**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-210XXXX**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 8.11.1

**Source:** Moderator (Qualcomm)

**Title:** Email discussion summary for [98-bis-e][ 310] 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
  + Definition of repeater classes and types
  + Repeater support/operation for TDD systems
  + Other topics such as specification skeletons
* 2nd round: TBA

# Topic #1: System Parameters

This section discusses different system parameters such as multi band support, whether to simply reuse the parameters already defined for base stations and UEs, etc.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2104614**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104614.zip) | CMCC | **Proposal 1: NR repeater should support multi-band and the** **Tx/Rx RF core requirements for single band shall apply separately to each supported operating band unless otherwise stated.** |
| [**R4-2104667**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104667.zip) | Ericsson | **Observation 1: To avoid amplification of signals in neighbor operators’ carriers, a repeater would either need to implement configuration specific analogue filters or digital filtering.**  **Observation 2: If a repeater amplifies in neighbor operators’ carriers, it may in some cases be beneficial to the neighbor operator, but it may also cause degradations in neighbor operator networks.**  **Observation 3: Narrow beamwidths may provide spatial selectivity and reduce the impact of amplification on neighbor operator carriers as long as operators are not co-located.**  **Proposal 1: RAN4 discuss the impact of amplification on neighbor operator carriers within the operating band on 5G performance of the neighbors and repeater architectures.**  **Proposal 2: If the passband is assumed to potentially contain other operator’s carriers, consider a requirement on repeater emissions within the rest of the passband when only one carrier is transmitted/amplified by the repeater.** |
| [**R4-2106323**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106323.zip) | Nokia, Nokia Shanghai Bell | ***Observation 1: The required system parameters specified in [R4-2103882], [38.104], and [38.101-1] are comprehensive and sufficient, and a subset of these can be utilized as system parameters for NR repeaters as well.***  ***Observation 2: Main discussion for system parameters for repeaters is whether it is sufficient to refer to other specifications or is it practical to spell out the content also in repeater specification.*** |
| [**R4-2106348**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106348.zip) | NTT DOCOMO, INC. | **Observation 1: Multi-band supporting repeater is expected to be widely used.**  **Proposal 1: RAN4 define the requirements for multi-band supporting repeater.**  **Proposal 2: RAN4 clarify the scope of the supporting multi-band combination FDD-FDD, FDD-TDD, and TDD-TDD.**  **Proposal 3: RAN4 should consider the feasibility of using different TDD pattern simultaneously in a NR repeater supporting multi-bands.**  **Proposal 4: If RAN4 conclude that having different TDD pattern simultaneously in the multi-band supporting repeater is not feasible, RAN4 consider the requirements for multi-band TDD repeater in terms of using the same TDD pattern.** |

## Open issues summary

The following topics are discussed in the 1st round:

* multi-band support
* specifications for multi band support
* referencing or explicit specifications
* impact on systems in neighbour channels
* requirements to protect neighbour channels

### Sub-topic 1-1

Multi-band support for repeaters is proposed to be taken into consideration.

**Issue 1-1: Multi-band support**

* Proposals
  + Option 1: Repeaters specifications should cover multi-band support
  + Option 2: Requirements developed only for repeaters supporting a single band
* Recommended WF
  + Option 1

### Sub-topic 1-2

If multi-band support for repeaters is considered, the specification impact has to be assessed.

**Issue 1-2: Multi-band support related requirements**

* Proposals
  + Option 1: Tx/Rx RF core requirements for single band shall apply separately to each supported operating band unless otherwise stated.
  + Option 2: requirements have to be discussed/specified based on the bands which are supported together
* Recommended WF
  + Option 1

### Sub-topic 1-3

Repeater operation might cause problems in adjacent channels if signals in neighbor carriers are also amplified. Is there a need to discuss the impact and develop requirements to address this problem?

**Issue 1-3: Impact of Repeater on neighbouring channels**

* Proposals
  + Option 1: Issue needs to be discussed and requirements on amplification in adjacent channels are needed
  + Option 2: This is not a problem, no requirement is needed
* Recommended WF
  + Option 1

### Sub-topic 1-4

If Option 1 is agreed for Sub-topic 1-4 then which requirements are needed?

**Issue 1-4: Requirements for amplification/emissions in neighboring channels**

* Proposals
  + Option 1: ACRR
  + Option 2: Any other requirements?
* Recommended WF
  + TBA

Please provide examples of other requirements if Option 2 is chosen

### Sub-topic 1-5

Repeater specifications will re-use many requirements defined for the base stations (38.104) and UEs(38.101-1, -2), it has to be discussed whether the repeater spec should use referencing as much as possible or requirements should be explicitly included in 38.106.

**Issue 1-5: Repeater Specification Drafting**

* Proposals
  + Option 1: Reference as much as possible other existing specifications (38.104, 38.101-1&38.101-2)
  + Option 2: Define requirements explicitly
* Recommended WF
  + Option 1

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1

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

Sub topic 1-2

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

Sub topic 1-3

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| **Company** | **Comments** |
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Sub topic 1-4

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

Sub topic 1-5

|  |  |
| --- | --- |
| **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** |
| 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:* |

### 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 (if applicable)

# Topic #2: Repeater Class/Type

This section discussed the introduction of different repeater classes and types.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2104611](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104611.zip)** | CMCC | **Observation 1: In China, DL repeater has been classified into three classes, wide area, medium range and local area while no class definition for UL.**  **Observation 2: Wide area and medium range NR repeater are necessary to provide better coverage with much less cost, especially for FR2.**  **Observation 3: NR repeater may be deployed inside the high-speed train to provide blanket inside coverage considering large penetrate loss of carriages. In this scenario, home class rather than the local area class would be much feasible.**  **Observation 4: there are two approaches to definition DL repeater classes:**   * **Option 1: no class definition for DL** * **Option 2: four classes including WA, MR, LA and home class. WA, MR and LA could reuse the same definition as NR BS and the home class could refer to LTE BS definition, characterized by requirements derived from femto cell.**   **Proposal 1: both of above approaches are suggested for DL repeater classes definition.**  **Proposal 2: it is noted if RAN4 finally agrees no class classification, some requirements need further check to estimate whether they are still applicable for all the NR repeaters. For example, co-location spurious emission requirement may not be applicable for repeater with less output power.**  **Proposal 3: it is suggested to refer to UE spec with no UL class classification for repeater.** |
| [**R4-2104668**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104668.zip) | Ericsson | **Proposal 1: At least for FR1, introduce classification of repeaters as wide area, medium range or local area in the same manner as BS.** |
| [**R4-2104793**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104793.zip) | CATT | **Proposal: NR repeater class is not defined.**  **Observation: If FR1 radiated requirements will be defined, NR repeater type needs to defined.** |
| [**R4-2104987**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104987.zip) | NEC | **Proposal: To define two classes for repeater requirements and not to distinguish DL and UL for repeater class definition.** |
| [**R4-2106324**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106324.zip) | Nokia, Nokia Shanghai Bell | *Observation 1: Two separate classes are needed to organize the RF requirements of backhaul (R-BH) and access (R-AC) links of an NR repeater.*  ***Proposal 1: NR repeater classes can be defined as LA, MR, and WA, similar to IAB.***  ***Proposal 2: The relationship between the IAB MT and DU parts with the R-BH and R-AC for different NR repeater classes can be modelled as shown in Table 1.***   |  |  |  | | --- | --- | --- | | ***Repeater class*** | ***Access link (R-AC)*** | ***Backhaul link (R-BH)*** | | ***LA*** | ***IAB-DU LA*** | ***IAB-MT LA*** | | ***MR*** | ***IAB-DU MR*** | ***IAB-MT WA*** | | ***WA*** | ***IAB-DU WA*** | ***IAB-MT WA*** | | ***Table 1: Relationship between IAB MT/DU with R-AC and R-BH links*** | | |   ***Proposal 3: Further study is needed to decide whether NR repeater types can be defined in a similar way as IAB. That is, for FR1 type 1-H, and for FR2 type 2-O by incorporating conducted and radiated requirements.*** |
|  |  |  |

## Open issues summary

The following topics are discussed in the 1st round:

* need for different classes for DL (access link)
* if different classes are needed, how many classes to define
* need for different classes for UL?
* need for introduction of different repeater types similar to base station
* repeater types to be introduced

### Sub-topic 2-1

Introduction of multiple repeater classes for DL (access link)

**Issue 2-1: Repeater Classes for DL (access link)**

* Proposals
  + Option 1: Introduce multiple classes
  + Option 2: No need for multiple classes
* Recommended WF
  + Option 1

### Sub-topic 2-2

If multiple classes are needed, there will be a need to discuss how many classes should be introduced

**Issue 2-2: Number of Repeater Classes for DL (access link)**

* Proposals
  + Option 1: 4 classes (WA, MR, LA and home class)
  + Option 2: 3 classes (WA, MR, LA)
  + Option 3: other options
* Recommended WF
  + TBA

If option 3 is preferred, number of classes and arguments should be presented.

### Sub-topic 2-3

Introduction of multiple repeater classes for UL (backhaul link)

**Issue 2-3: Repeater Classes for UL (backhaul link)**

* Proposals
  + Option 1: No need for multiple classes because power is capped as for UE
  + Option 2: Multiple classes are needed
* Recommended WF
  + Option 1

### Sub-topic 2-4

It is proposed to introduce different types as for base stations to differentiate the way the specifications are defined

**Issue 2-4: Repeater Types**

* Proposals
  + Option 1: Introduce multiple types similar to base station
  + Option 2: No need for different types
* Recommended WF
  + Option 1

### Sub-topic 2-5

If multiple types are introduced, it has to be discussed and agreed which types should be introduced

**Issue 2-5: Repeater Types**

* Proposals
  + Option 1: Introduce same types as base station depending on what will be defined(e.g. type 1-C, type 1-H, type 1-O, type 2-O)
  + Option 2: Other options
* Recommended WF
  + Option 1

If option 2 is preferred, please provide alternative proposals on how to differentiate the requirements.

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1

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

Sub topic 2-2

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

Sub topic 2-3

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

Sub topic 2-4

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

Sub topic 2-5

|  |  |
| --- | --- |
| **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** |
| 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:* |

### 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 #3: Repeaters in TDD

This section discussion several issues related to support and operation of repeaters in TDD systems.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2104616**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104616.zip) | CMCC | **Proposal 1: for timing accuracy, the same method as TDD UTRA repeater could be reused by defining DL/UL ramp on/off time.**  **Observation 1: SNR assumption are different for different deployment scenario when calculate REFSENSE.**  **Proposal 2: 5dB NF is suggested for all repeaters.**  **Observation 2: it’s hard to define a uniform REFSENSE requirement, which is variable and related to the practical deployment scenarios.**  **Proposal 3: NF is the equivalent requirements as REFSENSE for TDD to make sure repeater could decode synchronization signalling.** |
| [**R4-2104676**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104676.zip) | Ericsson | **Observation 1: If the same approach is follows as for BS, then there would be no requirement on synchronization for a repeater (but the specifications would be drafted with the assumption that synchronization is achieved).**  **Observation 2: UE DL synchronization is tested implicitly**  **Observation 3: There is no need to decide which of the options 1-4 is used**  **Observation 4: For the test, the repeater could be (pre-) configured if applicable.**  **Observation 5: Dynamic TDD can be operated as long as the repeater can detect the pattern from existing Uu signalling.**  **Observation 6: Dynamic TDD operation may cause severe inter-operator interference in outdoor scenarios.**  **Observation 7: UL timing can be adjusted by timing advance at the UE**  **Observation 8: Repeater group delay will impact throughput and capacity**  **Observation 9: There is no need for a requirement on group delay**  **Proposal 1: No need for a requirement relating to synchronization**  **Proposal 2: No need to agree on 3GPP on how the repeater detects the DL/UL pattern**  **Proposal 3: No need for a requirement on maximum group delay** |
| [**R4-2104700**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104700.zip) | Sony | **Observation 1: whether or not dynamic TDD is supported can impact the solution on how the repeater becomes aware of the UL/DL split:**   * **If dynamic TDD is supported, the same mechanism as indicate the dynamic TDD can be used by repeaters to gain awareness of the UL/DL split.** * **If dynamic TDD is not supported, then option 1 (via the cell broadcast information) or option 4 (via pre-configuration) can be supported, since they entail the least complexity and guarantee inter-operability of communication nodes.**   **Observation 2: It is beneficial for the flexibility of scheduling as well as the specification forward compatibility point of view to consider the dynamic TDD for smart repeater.**  **Observation 3: The TDD repeater can switch autonomously to the UL if it can figure out the end of DL transmission.**  **Observation 4: It is possible to specify a predefined switch time during the guard period for repeater to switch from DL to UL.**  **Observation 5: Indicating the maximum TA may involve dedicated signaling design and need further study.**  **Proposal 1: RAN4 may assume that the necessary dynamic UL/DL split information is made available to the repeater by signaling, or by some other means to be determined.**  **Proposal 2. If signaling is supported by TDD NR repeaters, set , i.e., the repeater TA is set to the maximum of the TAs configured to the UEs being served by the cell.** |
| [**R4-2104704**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104704.zip) | Qualcomm Incorporated | **Proposal 1. Baseline assumption for synchronization should be based on synchronization signals broadcast by the gNB.**  **Proposal 2. Baseline assumption for the knowledge of UL/DL split should be that it is acquired from the cell broadcast information.**  **Observation 1. No support for dynamic TDD for repeaters will lead to reduce the system coverage/capacity.**  **Proposal 3. Introduce a broadcast message with UL/DL configuration for the flexible slots to enable repeater support of dynamic TDD.**  **Proposal 4. Introduce a group delay requirement.**  **Observation 2. There is no need for the repeater to have any knowledge of UL transmission timing.**  **Proposal 5. Introduce requirements for DL to UL/UL to DL switching delay.** |
| [**R4-2104794**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104794.zip) | CATT | **Proposal 1: All of the possible implementation architectures are allowed for TDD repeater.**  **Observation: UE specific semi-static or flexible TDD slot configuration can’t be supported by repeater.**  **Proposal 2: Cell-specific semi-static or dynamic TDD slot configuration can be defined mandatory or optional based on declaration.**  **Proposal 3: Cell specific semi-static TDD slot configuration should be supported as mandatory requirement.**  **Proposal 4: Cell specific dynamic TDD slot configuration can be defined as optional requirement.**  **Proposal 5: Group delay requirement is not defined for NR repeater in 3GPP.**  **Proposal 6: UL timing requirement is not defined for repeater. The performance can be tested by TDD UL/DL pattern test.** |
| [**R4-2106325**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106325.zip) | Nokia, Nokia Shanghai Bell | **Observation 1. There are multiple implementation options for frame/slot/symbol synchronization of the repeater, but the assumptions of the implementation are out of scope of the Rel.17 WI.**  **Observation 2. The frame/slot/symbol timing accuracy requirement should consider the available switching times of UL/DL signals.**  **Observation 3. Base station may configure UL/DL resource with SFI which causes further requirements for a repeater to follow the UL/DL patterns.**  **Proposal 1. RAN4 to consider UL/DL signal timing within a repeater in practical deployment scenarios when determining the inaccuracy that will be tolerated for frame/slot/symbol timing.**  **Proposal 2. RAN4 should discuss to what degree Rel.17 repeaters would support semi-static and dynamic configurations of the UL/DL resources.** |
| [**R4-2106349**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106349.zip) | NTT DOCOMO, INC. | **Knowledge of UL/DL split:**  **Observation 1: In the case of Stand Alone, the repeater can know the TDD split by** **reading the cell broadcast information (SIB) coming from the gNB separately without any demodulation process to the signal to be transmitted to the UE.**  **Observation 2: Regarding Non-Stand Alone, the cell broadcast information (SIB) cannot be transmitted to the NR repeater.**  **Observation 3: Option 2 to 4 seems to be outside the scope of standardization discussion.**  **Proposal 1: RAN4 discuss how repeater to know TDD split based on Option 1, with considering NR repeater cannot get the cell broadcast information in the case of NSA.**  **Group delay:**  **Observation 4: The size of the acceptable delay on the NW side decreases as the supported SCS becomes larger.**  **Proposal 2: RAN4 define the requirements for the delay for FR1 and FR2.** |
| [**R4-2106603**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106603.zip) | ZTE Corporation | **Observation 1: without explicit DL-UL pattern information or with static DL-UL pattern only at repeater, the deployment scenario should be limited;** |
| [**R4-2107107**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107107.zip) | Huawei | **Observation 1:** A TDD switch requirement is necessary.  **Observation 2:** The UTRA TDD timing requirement does not include information on how synchronization is achieved, however the test method implies its from the RF burst pattern.  **Observation 3:** There is no need to specify how the timing information is generated.  **Observation 4:** The test set up should be suitable for the timing recovery method  **Observation 5:** Dynamic TDD networks require high isolation between different nodes to operate, which can require careful planning, this is not compatible with using repeaters. Repeaters should not be used in dynamic TDD networks. |

## Open issues summary

The following topics are discussed in the 1st round:

* need for explicit synchronization requirement
* need to explicitly specify synchronization source
* group delay requirements
* DL/UL, UL/DL switch delay requirement
* dynamic TDD support
* how to support dynamic TDD if needed
* need to consider NSA

### Sub-topic 3-1

Whether there is a need for an explicit synchronization requirement (and accuracy) is discussed in multiple contributions

**Issue 3-1: Need for Synchronization Requirement**

* Proposals
  + Option 1: Yes, there should be an explicit synchronization requirement
  + Option 2: No, there is no need for an explicit synchronization requirement
  + Option 3: No, it will be implicitly captured in other requirements or tests
* Recommended WF
  + Option 3

### Sub-topic 3-2

Some contributions discussed the synchronization source and whether this should explicitly captured in the specifications.

**Issue 3-2: Synchronization Source**

* Proposals
  + Option 1: Synchronization source should be explicitly captured in the specs
  + Option 2: There is no need to explicitly capture any synchronization source
  + Option 3: There is no need to explicitly capture any synchronization source but default assumption is that synchronization is acquired from cell synchronization signals (test method can imply it is acquired from cell sync signals)
* Recommended WF
  + Option 3

### Sub-topic 3-3

Multiple contribution discuss the need to specify a group delay requirement

**Issue 3-3: Group delay requirement**

* Proposals
  + Option 1: Group delay requirement is needed, further discussion should happen in the RF requirements discussion
  + Option 2: No need for a group delay requirement
* Recommended WF
  + Option 1

### Sub-topic 3-4

Multiple contributions discuss the need to have a TDD switching requirement (DL-UL and UL-DL)

**Issue 3-4: TDD Switching Requirement**

* Proposals
  + Option 1: Switching requirement is needed
  + Option 2: Switching requirement is not needed
* Recommended WF
  + Option 1

### Sub-topic 3-5

Multiple contributions discuss the support of dynamic TDD and different possibilities to support it.

**Issue 3-5: Dynamic TDD Support**

* Proposals
  + Option 1: No need to support any dynamic TDD
  + Option 2: Dynamic TDD is supported only based on current cell broadcast information
  + Option 3: Dynamic TDD is supported and broadcast signaling for semi-static configurations(e.g. UL/DL definition of flexible slots) can be introduced
  + Option 4: Support dynamic TDD, discuss other options on how to enable support
* Recommended WF
  + TBA

### Sub-topic 3-6

One contribution is discussing the need for NSA support to detect the UL/DL split that requires further discussion/clarification.

**Issue 3-6 : NSA Support**

* Proposals
  + Option 1: Explicit support for NSA is needed
  + Option 2: no explicit support is needed, channels used in NSA are expected to also support SA and broadcast SIBs
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1

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

Sub topic 3-2

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

Sub topic 3-3

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| **Company** | **Comments** |
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Sub topic 3-4

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

Sub topic 3-5

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

Sub topic 3-6

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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** |
| 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:* |

### 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

This section discusses other issues such as the skeleton of the new repeaters specifications, updated work plan, isolation requirements, OTA requirements for FR1, support for configurable bandwidth.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2104596**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104596.zip) | CMCC | Proposal of structure(skeleton) for TS 38.106 (core specifications) |
| [**R4-2104597**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104597.zip) | CMCC | Skeleton of TS 38.106 as proposed in R4-2104596 |
| [**R4-2104673**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104673.zip) | Ericsson | **Proposal 1: Requirements at output connectors should only apply during times at which the signal from the connectors is expected to be radiated.**  **Proposal 2: Do not add OTA requirements for FR1.** |
| [**R4-2106326**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106326.zip) | Nokia, Nokia Shanghai Bell | ***Observation 1: Deployment scenarios impact the applicable implementation aspects of the NR repeaters.***  ***Proposal 1: The isolation requirement between antenna access and backhaul antenna arrays is implementation aspect and does not need to be standardized.***  ***Proposal 2: Repeater specification needs to be designed to be flexible to allow different implementation options.*** |
| [**R4-2106920**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106920.zip) | Qualcomm Incorporated | **Observation 1: Lack of bandwidth configurability for repeaters would incur a large cost on the operator deployments.**  **Proposal: Introduce a broadcast message containing the bandwidth that the repeater should be configured to.** |
| [**R4-2104614**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104614.zip) | CMCC | **Proposal 2: as no clear motivation for network signalling has been proposed, pre-configuration and customer-based design for pass band are suggested without any network signalling.** |
| [**R4-2107212**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107212.zip) | Qualcomm Incorporated | Updated work plan |
| [**R4-2107213**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107213.zip) | Qualcomm Incorporated | Skeleton of TS 38.106 |

## Open issues summary

The following issues are discussed in the 1st round:

* specification skeleton
* updated work plan
* OTA requirements for FR1
* Isolation requirement
* configurable bandwidth

### Sub-topic 4-1

A new TS will be introduced for repeaters, some papers are proposing the skeleton for this TS

**Issue 4-1: Repeaters Specification Skeleton**

* Specification skeleton proposed in R4-2104596, R4-2104597 and R4-2107213
* Recommended WF
  + Please provide comments on the proposed skeleton and whether this can be endorsed

### Sub-topic 4-2

An updated work plan is proposed in R4-2107212 taking into the account the revisions in RAN#91e

**Issue 4-2: Updated work plan**

* Proposals
  + Option 1: Endorse updated work plan in R4-2107212
* Recommended WF
  + Option 1.

Please provide any comments if changes are needed

### Sub-topic 4-3

One contribution discussed the need for an isolation requirement between the repeater’s interfaces.

**Issue 4-3: Isolation requirement**

* Proposals
  + Option 1: No need to defined any isolation requirement between the repeater’s interfaces
  + Option 2: Isolation requirement between the repeater’s interfaces is needed
* Recommended WF
  + Option 1

### Sub-topic 4-4

The need for OTA requirements in FR1 was discussed in R4-2104673 and it is proposed not to introduce such requirements

**Issue 4-4: OTA Requirements for FR1**

* Proposals
  + Option 1: Do not introduce any OTA requirements for FR1
  + Option 2: OTA requirements for FR1 are needed
* Recommended WF
  + Option 1

### Sub-topic 4-5

Some contributions are discussing the necessity to have a configurable passband and proposals are contradicting.

**Issue 4-5: Configurable passband**

* Proposals
  + Option 1: Support for configurable passband is needed, some signaling should be introduced
  + Option 2: Support for configurable passband is not needed (proprietary methods are not precluded but nothing is introduced in the specifications)
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

Sub topic 4-1

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

Sub topic 4-2

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

Sub topic 4-3

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

Sub topic 4-4

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

Sub topic 4-5

|  |  |
| --- | --- |
| **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** |
| 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:* |

### 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