 4, 8 and 16 – elements. To make progress in our discussions, we should address what would be feasible worst-case array sizes for an 8-element array and a 16-element array.*

* Proposal 1: RAN4 should discuss feasible worst-case array sizes for both an 8-element and 16-element array assumption. (Intel, R4-2201927)
* Recommended WF
	+ Companies share their views on feasible worst-case sizes for a handheld UE with an 8-element and 16-element antenna array assumption.

**Issue 2-1d: Handheld UE – MU assessment**

*Given the study item’s timeline, if no consensus on the array size assumption of PC3 is reached during this meeting, we may proceed with MU derivations based on two separate worst-case sizes:*

* *8x2*
* *Larger than 16-elements worst-case (suitable for either an 8-element or larger core array assumption)*
* Proposal 2: If no conclusion is found for the array size of PC3 in this meeting, derive MU based on two worst-case sizes. (Intel, R4-2201927)
* Recommended WF
	+ Companies provide their views on Proposal 2 and other options to make progress during this meeting.

### Sub-topic 2-2: Test methodology for UE RF

**Issue 2-2a: MIMO EVM Measurement**

*In R4-2201990 an issue of EVM measurement for two-layer Tx is identified. Basically, using pseudo-inverse matrix in zero-forcing equalization does not allow to separate MIMO layers and hence correctly measure EVM. The following observations and proposals were made:*

* Observation 1: If a square matrix $\tilde{H}$ has full rank, then $\tilde{H}^{+}=\tilde{H}^{-1}$, and the pseudo-inverse is not needed. (Lenovo, Motorola Mobility)
* Observation 2: If a square matrix $\tilde{H}$ does not have full rank, then $\tilde{H}^{H}\tilde{H}$ does not have full rank and the inverse $\left(\tilde{H}^{H}\tilde{H}\right)^{-1}$does not exist. As a result, if $\tilde{H}$ ̃ does not have full rank, then the pseudo-inverse cannot be defined or computed as

$$\tilde{H}^{+}=\left(\tilde{H}^{H}\tilde{H}\right)^{-1}\tilde{H}^{H}$$

So, if the pseudo-inverse $\tilde{H}^{+}$were to be used, it would be necessary to define it in some other manner such as in terms of the singular value decomposition of $\tilde{H}$. (Lenovo, Motorola Mobility)

* Observation 3: If the square matrix $\tilde{H}$ does not have full rank, then it is not possible to separate the MIMO layers using the pseudo-inverse or any other linear receiver and the EVM requirement will be failed. (Lenovo, Motorola Mobility)
* Observation 4: If $\tilde{H}$ does not have full rank and $G\_{ZF}=\tilde{H}^{+}$is used, the resulting EVM will be no less than 71%. (Lenovo, Motorola Mobility)
* Proposal 1: If $\tilde{H}$ has full rank, then $G\_{ZF}=\tilde{H}^{-1}$. If $\tilde{H}$ has does not have full rank, the two layers cannot be separated and the EVM requirement is failed. (Lenovo, Motorola Mobility)
* Proposal 2: Agree to the text proposal for Section 5.2.3.1.1.2 of TR38.884-120 in the Appendix. (Lenovo, Motorola Mobility)
* Recommended WF
	+ Companies are encouraged to provide their view on necessity of EVM measurement methodology update and suggested text proposal for TR38.884.

**Issue 2-2b: Permitted test methods**

*With the relevant frequency-dependent parameters updated, the UE RF testing methodology and permitted test methods in TR 38.810 can be extended to FR2-2. As the editor’s note in clause 5 of TR 38.884 states, the baseline UE RF methodology includes testing and calibration of permitted methods along with a preliminary assessment of measurement uncertainty (detailed in Annex B).*

* Proposal: Unless otherwise stated, FR2-2 will follow the baseline UE RF methodology detailed in TR 38.810. MU assessment will be revised to reflect proper frequency-dependent parameters and worst-case array size. (Intel, R4-2201927)
* Recommended WF
	+ Moderator suggests companies share their views on whether the above Proposal is agreeable, and if additional aspects need to be considered to extend applicability of permitted test methods to FR2-2.

**Issue 2-2c: Enhanced test methodology**

*The test methodology enhancements captured in Objectives 1 through 5 of this study also need to be evaluated. We previously agreed that the enhancements content found in TR 38.884 would be used as baseline to start the FR2-2 applicability assessment. Furthermore, test time reduction methods have been discussed and agreed to be extended to FR2-2 [R4-2115767].*

* **Proposal 1:** At least, RSRPB based Rx beam peak search, Single link polarization measurement and Fast Spherical Coverage Method can be applied to 52.6-71GHz directly. (vivo)

**Agreement:** Proposal 1 is agreed.

* Proposal: Applicability of methodology enhancements of three methods in Objective 5 can be extended to FR2-2. Objective 3 discussions should be postponed until core requirements are discussed. Lastly, we should further discuss the remaining objectives.
* Recommended WF
	+ Moderator suggests companies share their view on the Proposal above, particularly postponing Objective 3 discussions. Additionally, companies can provide their input on whether an enhancement can be extended to FR2-2 or needs to be assessed and further discussed (use Objectives below for inputs).
		- Objective 1 – methodology for high DL power and low UL power test cases
		- Objective 2 – solutions to minimize the impact of polarization basis mismatch
		- Objective 4 –extreme temperature conditions for all applicable FR2 UE RF test cases
		- Objective 5 – test time reduction

