**3GPP TSG-RAN WG4 Meeting #102-e R4-22xxxxx**

**Electronic Meeting, 21st Feb – 3rd Mar, 2022**

**Title:** WF on NTN SAN demodulation requirements

**Source:** Huawei, HiSilicon

**Agenda item:** 10.13.6.1

**Document for:** Approval

# Introduction

This WF capture all agreements and open issues for the following topics in [102-e][325] NR\_NTN\_Demod.

* Topic #2: Satellite Access Node demodulation requirements
  + Issue 2-1: General assumptions
  + Issue 2-2: PUSCH requirements
  + Issue 2-3: PUCCH requirements
  + Issue 2-4: PRACH requirements

The agreed WFs on NTN SAN demodulation requirements in previous meetings are listed as following.

* R4-2203043, RAN4#101bis-e

# Topic #2: Satellite Access Node demodulation requirements

## Issue 2-1: General assumptions

**Issue 2-1-1: Doppler shift model**

*Tentative agreements*

* Consider 200Hz as the maximum Doppler shift for UL in service link

*Candidate options*

* Proposals
  + Option 1: Do not consider the residual Doppler error for UL in feeder link
  + Option 2: Consider the residual Doppler error for UL in feeder link. 0.5pp. is the worst case.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-1-2: Delay spread model**

*Tentative agreements*

* N/A

*Candidate options*

* Proposals
  + Option 1: Single delay spread
    - Option 1a: 100ns
    - Option 1b: 250ns
  + Option 2: Different delay spread
    - Option 2a: 10ns/50ns/150ns
    - Option 2b: 10ns/50ns/250ns.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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## Issue 2-2: PUSCH requirements

**Issue 2-2-1: Scope of PUSCH requirements**

*Tentative agreements*

* Not to consider the requirements for mapping Type B with non-slot transmission

*Candidate options*

* Proposals
  + Option 1: Do not consider 2 step RACH case
  + Option 2: Consider the 2 step RACH case

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-2-2: Channel model for PUSCH**

*Tentative agreements*

* Select NTN-TDL-A and NTN-TDL-C as the channel model for PUSCH requirements

*Candidate options*

* N/A

*Recommended WF*

* No need for 2nd round discussion.

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| **Company** | **Comments** |
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**Issue 2-2-3: SCS/CBW set for PUSCH requirements**

*Tentative agreements*

* N/A

*Candidate options*

* Proposals
  + Option 1: 15kHz SCS: SCS 5MHz/10MHz/20MHz, 30kHz SCS: 10MHz/20MHz
  + Option 2: a few of PRBs for all SCS.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-2-4: Modulation order for PUSCH requirements**

*Tentative agreements*

* N/A

*Candidate options*

* Proposals
  + Option 1: Select MCS4 for PUSCH requirements
  + Option 2: others

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-2-5: Antenna configuration for PUSCH requirements**

*Tentative agreements*

* N/A

*Candidate options*

* Proposals
  + Option 1: UE 1Tx – SAN 1Rx and UE 1Tx – SAN 2Rx
  + Option 2: UE 1Tx – SAN 2Rx
  + Option 3: UE 2Tx – SAN 2Rx, UE 2Tx – SAN 4Rx and UE 2Tx – SAN 8Rx
* Moderator’s note: companies can agree with UE with 1Tx first? Satellite companies’ input are encouraged.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-2-6: Test parameters for NTN PUSCH**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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**Issue 2-2-7: Test parameters for NTN UL timing adjustment**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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**Issue 2-2-8: Test parameters for NTN PUSCH repetition type A**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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**Issue 2-2-9: Test parameters for NTN msgA PUSCH for 2-step RA type**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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## Issue 2-3: PUCCH requirements

**Issue 2-3-1: Scope of PUCCH requirements**

*Tentative agreements*

* In addition to PUCCH format 0/1/2/3/4, RAN4 to define NTN multi-slot PUCCH demodulation requirements
* Prioritize UCI with HARQ on PUCCH demodulation requirement

*Candidate options*

* N/A

*Recommended WF*

* No need for 2nd round discussion

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| **Company** | **Comments** |
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**Issue 2-3-2: Channel model for PUCCH requirements**

*Tentative agreements*

* RAN4 to use one NTN-TDL channel model for PUCCH requirements definition

*Candidate options*

* Proposals
  + Option 1: Select NTN-TDL-A and NTN-TDL-C
  + Option 2: select one of channel model from NTN-TDL-A and NTN-TDL-C

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-3-3: SCS/CBW set for PUCCH requirements**

*Tentative agreements*

* To follow the same SCS/CBW set as PUSCH as the start point

*Candidate options*

* Proposals
  + Option 1: follow the same SCS/CBW set as PUSCH and no need to reduce test
  + Option 2: follow the same SCS/CBW set as PUSCH and need to reduce test cases (specify if any)

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-3-4: Antenna configuration for PUCCH**

*Tentative agreements*

* N/A

*Candidate options*

* Proposals
  + Option 1: UE 1Tx – SAN 1Rx and UE 1Tx – SAN 2Rx
  + Option 2: UE 1Tx – SAN 2Rx
  + Option 3: UE 2Tx – SAN 2Rx, UE 2Tx – SAN 4Rx and UE 2Tx – SAN 8Rx
* Moderator’s note: companies can agree with UE with 1Tx? Satellite companies’ input are encouraged.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-3-5: Test parameters for NTN PUCCH format 0/1/2/3/4**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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**Issue 2-3-6: Test parameters for NTN PUCCH multi-slot PUCCH format 1**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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## Issue 2-4: PRACH requirements

**Issue 2-4-1: Channel model for PRACH**

*Tentative agreements:*

* N/A

*Candidate options*

* Proposals
  + Option 1: Define NTN SAN PRACH demodulation requirement for AWGN and NLOS multi-path channel.
  + Option 2: Define NTN SAN PRACH demodulation requirement for one multi-path channel.

*Recommended WF*

* Companies are encouraged to provide the views on this issue.

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| **Company** | **Comments** |
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**Issue 2-4-2: Test parameters for NTN PRACH demodulation requirement**

*Tentative agreements*

* N/A

*Candidate options*

* N/A

*Recommended WF*

* Postpone the discussion until having the conclusion for channel model, MCS, etc.

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| **Company** | **Comments** |
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# Reference

1. R4-2207169, Email discussion summary for [102-e][325] NR\_NTN\_Demod, RAN4#102-e, Qualcomm Incorporated
2. R4-2203043, WF on NTN SAN demodulation requirements, RAN4#101bis-e, Huawei, HiSilicon