**3GPP TSG-RAN WG4 Meeting #110 R4-2401693**

**Athens, 26th Feb - 1st Mar, 2024**

**Agenda item:** 8.18.9

**Source:** Moderator (Huawei, HiSilicon)

**Title:** Topic summary for [110][320] NR\_NTN\_enh\_SAN\_UE\_demod

**Document for:** Information

# Introduction

This contribution summarises the open issues for NR\_NTN\_enh\_SAN\_UE\_demod under AI 8.18.8 at RAN4#110.

This topic is introduced in RAN4 demodulation at RAN4#110 with a completion by RAN#104 in June 2024.

Three topics are captured:

* Topic #1: General
* Topic #2: UE demodulation performance requirements
* Topic #3: SAN demodulation performance requirements

# Topic #1: General

## Open issues summary

### Sub-topic 1-1: Scenario and channel model

**Issue 1-1: Doppler for DL**

* Proposals
  + Option 1 (Apple, Huawei): 600Hz
  + Option 2 (Qualcomm): 1200Hz
  + Option 3 (Ericsson): 2000Hz
* Recommended WF
  + Further discuss is needed.

**Issue 1-2: Doppler for UL**

* Proposals
  + Option 1 (Ericsson, Samsung, Huawei): 3000Hz
* Recommended WF
  + Option 1

# Topic #2: UE demodulation performance requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| TDoc | Title | Source |
| [**R4-2400254**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400254.zip) | NR NTN UE demodulation disussion | Nokia, Nokia Shanghai Bell |
| [**R4-2400461**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400461.zip) | On UE demod requirements for NR NTN enhancement | Apple |
| [**R4-2400735**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400735.zip) | [NR\_NTN\_enh-Perf]Discussion on the performance requirements for NR NTN enhancements | Qualcomm India Pvt Ltd |
| [**R4-2400736**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400736.zip) | [NR\_NTN\_enh-Perf]Simulation results for NR NTN enhancements | Qualcomm India Pvt Ltd |
| [**R4-2401556**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401556.zip) | On UE demodulation requirement for NR NTN enhancement | Ericsson |
| [**R4-2401557**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401557.zip) | Simulation results for NR NTN enhancement UE demodulation requirement | Ericsson |
| [**R4-2401718**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401718.zip) | Discussion on UE demodulation requirements for NR NTN enhancements | Huawei,HiSilicon |

## Open issues summary

* + 1. Sub-topic 2-1: Test scope

*Moderator’s note: Based on the workplan, we should finalize discussions on performance requirements scope in this meeting.*

**Issue 2-1-1: Disabled HARQ process for above 10 GHz bands**

* Proposals
  + Option 1 (Qualcomm): Not define.
  + Option 2 (Ericsson, Huawei): Define
* Recommended WF
  + Further discuss is needed.

**Issue 2-1-2: How to define requirements for GSO and NGSO for above 10 GHz bands**

* Proposals
  + Option 1 (Qualcomm): Consider 32 HARQ processes for GSO scenarios and 16 HARQ processes for NGSO scenarios.
  + Option 2 (Huawei): Consider one set of requirements for both NGSO and GSO.
* Recommended WF
  + Further discuss is needed.

**Issue 2-1-2: Whether to define UE PDCCH demodulation requirements for above 10 GHz bands**

* Proposals
  + Option 1 (Nokia, Apple, Ericsson, Huawei): Yes
  + Option 2 (Qualcomm): Further discuss PDCCH performance requirements for NR NTN enhancements in Rel-18.
* Recommended WF
  + Agree with Option 1 as per majority view?

**Issue 2-1-3: How to define UE PDCCH demodulation requirements for above 10 GHz bands (If agreement of Issue 2-1-2 is Yes)**

* Proposals
  + Option 1 (Nokia): Further evaluate feasibility of reusing TN FR2 PDCCH requirements
  + Option 2 (Apple , Ericsson, Huawei): Define new requirements
* Recommended WF
  + Further discuss is needed.
    1. Sub-topic 2-2: General issues for above 10 GHz bands

**Issue 2-2-1: Channel bandwidth**

* Proposals
  + Option 1 (Nokia, Apple, Qualcomm, Ericsson): 100MHz
  + Option 2(Huawei): 200MHz
* Recommended WF
  + Further discuss is needed.

