3GPP TSG-RAN WG4 Meeting # 99-e R4-21xxxxx

**Electronic Meeting, 19– 27 May, 2021**

**Agenda item:** 8.28.2, 8.28.3

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [99-e][121] NR\_FR1\_35MHz\_45MHz\_BW

**Document for:** Information

# Introduction

The scope of this email discussion is to discuss the contributions submitted at agenda 8.28.2 and 8.28.3 on introduction of channel bandwidths 35MHz and 45MHz for NR. The following topics are discussed in the email discussion.

* Topic#1: UE RF requirements
* Topic#2: BS CRs

# Topic #1: UE RF requirements

## Companies’ contributions summary

UE REFSENS

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| **T-doc number** | **Company** | **Proposal summary** |
| [**R4-2110657**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110657.zip) | Huawei, HiSilicon | On asymmetric Uplink /Downlink scenarios,**Proposal 1:** The following note is added for the REFSENS for band n8/n71 35MHz, and n2/n25 45MHzNOTE: the requirement is met for a default TX–RX frequency separation specified in Table 5.4.4-1.**Proposal 2:** The widest channel bandwidth is applicable only to downlink should be clarified in Table Table 5.3.5-1 with NOTE3.NOTE 3: This UE channel bandwidth is applicable only to downlink. |
| [**R4-2111471**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111471.zip) | Qualcomm Incorporated | On 35MHz and 45MHz REFSENS**Observation 1:**  The “best” option and unrestricted option provide similar REFSENS.**Proposal 1:**  Consider 25MHz, “best” 40MHzUL/45MHz DL, or unrestricted 45MHz UL BW option for n2 REFSENS.**Proposal 2:**  Consider 25MHz, “best” 40MHzUL/45MHz DL, or unrestricted 45MHz UL BW option for n25 REFSENS.**Proposal 3**: Consider 35MHz, “best” 20MHzUL/35MHz DL, or unrestricted 35MHz UL BW option for n71 REFSENS.**Proposal 4**: Consider 35MHz, “best” 20MHzUL/35MHz DL, or unrestricted 35MHz UL BW option for n71 REFSENS. |
| [**R4-2111530**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111530.zip) | Skyworks Solutions Inc. | On remaining n8 n71 Asymmetric Uplink Downlink Requirements**Proposal 1: Adopt changes highlighted in yellow in Table 2 and Table 3 for introduction of n8 and n71 asymmetric UL 20MHz/DL 35MHz operation.**Table 2: Proposal for Table 5.3.5-1 - Channel bandwidths for NR band n8 and n71.

| NR band / SCS / UE Channel bandwidth |
| --- |
| NR Band | SCSkHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 35 MHz | 40 MHz | 50 MHz | 60 MHz | 70 MHz | 80 MHz | 90 MHz | 100 MHz |
| n8 | 15 | Yes | Yes | Yes | Yes |  |  | Yes3,4 |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes3,4 |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n71 | 15 | Yes | Yes | Yes | Yes |  |  | Yes3,4 |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  | Yes3,4 |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | NOTE 3: This UE channel bandwidth is applicable only to downlink.NOTE 4: This UE channel bandwidth is optional in this release of the specification.N |

Table 3: Proposal “Table 5.3.6-1 FDD asymmetric UL and DL channel bandwidth combinations” for n8 and n71.

|  |  |  |  |
| --- | --- | --- | --- |
| NR Band | Channel bandwidths for UL (MHz) | Channel bandwidths for DL (MHz) | Asymmetric channel bandwidth combination set |
| n8 | 20 | 35 | 0 |
| n71 | 5 | 10 | 0 |
| 10 | 15 |
| 15 | 20 |
| 5 | 10 | 1 |
| 10 | 15 |
| 15 | 20 |
| 20 | 35 |
| NOTE 1: The assignment of the paired UL and DL channels are subject to a TX-RX separation as specified in clause 5.4.4. |

**Proposal 2: Include the word “maximum” in the following text in sub-clause 5.3.6, as highlighted in yellow:**The UE channel bandwidth can be asymmetric in downlink and uplink. In asymmetric channel bandwidth operation, the narrower carrier shall be confined within the frequency range of the wider channel bandwidth. In FDD, the confinement is defined as a maximum deviation to the Tx-Rx carrier center frequency separation (defined in Table 5.4.4-1) as follows:**ΔFTX-RX = | (BWDL – BWUL)/2 |****Proposal 3: Add text highlighted in yellow to sub-clause 3.2****ΔFTX-RX Maximum deviation to the Tx-Rx carrier center frequency separation for asymmetric uplink/downlink channel bandwidth operation** |

REFSENS table split and simplication

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| **T-doc number** | **Company** | **Proposal summary** |
| [**R4-2111471**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111471.zip) | Qualcomm Incorporated | On REFSENS simplification**Proposal 5**: Keep REFSENS simplification for TDD bands only. |
| [**R4-2109418**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109418.zip) | ZTE Wistron Telecom AB | A unified equation for specifying REFSENS for both TDD and FDD bands$$REFSENS=-100+10∙log\_{10}\left(\frac{N\_{RB}∙SCS\left(kHz\right)∙12}{4500}\right)+∆R$$ |
| [**R4-2109419**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109419.zip) | ZTE Wistron Telecom AB | Draft CR for specifying REFSENS based on a unified equation method |
| [**R4-2110160**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110160.zip) | Apple | CR for TS 38.101-1: FR1 REFSENS table split and simplication |
| [**R4-2111149**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111149.zip) | Ericsson | REFSENS table structure, band groupsObservation 1: Changing the REFSENS table structure in TS38.101-1 will have a large impact on the corresponding RAN5 test specification TS38.521-1.Observation 2: With a formula based REFSENS requirement table RAN5 will most probably anyway need to calculate and present the actual values as part of the test case in question.Observation 3: An Operating band grouping concept can be introduced to define the REFSENS requirement values that is more readable than a formula-based approach.**Proposal 1:** Send an LS to RAN5 informing them on the split of REFSENS tables for FDD and TDD and ask for their feedback on formula based TDD table vs. band grouping concept |
| [**R4-2111538**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111538.zip) | Skyworks Solutions Inc. | FR1 FDD SDL REFSENS Table Simplification**Proposal**: REFSENS Table is split into two groups: with MSD/without MSD |

38.101-1 CR

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| **T-doc number** | **Company** | **Proposal summary** |
| R4-2111150 | Ericsson | Draft CR to add 35 and 45MHz BW to TS38.101-1Withdrawn |

## Open issues summary

### Sub-topic 1-1

**Issue 1-1: REFSENS for Asymmetric Uplink Downlink**

* Proposals summary

Option 1:

* To add a new entry in "Table 5.3.6-1: FDD asymmetric UL and DL channel bandwidth combinations"
* To add a note in Table 5.3.5-1 to state that UE channel bandwidth is applicable only to downlink
* To include the word “maximum” deviation definition to ΔFTX-RX

Option 2:

* To state that the REFSENS requirement is met for a default specific duplex spacing in the general REFSENS section
* To add a note in Table 5.3.5-1 to state that UE channel bandwidth is applicable only to downlink

Option 3:

* Consider “best” option with asymmetric Uplink Downlink, or unrestricted UL BW option.
* Recommended WF
	+ Discussion on the options and check whether consensus can be reached at 1st round discussion.

### Sub-topic 1-2

**Issue 1-2: REFSENS table split and simplication**

* Proposals summary
* On REFSENS table split
* Option 1: one table for TDD bands and the other table for FDD bands
* Option 2: one table for FDD bands with MSD and the other table for FR1 bands without MSD
* On REFSENS simplication
	+ Option 1: equation-based REFSENS representation
	+ Option 2: band grouping
	+ Option 3: Ask for RAN5 feedback
* Recommended WF
	+ Discussion on the options and check whether consensus can be reached at 1st round discussion.

### Sub-topic 1-3

**Issue 1-3: CR to 38.101-1**

There is no big CR submitted for this meeting. We need one company to draft the big CR for the WI

* Recommended WF
	+ Welcome the volunteer to draft big CR to 38.101-1.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 1-1: REFSENS for Asymmetric Uplink Downlink

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| **Company** | **Comments** |
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Sub-topic 1-2: REFSENS table split and simplication

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| **Company** | **Comments** |
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Sub-topic 1-3: CR to 38.101-1

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| **Company** | **Comments** |
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### 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.*

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

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|  | **Status summary**  |
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## Discussion on 2nd round (if applicable)

###  Companies views’ collection for 2nd round

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| **Company** | **Comments** |
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# Topic #2: BS CRs

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110485 | Ericsson | CR to TS 37.105: Intoduction of 35 MHz and 45 MHz |
| R4-2110486 | Ericsson | CR to TS 38.141-1: Introduction of CBWs 35 MHz and 45 MHz |
| R4-2110598 | ZTE Corporation | CR to TS 38.141-2: Introduction of 35MHz and 45MHz |
| R4-2110599 | ZTE Corporation | CR to TS 37.145-1: introduction of 35MHz and 45MHz |
| R4-2110659 | Huawei, HiSilicon | CR for TS 37.141: introduction of channel bandwidths 35MHz and 45MHz |
| R4-2110660 | Huawei, HiSilicon | CR for TS 37.145-2: introduction of channel bandwidths 35MHz and 45MHz |
| R4-2110747 | Huawei, HiSilicon | CR for TS 38.104: introduction of channel bandwidths 35MHz and 45MHz |
| R4-2111222 | Nokia, Nokia Shanghai Bell | CR to 37.104: Introduction of requirements for 35 and 45MHz channel bandwidths |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2110485 |  |
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## Summary for 1st round

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
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## Discussion on 2nd round (if applicable)

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## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

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| **Title** | **Source** | **Comments** |
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**Existing tdocs**

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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