### Sub-topic 2-3: Test methodology for RRM

**Issue 2-3a: FR2-1 RRM test methodology reuse**

* Proposal 1: All test methods and measurement setup for FR2 RRM methodology defined in TR 38.810 [3] Clause 6 are applicable for FR2-2, except for Noc derivation (TR 38.810 - Clause 6.2.1.4.3) and Maximum SNR derivation (TR 38.810 - Annex B.2) (Intel)
* Recommended WF
	+ Companies are encouraged to provide their view on the above proposal.

**Issue 2-3b: Noc level derivation**

*In RAN4 #101e Noc level derivation for UE demodulation test methods were discussed.*

* Proposal 1: For FR2-2 RRM testing the Noc level is derived similar to the Noc level for UE demodulation test methods (Intel)
* Recommended WF
	+ Companies are encouraged to share their views on whether Noc level derivation for RRM testing can be reused from demodulation testing methodology for FR2-2.

**Issue 2-3c: Informative assessment of the testable RRM DL SNR range**

*In RAN4 #101e it was agreed to provide informative assessment on max testable DL SNR for FR2-2 for UE demodulation test methods.*

* Proposal 1: Perform an informative assessment of testable RRM DL SNR range for FR2-2 for maximum frequency (~71GHz) using TR38.810 methodology as starting point (Intel)
* Recommended WF
	+ Companies are encouraged to provide their view on the above proposal.

### Sub-topic 2-4: Test methodology for UE demodulation and CSI

**Issue 2-4a: Multi-path fading channel model**

*Captured in R4-2120767*

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| **Agreement:** Define methodology for multi-path fading and static propagation conditions modelling for FR2-2* Reuse FR2-1 static propagation conditions methodology for FR2-2
* Channel model parameters i.e. delay spread and Doppler spread need to be defined firstly.
 |

* Proposal 1: For analysis of FR2-2 test methodology definition for multi-path fading channels consider TDL-A channel model with RMS delay spread is in range of 5-20ns and with 3km/h UE mobility (Intel)
* Recommended WF
	+ Moderator suggests discussing the proposed channel model for further FR2-2 analysis.

**Issue 2-4b: Path delay grid**

*Captured in R4-2120767*

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| **Agreement:** For multi-path fading channel modelling, further discuss Fsample value with candidate options as following* Option 1: 2000MHz
* Option 2: 800MHz
* Option 3: 400MHz
* Other options not precluded
 |

* Proposal 1: For multi-path fading channel modelling use Fsample = 2000MHz for channel bandwidth up to 2000MHz as long the value is feasible from TE implementation perspective. (Intel)
* Recommended WF
	+ Companies are encouraged to provide their view on the proposed 2000MHz sampling frequency and 2000MHz channel bandwidth for multi-path fading channel modelling.

**Issue 2-4c: Noc level derivation**

*Captured in R4-2120767*

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| ***Agreement:*** Define Noc levels for FR2-2 UE demodulation testing based on FR2-1 methodology:* Noc (PC\_X, Band\_Y) = RESFENSPCX, BandY -10log10(SCSREFSENS x PRBREFSENS x 12) - SNRREFSENS + ∆thermal
* FFS: Noc(PC\_X, Band\_Y) = -155 dBm/Hz + REFSENSPC\_X, Band\_Y, 100MHz – REFSENSPC3, n260, 100MHz
* Note: Further confirmation of used parameters is needed based on core requirements definition.
 |

* Proposal 1: Define Noc levels for FR2-2 UE demodulation testing only based on the following definition:

Noc (PC\_X, Band\_Y) = RESFENSPCX, BandY -10log10(SCSREFSENS x PRBREFSENS x 12) - SNRREFSENS + ∆thermal (Intel)

* Proposal 2: Consider parameters from Table 2 for Noc level definition. (Intel)

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| Parameter | Clarification/Value |
| REFSENSPCX, BandY | The REFSENS value in dBm specified for Power Class X UE in band Y |
| CBW for REFSENS | 100 MHz |
| SCSREFSENS | 120 kHz |
| PRBREFSENS | NRB associated with subcarrier spacing SCSREFSENS for channel bandwidth used for REFSENS calcualtion |
| SNRREFSENS | -1 dB |
| ∆thermal | An amount of dB that the wanted noise is set above UE thermal noise, giving a rise in total noise of ∆BB. ∆thermal = 6dB, giving a rise in total noise of 1dB |

* Recommended WF
	+ Companies are encouraged to provide their view whether proposed and only proposed equation can be used for Noc level derivation for FR2-2.
	+ Companies are encouraged to provide their view on the proposed parameters.