**Issue 2-2-2: Antenna configuration**

* Proposals
  + Option 1 (Nokia, Ericsson): 1Tx1Rx
    - Option 1a (Ericsson): Take 1Tx1Rx for parabolic VSAT antenna configuration for initial demodulation discussion and input from satellite companies is needed
  + Option 2 (Apple, Qualcomm): 1Tx2Rx
    - Option 2a (Apple): Need further clarification on impact to demodulation performance with parabolic VSAT antenna configuration
  + Option 3 (Huawei): Both 1Tx1Rx and 1Tx2Rx, with antenna type not limit to parabolic, but also phase antenna array
* Recommended WF
  + Further discuss is needed.

**Issue 2-2-3: Beamforming and beam steering**

* Proposals
  + Option 1 (Nokia, Apple, Ericsson, Huawei): Do not consider beamforming and beam steering for FR2 NTN demodulation requirements.
* Recommended WF
  + Option 1

**Issue 2-2-4: Rx phase noise**

* Proposals
  + Option 1 (Nokia, Apple, Qualcomm, Ericsson, Huawei): Do not consider PN impact in ideal simulation results alignment. The phase noise impact can be considered in impairment results.
* Recommended WF
  + Option 1

**Issue 2-2-5: Applicability rule**

* Proposals
  + Option 1 (Nokia, Qualcomm, Huawei): Adding similar applicability rule for FR2 NTN UE optional capabilities as in Rel-17 FR1 NTN UE
    - Option 1a (Huawei):

|  |  |  |
| --- | --- | --- |
| UE-NR-Capability-v1700 | | Applicability |
| nonTerrestrialNetwork-r17 | ntn-ScenarioSupport-r17 |
| Supported | GSO only | UE needs to pass the test in Section x of TS38.101-5 |
| NGSO only | UE needs to pass the test in Section x of TS38.101-5 |
| N/A  Note: N/A means UE supports both GSO and NGSO | UE needs to pass the test in Section x of TS38.101-5 |

* + Option 2 (Apple): Discuss applicability rules once we have concluded the discussion on scenarios and test setup.
* Recommended WF
  + Postpone it after the test scope is stable.
    1. Sub-topic 2-3: Test setup for above 10 GHz bands

**Issue 2-3-1: MCS for PDSCH**

* Proposals
  + Option 1 (Apple, Ericsson, Huawei): MCS4 (QPSK, 0.30) and MCS13 (16QAM, 0.48)
* Recommended WF
  + Option 1

**Issue 2-3-2: PDCCH aggregation level (If agreed to be introduced)**

* Proposals
  + Option 1 (Apple): 8 as baseline
  + Option 2 (Ericsson): 2 and 4
  + Option 3 (Huawei): 4, 8 and 16
* Recommended WF
  + Further discuss is needed.

1. Topic #3: SAN demodulaton requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| TDoc | Title | Source |
| [**R4-2400043**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400043.zip) | Further discussion on SAN demodulation requirements for above 10 GHz bands | CATT |
| [**R4-2400253**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400253.zip) | NR NTN SAN demodulation disussion | Nokia, Nokia Shanghai Bell |
| [**R4-2401402**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401402.zip) | Discussion on NR NTN enhancement SAN demodulation requirements | Ericsson |
| [**R4-2401403**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401403.zip) | Simulation results for NR NTN enhancement SAN demodulation requirements | Ericsson |
| [**R4-2401579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401579.zip) | View on BS demodulation requirements for NTN enhancement | Samsung |
| [**R4-2401717**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401717.zip) | Discussion on SAN demodulation requirements for NR NTN enhancements | Huawei,HiSilicon |

## Open issues summary

* + 1. Sub-topic 3-1: General issues for above 10 GHz bands

**Issue 3-1-1: Antenna configuration**

|  |
| --- |
| * *Agreement in last meeting:*   + *Keep the previous agreement to consider both 1Tx1Rx and 1Tx2Rx*   + *FFS 2Tx2Rx pending on conclusion of the 2Tx UE RF requirement.* |

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Huawei): Do not consider 2Tx
* Recommended WF
  + Option 1

**Issue 3-1-2: Phase noise**

* Proposals
  + Option 1 (Ericsson): Do not consider impact of phase noise for PUSCH SAN demodulation requirements in FR2-1.
* Recommended WF
  + Option 1
    1. Sub-topic 3-2: Test setup for normal PUSCH with CP-OFDM for above 10 GHz bands

**Issue 3-2-1: MCS**

* Proposals
  + Option 1 (CATT): MCS 2/16/20 in Table 1
  + Option 2 (Nokia): MCS 2/16/20 in Table 1 with downselection based on SNR operating point
  + Option 3 (Ericsson): MCS 4/16/20 in Table 1
  + Option 4 (Huawei): MCS 4 in Table 1
* Recommended WF
  + Further discuss is needed.

