**3GPP TSG-RAN WG4 Meeting # 101-Bis-e R4-22xxxx**

**Electronic Meeting, 17th – 25th January, 2021**

**Agenda item:** 6.5.1

**Source:** Moderator (Qualcomm Incorporated)

**Title:** Email discussion summary for [101bis-e][301] NR\_Repeater\_General

**Document for:** Information

# Introduction

This email thread is discussing several issues regarding the introduction of repeaters for NR in both FR1 and FR2. The main topics for discussion are listed below:

* 1st round:
	+ System parameters
	+ TDD Repeater Switching Requirements
	+ Other issues
* 2nd round: TBA

# Topic #1: System Parameters

*Several system parameters are discussed in this section. The discussion is mainly on continuations from the last meeting.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200089**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200089.zip) | CATT | **Proposal 1:** **NR BS co-located requirements can be reused for multi-band NR repeater co-location requirements.** |
| [**R4-2200818**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200818.zip) | CMCC | **Observation 1: operators are suggested to avoid co-location deployment between repeater and gNB. Since such co-location scenarios may not be avoided, it’s better to still consider the scenario that repeater is co-located with gNB.** **Observation 2: NR repeater maybe co-located with other RAT repeater over non-overlapping spectrum.****Proposal 1: It is still suggested to retain co-located related requirements in repeater spec assuming repeater maybe co-located with gNB and other RAT repeater over different non-overlapping frequency range.****Proposal 2: it is suggested to only retain co-located requirement between repeater and gNB and doesn’t explicitly define repeater-repeater co-located spurious emission requirements.****Proposal 3: interference signal strength is assumed to be 16dBm for co-located input IMD requirements regardless repeater is co-located with gNB or other repeater.****Proposal 4:** **interference signal strength is assumed to be 30dB lower than wanted signal when define output IMD requirements.** |
| [**R4-2201289**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201289.zip) | ZTE Corporation | **Proposal 1: It is appropriate to associate the co-location spurious emission requirement with the repeater class.****Proposal 2: The requirements related to multi-band co-location at this stage are only applicable to type 1-C repeaters.****Proposal 3: Define the the following definition: “multi-band repeater: Antenna Connector of repeater type 1-C associated with a transmitter or receiver that is characterized by the ability to process two or more pass band(s) in common active RF components simultaneously, where at least one pass band is configured at a different operating band than the other pass band(s) and where this different operating band is not a sub-band or superseding-band of another supported operating band.”****Proposal 4: The description text of input intermodulation can refer to the relevant text in the NR BS specification, and the co-located TDD repeater that are synchronized and using the same or adjacent operating band can transmit without special co-locations requirements. For unsynchronized TDD repeater, it may need further evaluation.****Proposal 5: It is reasonable to re-use the co-location requirements of NR or LTE respectively; No need to make additional changes to the requirements; declare the exclusion or provision of the multi-band scenario through Notes.****Proposal 6: We believe that re-using the BS spurious emission co-location requirements in TS 38.104 could be a good starting point.****Proposal 7: The LTE repeater input intermodulation requirements could be a good starting point.****Proposal 8: The input intermodulation requirements shall apply in addition inside any Inter RF pass band gap.** |

## Open issues summary

### Sub-topic 1-1

Pass band definition:

There is one proposal for the pass band definition as stated below:

**Issue 1-1: Multi-band repeater definition**

* Proposals
	+ Option 1: Define multi-bad repeater as follows:
		- **Antenna Connector of repeater type 1-C associated with a transmitter or receiver that is characterized by the ability to process two or more pass band(s) in common active RF components simultaneously, where at least one pass band is configured at a different operating band than the other pass band(s) and where this different operating band is not a sub-band or superseding-band of another supported operating band.**
	+ Option 2: Other definition
* Recommended WF
	+ Option 1

If Option 1 is not agreeable then propose an alternate definition or changes to improve the definition proposed.

### Sub-topic 1-2

Co-location requirements:

Co-location requirements are not yet agreed, they have to be discussed.

**Issue 1-2: Co-location requirements framework**

* Proposals
	+ Option 1: Retain co-location related requirements in repeater spec assuming repeater maybe co-located with gNB and other RAT repeater over different non-overlapping frequency range, do not define explicit repeater-repeater colocation spurious requirements.(CMCC)
	+ Option 2: Retain co-location related requirements in repeater spec assuming repeater maybe co-located with gNB and other RAT repeater over different non-overlapping frequency range, also define explicit repeater-repeater co-location spurious requirements.
	+ Option 3: Only define repeater-repeater co-location requirements (NR to NR and NR to other RATs)
	+ Option 4: Other options
* Recommended WF
	+ Option 1

Please state arguments for your choice to achieve better progress on this discussion

### Sub-topic 1-3

Co-location requirements:

**Issue 1-3: Co-location requirements**

* Proposals
	+ Option 1: NR or LTE BS co-location requirements can be reused for multi-band NR repeater co-location requirements
		- Differentiate repeater co-location requirement based on repeater class
	+ Option 2: NR or LTE BS co-location requirements can be reused for multi-band NR repeater co-location requirements
	+ Do not differentiate repeater co-location requirement based on repeater class, base requirements on class with highest power
* Recommended WF
	+ Option 1

If option 2 is preferred, please state supporting arguments

### Sub-topic 1-4

Co-location requirements, input IMD requirements

**Issue 1-4:**

* Proposals
	+ Option 1: interference signal strength is assumed to be 16dBm for co-located input IMD requirements regardless repeater is co-located with gNB or other repeater.
	+ Option 2: The LTE repeater input intermodulation requirements could be a good starting point. Input intermodulation requirements shall apply in addition inside any inter-RF pass band gap
	+ Option 3: others
* Recommended WF
	+ TBA

Please state your preference and supporting arguments. If a combination of options 1&2 or another option is preferred, please put forward a clear proposal

### Sub-topic 1-5

Co-location requirements, output IMD requirements

**Issue 1-5:**

* Proposals
	+ Option 1: interference signal strength is assumed to be 30dB lower than wanted signal when define output IMD requirements.
	+ Option 2: Take BS spurious emission co-location requirements in TS 38.104 as starting point.
	+ Option 3: others
* Recommended WF
	+ TBA

Please state your preference and supporting arguments. If a combination of options 1&2 or another option is preferred, please put forward a clear proposal

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1

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

Sub topic 1-2

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

Sub topic 1-3

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

Sub topic 1-4

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

Sub topic 1-5

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

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2200086 | Company A |
| Company B |
|  |
| R4-2200087 | 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:* |

### 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 (if applicable)

# Topic #2: TDD Repeater Switching Requirements

This section discusses how to define the switching requirements for TDD repeaters.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200090**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200090.zip) | CATT | **Proposal 1: BS transient period requirement is reused for both repeater DL and UL, i.e. the requirement is for OFF to ON and ON to OFF.****Proposal 2: The reference point is the same as what is used for transmit output power. It can be discussed further in conformance test phase.** |
| [**R4-2200821**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200821.zip) | CMCC | **Proposal 1: output power and EVM should be tested during the whole ON state to ensure repeater doesn’t terminate amplification before the end of ON period.****Proposal 2: power levels for OFF state is suggested as below:*** **-85dBm/MHz per antenna connector for FR1 DL**
* **-50dBm/MHz per channel bandwidth for FR1 UL**
* **applying co-located spurious emission for co-located scenario if defined in repeater spec.**

**Proposal 3: OFF power should be tested during testing period start from the end of ON period + transition period to the start of next ON period – transition period for repeater’s transient period testing as shown in above fig 1.****Observation 1: we should regulate group delay requirements to avoid U->D interference.****Proposal 4: define [5-10]us group delay requirements or at least test group delay requirements based on vendor’s declaration.** |
| [**R4-2201290**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201290.zip) | ZTE Corporation | **Observation 1: When the synchronization issues can be decoupled from TDD switching requirements i.e. the repeater can be synchronized by default or through other requirements, the switching requirements including transmitter OFF power and transient period could ensure that the repeater successfully completes the switching operation.****Observation 2: When The synchronization issues can not be decoupled from TDD switching requirements, in order to ensure that the switching operation works correctly, additional switching requirements may need to be introduced to implicitly solve the synchronization issue of repeater.****Proposal 1: RAN4 should first determine whether the switching requirements are related to synchronization issues. When synchronization can be guaranteed, transmitter OFF power and transient period are sufficient for switching operation, no additional switching requirements are needed.** |
| [**R4-2201526**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201526.zip) | Ericsson | **Proposal 1: The timing should be defined based on the slot timing, not the timing of the input signal for the core requirement.****Proposal 2: The agreed transition times are acceptable assuming that repeaters do not do any kind of digital conversion / processing.****Proposal 3: The declaration for the exception repeater should be: The repeater will not be deployed in which it can cause interference towards other nodes due to switching times.****Proposal 4: For FR1 DL, the OFF power shall be -85dBm / MHz per connector****Proposal 5: For FR2 DL, the OFF power shall be -36 dBm / MHz TRP****Proposal 6: For FR1 UL, the OFF power shall be -50dBm / (REF\_SCS\*(12\*NRB+1)/1000) per connector****Proposal 7: For FR2 UL, the OFF power shall be -36 dBm / MHz TRP** |
| [**R4-2201544**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201544.zip) | NEC | **Proposal 1: To agree off power limits same as BS/UE off power limits.****Proposal 2: To agree “no input signal” for off power requirement condition.****Proposal 3: To adopt transmitter transient period requirement for BS-side connector/RIB and UE-side connector/RIB, instead of DL-UL and UL-DL transient requirement.** |
| [**R4-2201656**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201656.zip) | Nokia, Nokia Shanghai Bell | **Observation 1: For conformance testing of DL-to\_UL switch,** 1. **Input signal needs to be at ON level till the end of the DL interval as per TDD configuration.**
2. **Input signal needs to be turned ON at the start of UL interval at the UE side of the repeater.**

**For conformance testing of UL-to-DL switch,** 1. **Input signal needs to be at ON level till the end of the UL interval at the UE side as per TDD configuration.**
2. **Input signal needs to be turned ON at the start of DL interval at the gNB side of the repeater.**

 Figure 1 DL-UL switching **Proposal 1: Include Figure 1 in the specification to illustrate repeater TDD switching procedure.****Proposal 2: For the UL OFF power level, use -50 dBm/actual Tx BW for FR1, but for FR2 use -36dBm/MHz.****Proposal 3: For FR1, the input power level for OFF power need not be specified; for FR2, the input signal should be OFF during repeater OFF period.****Proposal 4: The input power level for maximum output power in the downlink should be equal to (*maximum DL output power* – *maximum DL gain*) and the input power level for maximum output power in the uplink should be equal to (*maximum UL output power* – *maximum UL gain*).****Proposal 5: To allow declaring special implementation with long group delay, impact on frame utilization and/or possible deployment locations needs to be made visible in the specifications.****Proposal 6: Switching requirements are verified also for special implementation.** **Proposal 7: Confirm that the timing reference for the test should be the repeater input port.****Proposal 8: Confirm the following:** **For FR2 UL, DL-UL and UL-DL transition times are 3us.**  |

## Open issues summary

The following issues are discussed in this section:

1. transient time for FR2 UL(ramp-up/ramp-down)
2. transient time assuming no digital conversion/processing
3. Off power levels
4. timing reference – slot timing
5. timing reference – input port
6. handling of exception for group delay
7. Input power during repeater off period
8. input power for maximum output power
9. conformance testing of DL/UL to UL\DL switching
10. output power and EVM test
11. Synchronization handling

### Sub-topic 2-1

Transient time(ramp-up/ramp-down) for FR2 UL

**Issue 2-1: Transient time for FR2 UL**

* Proposals
	+ Option 1: Confirm 3us
	+ Option 2: Other options
* Recommended WF
	+ Option 1. If Option 2 is prepared, please provide an alternative proposal

### Sub-topic 2-2

Transition time assumption

**Issue 2-2: Transition time assumption**

* Proposals
	+ Option 1: transition times are acceptable assuming that repeaters do not do any kind of digital conversion / processing.
	+ Option 2: No need for any explicit assumption/agreement. Repeater just has to meet the requirement, actual implementation does not matter
	+ Option 3: Others
* Recommended WF
	+ TBD

If Option 3 is preferred please provide an alternative proposal

### Sub-topic 2-3

Off Power levels

**Issue 2-3: Off Power Levels**

* Proposals
	+ Option 1: Agree the following:
		- **For FR1 DL, the OFF power shall be -85dBm / MHz per connector**
		- **For FR2 DL, the OFF power shall be -36 dBm / MHz TRP**
		- **For FR1 UL, the OFF power shall be -50dBm / (REF\_SCS\*(12\*NRB+1)/1000) per connector**
		- **For FR2 UL, the OFF power shall be -36 dBm / MHz TRP**
	+ Option 2: Other proposals
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal

### Sub-topic 2-4

Time reference for timing measurements

**Issue 2-4: Time reference for transient times**

* Proposals
	+ Option 1: Use the slot timing, not the timing of the input signal to define core requirement
	+ Option 2: Use the input signal timing as reference for the core requirement
	+ Option 3: Others
* Recommended WF
	+ Option 1

Please state your preference and supporting arguments. If Option 3 is preferred, please provide an alternate solution

### Sub-topic 2-5

Reference point for timing measurements

**Issue 2-5: Reference point for timing measurements**

* Proposals
	+ Option 1: The reference is the input port
	+ Option 2: The reference point is the same as what is used for transmit output power
	+ Option 3: Other option
* Recommended WF
	+ Option 1

Please state supporting arguments for the preferred option. If option 3 is preferred, please provide an alternate proposal

### Sub-topic 2-6

Handling of exceptions for group delay

**Issue 2-6: Exceptions for group delay**

* Proposals
	+ Option 1: The declaration for the exception repeater should be: The repeater will not be deployed in which it can cause interference towards other nodes due to switching times.
	+ Option 2: Allow declaring special implementation with long group delay, impact on frame utilization and/or possible deployment locations needs to be made visible in the specifications.
	+ Option 3: Allow declaring special implementation with long group delay, impact on frame utilization and declare that repeater will not be deployed such that it could cause interference towards other nodes (combination of Option 1 and Option 2)
	+ Option 4: Other
* Recommended WF
	+ TBA

Please state your preference and supporting arguments. If Option 4 is preferred, please provide an alternate proposal.

### Sub-topic 2-7

Input power during repeater off period

**Issue 2-7: Input power during off period**

* Proposals
	+ Option 1: For FR1, the input power level for OFF power need not be specified; for FR2, the input signal should be OFF during repeater OFF period.
	+ Option 2:“no input signal” for off power requirement condition(for both FR1 and FR2)
	+ Option 3: Other options
* Recommended WF
	+ Option 2

If Option 3 is preferred, please provide an alternate proposal.

### Sub-topic 2-8

Input power for maximum output power

**Issue 2-8: Input power for maximum output power**

* Proposals
	+ Option 1: The input power level for maximum output power in the downlink should be equal to (maximum DL output power – maximum DL gain) and the input power level for maximum output power in the uplink should be equal to (maximum UL output power – maximum UL gain).
	+ Option 2:Other options
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal

### Sub-topic 2-9

Conformance testing of switching time

**Issue 2-9: Conformance testing of switching time**

* Proposals
	+ Option 1: Follow the description in Observation 1 of R4-2201656, also include the figure in the specifications
	+ Option 2:Follow the description in Observation 1 of R4-2201656, no need for any diagram in the specifications
	+ Option 3: Other testing methodology
* Recommended WF
	+ Option 1

If option 3 is preferred, please provide an alternate proposal

### Sub-topic 2-10

Output power and EVM testing for On period

**Issue 2-10: Output power testing during On period**

* Proposals
	+ Option 1: output power and EVM should be tested during the whole ON state to ensure repeater doesn’t terminate amplification before the end of ON period.
	+ Option 2:Other options
* Recommended WF
	+ TBD

If Option 2 is preferred, please provide an alternat proposals and supporting arguments.

### Sub-topic 2-11

Synchronization handling/assumptions

**Issue 2-11: Synchronization handling/assumptions**

* Proposals
	+ Option 1: Synchronization is assumed for the requirements and in the test (transmitter OFF power and transient period are sufficient for switching operation)
	+ Option 2:Other options
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1

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

Sub topic 2-2

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

 Sub topic 2-3

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

Sub topic 2-4

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

Sub topic 2-5

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

Sub topic 2-6

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| **Company** | **Comments** |
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Sub topic 2-7

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| **Company** | **Comments** |
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Sub topic 2-8

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| **Company** | **Comments** |
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Sub topic 2-9

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| **Company** | **Comments** |
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Sub topic 2-10

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

Sub topic 2-11

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

### 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** |
| [**R4-2200091**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200091.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.*