**Issue 2-4d: Informative assessment of the testable Demodulation DL SNR range**

*Captured in R4-2120767*

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| **Agreement:** RAN4 to perform an informative assessment of testable DL SNR range for FR2-2 for maximum frequency (~71GHz) using TR38.810 methodology as starting point.* Derivation of max testable SNR for other portions of FR2-2 range may be further performed
* Further refinement on the test methodology from TR 38.810 not precluded
 |

* General methodology
	+ Observation 1: Atmospheric attenuation has no impact on path loss at the range scales of an FR2 testing chamber (Apple)
	+ Observation 2: In general, a simple extension of the permitted methods up to FR2-2 does not appear to yield a system capable of achieving a sufficient SNR for demodulation testing. (Apple)
	+ Proposal 1: Further discussion on how to achieve testable SNR ranges for band n263 is needed. (Apple)
* Test methods and CBWs to be considered
	+ Proposal 1: Consider DNF, DFF, and IFF test methods and 100, 400, 800, 1600, and 2000 MHz CBWs for maximum testable SNR derivation (Intel)
* Required parameters for assessment
	+ Observation 1: For 71 GHz and reference range length of 0.725m the path loss is 66.7 dB (Apple)
	+ Observation 2: For 71 GHz the cable loss per meter is 10.3 dB (Apple)
	+ Observation 3: The values of probe antenna gain and backoff from P1dB need to be further checked with test equipment vendors to verify their applicability to band n263 (Apple)
	+ Proposal 1: Ask inputs from TE vendors on the following test system parameters to derive max testable SNR: (Intel)
		- TE amplifier 1dB compression, dBm;
		- backoff from 1dB compression, dB;
		- Cable loss, dB;
		- Free space path loss, dB;
		- TE DL absolute power setting uncertainty, dB;
		- Probe antenna gain, dB;
		- Beam peak search procedure/measurement error, dB.
* Recommended WF
	+ Companies are encouraged to discuss observations made for SNR calculation methodology for FR2-2 and provide their views on the proposed test methods and CBWs to be considered.
	+ TE vendors are encouraged to provide their view on the required test system parameters.

### Sub-topic 2-5: Text proposals for TR 38.884

**Issue 2-5: TP on test methods extension to FR2-2**

*TP R4-2201873 on the extension of test methods to FR2-2 covers the following:*

* *UE RF permitted test methods (general aspects)*
* *UE RF testing methodology enhancements (sub-clause headings)*
* *RRM testing methodology enhancements*
* *UE Demodulation testing methodology enhancements*
* *Propagation conditions*
* Recommended WF
	+ Moderator suggests companies provide any feedback on TP R4-2201873 directly into Section **2.3.2 CRs/TPs** **comments collection**.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 2-1: UE types

Issue 2-1a: Vehicular UE – ground plane

Issue 2-1b: Vehicular UE – power supply and routings

Issue 2-1c: Handheld UE - worst-case antenna array assumption

Issue 2-1d: Handheld UE – MU assessment

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| **Company** | **Comments** |
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Sub-topic 2-2: Test methodology for UE RF

Issue 2-2a: MIMO EVM Measurement

Issue 2-2b: Permitted test methods

Issue 2-2c: Enhanced test methodology

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| **Company** | **Comments** |
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Sub-topic 2-3: Test methodology for UE RRM

Issue 2-3a: FR2-1 RRM test methodology reuse

Issue 2-3b: Noc level derivation

Issue 2-3c: Informative assessment of the testable RRM DL SNR range

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| **Company** | **Comments** |
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Sub-topic 2-4: Test methodology for UE demodulation and CSI

Issue 2-4a: Multi-path fading channel model

Issue 2-4b: Path delay grid

Issue 2-4c: Noc level derivation

Issue 2-4d: Informative assessment of the testable Demodulation DL SNR range

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| **Company** | **Comments** |
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### CRs/TPs comments collection

*Moderator suggests companies to comment directly for the CR below. in 1.3.2 CRs/TPs comment collection*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2201873**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201873.zip) | 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 #1-1:** | **TBA** |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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

**TBA**

## Companies views’ collection for 2st round

### Open issues

**TBA**

## Summary for 2nd round

### Open issues

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|  | **Status summary**  |
| **Issue 2-1:** | **TBA** |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
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|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2200452 | TP to TR 38.884 on release independence applicability of test method enhancements | Apple |  |  |
| R4-2200907 | On permitted test methods for demodulation in FR2-2 | Apple |  |  |
| R4-2201873 | TP to TR 38.884 on extension of NR test methods to FR2-2 | Intel Corporation |  |  |
| R4-2201874 | NR FR2-2 OTA test methods for RRM | Intel Corporation |  |  |
| R4-2201875 | NR FR2-2 OTA test methods for UE demodulation | Intel Corporation |  |  |
| R4-2201990 | Issues with MIMO EVM Measurement Using the Pseudo-Inverse | Lenovo, Motorola Mobility |  |  |
| R4-2201921 | On Vehicular UEs | Keysight Technologies UK Ltd |  |  |
| R4-2201927 | UE types and permitted methods for FR2-2 | Intel Corporation |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

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| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents