**3GPP TSG-RAN WG4 Meeting # 100-e R4-210XXXX**

**Electronic Meeting, August 16-27, 2021**

**Agenda item:** 9.16.6

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [100-e][139] NR\_ext\_to\_71GHz\_Part\_3

**Document for:** Information

# Introduction

This email discussion is to discuss the co-existence simulation for extend to 71 GHz WI. The targets of the two rounds are as following,

* 1st round:
	+ Summarize and collect comments on simulation assumption, calibration and future plans to have some tentative agreements.
* 2nd round: TBA
	+ Agree the co-existence simulation WF.

# Topic #1: Simulation assumption

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| Rev R4-2111914 | CATT | The confirmation of the simulation assumption and the calibration between different companies are needed. |
| Rev R4-2112020 | Korea Testing Laboratory | **Proposal 1: Further study for coexistence in dynamic time-division duplex (D-TDD) systems is required in indoor scenarios.****Proposal 2: study of timing asynchronous scenario which can affect TP loss caused by ACIR for indoor scenarios.** |
| R4-2112997 | vivo | **Proposal 2: For UL coexistence study, the EIRP limit and power control parameters should be further studied.** |
| R4-2113316 | Ericsson | **Proposal 1:** It is proposed to use antenna model parameter sets in Table 2.1-2 if co-existence simulations are considered or if antenna parameters are shared to other groups.**Table 2.1-2: Deployment scenarios**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Sub-urban** | **Urban** | **Dense urban** | **Indoor**  |
| *Am* (dB) | 30 | 30 | 30 | 30 |
| *SLAv* (dB) | 30 | 30 | 30 | 30 |
| *3dB* (deg.) | 90 | 90 | 90 | 90 |
| *3dB* (deg.) | 90 | 90 | 90 | 90 |
| *GE,max* (dBi) | 5.3 | 5.3 | 5.3 | 5.3 |
| *LE* (dB) | 2.2 | 2.2 | 2.2 | 2.2 |
| *M* | 32 | 16 | 8 | 4 |
| *N* | 32 | 16 | 16 | 8 |
| *P* | 2 | 2 | 2 | 2 |
| *dv* (m) | 0.5 | 0.5 | 0.5 | 0.5 |
| *dh* (m) | 0.5 | 0.5 | 0.5 | 0.5 |
| *range* (deg.) | 90 to 120 | 90 to 120 | 90 to 120 | 60 to 120 (1) |
| *range* (deg.) | -60 to 60 | -60 to 60 | -60 to 60 | -60 to 60 (1) |
| *Ptx*(dBm) | 2 | 2 | 2 | 2 |
| Note 1: Ceiling mounted base station is considered |

 |
| R4-2112146 | Qualcomm CDMA Technologies | UE Minimum conducted power is assumed as -20dBm. |

## Open issues summary and companies views’ collection for 1st round

### Sub-topic 1-1

**Issue 1-1: Synchronization assumption of indoor scenario**

* Proposals
	+ Option 1: Proposals in Rev R4-2112020
		- Proposal 1: Further study for coexistence in dynamic time-division duplex (D-TDD) systems is required in indoor scenarios.
		- Proposal 2: study of timing asynchronous scenario which can affect TP loss caused by ACIR for indoor scenarios.
	+ Option 2: Synchronized TDD is assumed as TR 38.803
* Recommended WF
	+ To be discussed

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-2

**Issue 1-2: UE EIRP limit assumption**

* Proposals
	+ Option 1: Proposal in R4-2112997

**Proposal 2: For UL coexistence study, the EIRP limit and power control parameters should be further studied.**

* + Option 2: Keep current assumption in WF R4-2107915
* Recommended WF
	+ To be discussed

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| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-3

**Issue 1-3: UE power control parameters**

* Proposals
	+ Parameter used in R4-2112997
		- CLx-ile is selected as 116
	+ Parameter used in R4-2112146
		- UE minimum conducted power is -20 dBm.
* Recommended WF
	+ To be discussed

Moderator assumes the power control scheme in TR 38.803 will be reused, but some parameters may need to be modified.

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For uplink scenario, TPC model specified in Section 9.1 TR 36.942 is applied



with following parameters.

- CLx-ile = 88 + 10\*log10(200/X), where X is UL transmission BW (MHz)

- γ = 1

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Companies can comment the understanding, which parameter should be aligned and what value should be used.

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| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-4

**Issue 1-4: BS antenna model parameter**

* Proposals
	+ Option 1: Proposal1 in R4-2113316
		- **Proposal 1:** It is proposed to use antenna model parameter sets in Table 2.1-2 if co-existence simulations are considered or if antenna parameters are shared to other groups.

**Table 2.1-2: Deployment scenarios**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Sub-urban** | **Urban** | **Dense urban** | **Indoor**  |
| *Am* (dB) | 30 | 30 | 30 | 30 |
| *SLAv* (dB) | 30 | 30 | 30 | 30 |
| *3dB* (deg.) | 90 | 90 | 90 | 90 |
| *3dB* (deg.) | 90 | 90 | 90 | 90 |
| *GE,max* (dBi) | 5.3 | 5.3 | 5.3 | 5.3 |
| *LE* (dB) | 2.2 | 2.2 | 2.2 | 2.2 |
| *M* | 32 | 16 | 8 | 4 |
| *N* | 32 | 16 | 16 | 8 |
| *P* | 2 | 2 | 2 | 2 |
| *dv* (m) | 0.5 | 0.5 | 0.5 | 0.5 |
| *dh* (m) | 0.5 | 0.5 | 0.5 | 0.5 |
| *range* (deg.) | 90 to 120 | 90 to 120 | 90 to 120 | 60 to 120 (1) |
| *range* (deg.) | -60 to 60 | -60 to 60 | -60 to 60 | -60 to 60 (1) |
| *Ptx*(dBm) | 2 | 2 | 2 | 2 |
| Note 1: Ceiling mounted base station is considered |

* + Option 2: Keep current assumption in WF R4-2107915
* Recommended WF
	+ To be discussed

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| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-5

**Issue 1-5: Other simulation assumptions**

* Proposals
	+ None
* Recommended WF
	+ To be discussed

Companies can comment if any other different simulation assumptions compared with WF R4-2107915 should be revisited and decided.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

## 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:* |

## Discussion on 2nd round (if applicable)

# Topic #2: Calibration and alignment

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| Rev R4-2111914 | CATT |

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**Table 2.1-1: ACIR simulation results for indoor scenario, DL 5% throughput loss**

|  |  |  |
| --- | --- | --- |
|  | 100 MHz | 400 MHz |
| 60 GHz average | 13.5 dB | 13.5 dB |
| 60 GHz edge | 22.5 dB | 22.5 dB |
| 70 GHz average | 15 dB | 15 dB |
| 70 GHz edge | 23 dB | 23 dB |

**Table 2.1-2: ACIR simulation results for indoor scenario, UL 5% throughput loss**

|  |  |  |
| --- | --- | --- |
|  | 100 MHz | 400 MHz |
| 60 GHz average | 0 dB | 0 dB |
| 60 GHz edge | 2 dB | 1dB |
| 70 GHz average | 0 dB | 0 dB |
| 70 GHz edge | 4.5 dB | 3 dB |

**Table 2.2-1: ACIR simulation results for dense urban scenario, DL 5% throughput loss**

|  |  |  |
| --- | --- | --- |
|  | 100 MHz | 400 MHz |
| 60 GHz average | 8.5 | 6.5 |
| 60 GHz edge | 0 | 0 |
| 70 GHz average | 10.5 | 8.5 |
| 70 GHz edge | 0 | 0 |

**Table 2.2-2: ACIR simulation results for dense urban scenario, UL 5% throughput loss**

|  |  |  |
| --- | --- | --- |
|  | 100 MHz | 400 MHz |
| 60 GHz average | 0 | 0 |
| 60 GHz edge | 0 | 0 |
| 70 GHz average | 0 | 0 |
| 70 GHz edge | 0 | 0 |

The confirmation of the simulation assumption and the calibration between different companies are needed. |
| Rev R4-2112020 | Korea Testing Laboratory | **Observation: For NR DL at 60 GHz carrier frequency, ACIR would be limited by 16.5 dB for co-existence support to prevent more than 5% TP loss.** |
| R4-2112146 | Qualcomm CDMA Technologies | **Observation 1: For indoor deployments, an ACIR of 15 and 13.7 dB would be enough to keep degradation due to ACI within 5% loss for DL and UL, respectively.** **Observation 2: For dense deployment scenarios (i.e., coordinated, and uncoordinated), the system is noise limited. For UL, with the current assumptions is not possible to close the link budget. For downlink, a very low ACIR (around 6 dB) would be enough to keep degradation due to ACI within 5% loss, this is because the impact of noise is dominating, making adjacent channel interference less relevant in terms of relative throughput degradation.****Observation 3: We can consider the ACIR limits considered in TR 38.803 for 70 GHz as a basis for 52.6-71 GHz. The ACIR limit is driven by indoor deployment scenario (while UMi scenario is highly noise limited).** |
| R4-2112997 | vivo | Table 2. Summary of co-existence simulation results

|  |  |  |
| --- | --- | --- |
|  | Indoor office | Dense urban |
| 60G | 70G | 60G | 70G |
| DL: ACIR (5% TP loss) | 15 dB | 15 dB | 0 dB | 0 dB |
| UL: ACIR (5% TP loss) | 0 dB | 0 dB | 0 dB | 0 dB |

**Observation 1: The ACIR value meeting 5% throughput loss is 15 dB in 60/70 GHz frequency for indoor office scenario.****Observation 2: In UL, the throughput loss for indoor case is rather low for 60/70 GHz frequency.****Observation 3: In DL, the throughput loss would not exceed the 5% criterion for the dense urban scenario.** **Observation 4: In Dense urban scenario, the UL SINR cannot reach the minimum value to calculate the throughput, in this case UL throughput is 0.** **Proposal 1: For DL case, re-evaluate ACIR for 60/70 GHz carrier frequency.****Proposal 2: For UL coexistence study, the EIRP limit and power control parameters should be further studied.** |
| R4-2113924 | ZTE Corporation | **Observation: more stringent DL ACIR requirement are needed for 52.6-71GHz due to different antenna configuration and lower output power limit.**Table 5.5-9S: Interpolated ACIR values for DL to meet the 5% throughput loss criteria at 70GHz

|  |  |  |
| --- | --- | --- |
| **Scenario** | **Indoor** | **Dense urban** |
| **NF [dB]** | **13** | **15** | **13** | **15** |
| **ZTE** | **Average** | 9.25  | 9.10  | 5.00  | 5.00  |
| **5%-tile** | 19.21  | 18.13  | NA | NA |

Table 2. simulation results for uplink in indoor scenario

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sCase | ACIR [dB] | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
| 60GHz, 100MHz | Average throughput loss | 0.32  | 0.10  | 0.03  | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  |
| Cell edge through loss | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN |
| 60GHz, 400MHz | Average throughput loss | 0.13  | 0.04  | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Cell edge through loss | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN |
| 70GHz, 100MHz | Average throughput loss | 0.22  | 0.08  | 0.03  | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  |
| Cell edge through loss | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN |
| 70GHz, 400MHz | Average throughput loss | 0.09  | 0.03  | 0.01  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Cell edge through loss | NaN | NaN | NaN | NaN | NaN | NaN | NaN | NaN |

 |
| R4-2112277 | Nokia, Nokia Shanghai Bell | Observation 1) Scenario Indoor-C is a more stringent case compared to Scenario Outdoor-A in term of the required downlink and uplink ACIR to limit the average and 5%-tile downlink throughput losses of the victim UE to 5%.Observation 2) The average and 5%-tile downlink throughput losses of the victim UE can only be limited to 5% in the simulated Scenario Indoor-C with downlink ACIR offsets of 1dB (i.e. 1dB more stringent ACIR compared to the ACIR using 23.5dB BS ACLR and 20.5dB UE ACS).Observation 3) The average and 5%-tile uplink throughput losses of the victim UE can only be limited to 5% in the simulated Scenario Indoor-C with uplink ACIR offsets of 4dB (i.e. 4dB more stringent ACIR compared to the ACIR using 15dB UE ACLR and 21.5dB BS ACS).Therefore, our preliminary simulation results show there is no technical justification to relax the required ACIR values compared to the current ones in TR 38.803 at 70GHz carrier frequency.Observation 4) There is no technical justification to relax the required ACIR values compared to the current ones in TR 38.803 at 70GHz carrier frequency**.**Hence it is proposed that:**Proposal 1) New coexistence simulation is not required and the results in TR 38.803 can be reused to decide the required ACIR values for extending current NR operation to 71 GHz.** |

## Companies’ comments for simulations results for 1st round

If there’s any questions/comments for the simulation results, companies can comment and respond here.

|  |  |
| --- | --- |
| **Tdoc number** | **Comments collection** |
| Rev R4-2111914Some co-existence simulation results for 57-71 GHz, CATT | Company A |
| Company B |
|  |
| Rev R4-2112020Simulation results for NR DL coexistence study: indoor deployment at 60GHz, Korea Testing Laboratory | Company A |
| Company B |
|  |
| R4-2112146NR coexistence simulation results for 52.6-71 GHz, Qualcomm CDMA Technologies | Company A |
| Company B |
|  |
| R4-2112997Initial simulation results for coexistence studies, vivo | Company A |
| Company B |
|  |
| R4-2113924Initial coexistence simulation results for 52.6-71GHz, ZTE Corporation | Company A |
| Company B |
|  |
| R4-2112277Proposals on coexistence simulation for extending current NR operation to 71 GHz, Nokia, Nokia Shanghai Bell | Company A |
| Company B |
|  |

## Open issues summary

According to the contributions provided in this meeting, moderator thinks calibration between companies is needed. Companies need to agree what needs to be calibrated for the simulation.

### Sub-topic 2-1

**Issue 2-1: What need to be calibrated for the simulation?**

* Recommended WF
	+ DL SINR/SNR cdf, UL SINR/SNR cdf, coupling loss cdf
	+ Others (?)

Companies please comment or propose what needs to calibrated for the co-existence simulation.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

## 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:* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: Work plan for future meetings

According to the contributions provided in this meeting, moderator thinks it’ll be good that a work plan is set and agreed to guarantee the co-existence simulation progress.

## Open issues summary

### Sub-topic 3-1

**Issue 3-1: Work plan for the co-existence simulation**

* Recommended WF
	+ RAN4#100e: Agree the simulation assumption and the calibration aspects.
	+ During the period between RAN4#100e and RAN4#101e: Offline calibrate between the companies.
	+ RAN4#101e: Calibrate and align the simulation results, try to agree preliminary ACIR.
	+ RAN4#101b-e: Further update simulation results if any, agree the final ACIR requirement.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

## Summary for 1st round

### Open issues

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

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

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
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**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| Rev [R4-2111914](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2111914.zip) | Some co-existence simulation results for 57-71 GHz | CATT |  |  |
| Rev [R4-2112020](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112020.zip) | Simulation results for NR DL coexistence study: indoor deployment at 60GHz | Korea Testing Laboratory |  |  |
| [R4-2112146](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112146.zip) | NR coexistence simulation results for 52.6-71 GHz | Qualcomm CDMA Technologies |  |  |
| [R4-2112997](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112997.zip) | Initial simulation results for coexistence studies | vivo |  |  |
| [R4-2113924](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113924.zip) | Initial coexistence simulation results for 52.6-71GHz | ZTE Corporation |  |  |
| [R4-2112277](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112277.zip) | Proposals on coexistence simulation for extending current NR operation to 71 GHz | Nokia, Nokia Shanghai Bell |  |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
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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

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)