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

### 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)

*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 #4: Others

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2200088**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2200088.zip) | CATT | **Proposal: The environmental requirements are removed from the repeater core specification TS 36.106 and will be defined in the test specifications TS 38.115-1 and TS 38.115-2.** |
| [**R4-2201657**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201657.zip) | Nokia, Nokia Shanghai Bell | ***Proposal 1: Consider the conducted reference points for Repeater Type 1-C as shown in Figure 1, and Radiated reference points for Repeater Type 2-O as shown in Figure 2.******Figure 1:*** ***Conducted reference points for Repeater Type 1-C******Figure 2:*** ***Radiated reference points for Repeater Type 2-O******Observation 1: If the RDN is not needed as a component of the repeater in the Rel-17 repeater specification, the RDN will highly likely be required for Rel-18 network-controlled repeaters.******Observation 2: By looking at the BS regional requirement, we believe that there are some parameters (e.g., operating band, OBUE, etc.), which needs local or regional regulations.******Proposal 2: RAN4 to identify and discuss regional requirements for the repeaters.******Proposal 3: At least the following requirements need to be identified as regional requirements**** ***Operating bands***
* ***OBUE***
* ***Spurious emissions***
 |
| [**R4-2201932**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201932.zip) | Huawei | **Proposal 1:** Use the similar OTA beam declarations for the repeater as the BS.**Observation 1:** It is not suggested that it is necessary to test the repeater in as many directions as the BS as its functionality is much simpler, however the range of the directional performance should be known. The number of test directions can be further discussed during conformance:**Proposal 2:** the input condition must be a specified power and direction**Proposal 3:** defined the output power with specified input power and receive antennas reference direction.**Proposal 4:** The directional capability of the DL receive antenna is covered by the UL Tx declarations (and visa-versa).**Proposal 5:** keep the option to have 2 output power declarations for FBW greater than 6%.**Proposal 6:** EIRP and TP have accuracy requirements same as the BS. |

## Open issues summary

*Details related to the drafting of the specifications are not yet agreed, there are some proposal to further progress the work.*

### Sub-topic 3-1

Environmental Requirements in the specifications

**Issue 3-1: Environmental Requirements**

* Proposals
	+ Option 1: The environmental requirements are removed from the repeater core specification TS 36.106 and will be defined in the test specifications TS 38.115-1 and TS 38.115-2.
	+ Option 2: Other proposals
* Recommended WF
	+ TBA

Please state your preference. If option 2 is preferred, please provide some alternate proposal

### Sub-topic 3-2

Reference points in the specifications

**Issue 3-2: Reference points**

* Proposals
	+ Option 1: Consider the conducted reference points for Repeater Type 1-C as shown in Figure 1, and Radiated reference points for Repeater Type 2-O as shown in Figure 2 (R4-2201657
	+ Option 2: Other definitions for the reference points
* Recommended WF
	+ Option 1

Please provide comments if a different split is desired. If Option 2 is preferred, please provide an alternate work split proposal.

### Sub-topic 3-3

Handling of regional requirements

**Issue 3-3: Regional requirements**

* Proposals
	+ Option 1: RAN4 to identify and discuss regional requirements for the repeaters. Consider at least the following:
		- Operating bands
		- OBUE
		- Spurious emissions
	+ Option 2: No need to handle regional requirements
* Recommended WF
	+ Option 1

If other requirements should be added to option 1, please provide proposals. If Option 2 is preferred, please state the argument why these requirements do not need to be considered.

### Sub-topic 3-4

Beam declarations for testing

**Issue 3-4: Beam declarations**

* Proposals
	+ Option 1: Use the similar OTA beam declarations for the repeater as the BS.
	+ Option 2: Other declaration framework
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

### Sub-topic 3-5

Input conditions

**Issue 3-5: Input conditions**

* Proposals
	+ Option 1: The input condition must be a specified power and direction
	+ Option 2: Other conditions
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

### Sub-topic 3-6

Output power definition

**Issue 3-6: Output Power**

* Proposals
	+ Option 1: Define the output power with specified input power and receive antennas reference direction
	+ Option 2: Other definition
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

### Sub-topic 3-7

Directional capabilities of antennas

**Issue 3-7: Directional capabilities**

* Proposals
	+ Option 1: The directional capability of the DL receive antenna is covered by the UL Tx declarations (and visa-versa).
	+ Option 2: Other options
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

### Sub-topic 3-8

Output Power declaration options

**Issue 3-8: Output Power Declaration**

* Proposals
	+ Option 1: Keep the option to have 2 output power declarations for FBW greater than 6%.
	+ Option 2: Other definition
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

### Sub-topic 3-9

Output power accuracy

**Issue 3-9: Output Power Accuracy**

* Proposals
	+ Option 1: EIRP and TP have accuracy requirements same as the BS.
	+ Option 2: Other accuracy
* Recommended WF
	+ Option 1

If Option 2 is preferred, please provide an alternate proposal.

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1

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

Sub topic 3-2

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

Sub topic 3-3

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

Sub topic 3-4

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

Sub topic 3-5

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

Sub topic 3-6

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

Sub topic 3-7

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

Sub topic 3-8

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

Sub topic 3-9

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

### 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** |
| [**R4-2201529**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-bis-e/Docs/R4-2201529.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.*

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

### 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)

*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 |
|  |  |  |

**Existing tdocs**

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

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 |  |
|  |  |  |  |  |

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)