**Issue 3-2-2: Additional DM-RS position**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Samsung, Huawei): pos1
* Recommended WF
  + Option 1

**Issue 3-2-3: RB assignment**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Samsung, Huawei): Full applicable test bandwidth
* Recommended WF
  + Option 1

**Issue 3-2-4: PTRS configuration**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Huawei): Do not configure
  + Option 2 (Samsung): (K=2,L=1) and disabled
* Recommended WF
  + Agree with Option 1 as per majority view?

**Issue 3-2-5: Other parameters**

* Proposals
  + Option 1

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Disabled |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| Number of DM-RS CDM group(s) without data | 2 |
| Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
| DM-RS port(s) | {0} |
| DM-RS sequence generation | NID=0, nSCID =0 |
| Time domain resource | PUSCH mapping type | B |
| Start symbol index | 0 |
| Allocation length | 10 |
| Frequency domain resource | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |

* Recommended WF
  + Option 1
    1. Sub-topic 3-3: Test setup for normal PUSCH with DFT-s-OFDM for above 10 GHz bands

**Issue 3-3-1: MCS**

* Proposals
  + Option 1 (CATT): MCS 2 in Table 1
  + Option 2 (Nokia): MCS 2/16/20 in Table 1 with downselection based on SNR operating point
  + Option 3 (Ericsson): MCS 4/16/20 in Table 1
    - Introduce limited FR2-1 PUSCH SAN demodulation requirements with transform precoding enabled.
  + Option 4 (Huawei): MCS 4 in Table 1
* Recommended WF
  + Further discuss is needed.

**Issue 3-3-2: Additional DM-RS position**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Huawei): pos1
  + Option 2 (Samsung): pos2
* Recommended WF
  + Agree with Option 1 as per majority view?

**Issue 3-3-3: RB assignment**

* Proposals
  + Option 1 (CATT, Samsung, Huawei): 30 PRBs in the middle of the test bandwidth
  + Option 2 (Nokia, Ericsson): Full applicable test bandwidth
* Recommended WF
  + Further discuss is needed.

**Issue 3-3-4: PTRS configuration**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Samsung, Huawei): Do not configure
* Recommended WF
  + Option 1.

**Issue 3-3-5: Other parameters**

* Proposals
  + Option 1

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Enabled |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| Number of DM-RS CDM group(s) without data | 2 |
| Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
| DM-RS port(s) | {0} |
| DM-RS sequence generation | NID=0, nSCID =0 |
| Time domain resource | PUSCH mapping type | B |
| Start symbol index | 0 |
| Allocation length | 10 |
| Frequency domain resource | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |

* Recommended WF
  + Option 1
    1. Sub-topic 3-4: Test setup for PUSCH repetition Type A for above 10 GHz bands

**Issue 3-4-1: MCS**

* Proposals
  + Option 1 (CATT, Huawei): MCS 5 in Table 3
  + Option 2 (Nokia): MCS 2/16/20 in Table 1 with downselection based on SNR operating point
* Recommended WF
  + Further discuss is needed.

**Issue 3-4-2: Other parameters**

* Proposals
  + Option 1

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Disabled |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 3, 0, 3 [Note 1] |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| Additional DM-RS symbols | Pos1 |
| Number of DM-RS CDM group(s) without data | 2 |
| Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
| DM-RS port(s) | 0 |
| DM-RS sequence generation | NID=0, nSCID =0 |
| Time domain resource | PUSCH mapping type | B |
| Start symbol index | 0 |
| Allocation length | 10 |
| PUSCH aggregation factor | n2 |
| Frequency domain resource | RB assignment | Full applicable test bandwidth |
| Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| PT-RS configuration | Frequency density (*KPT-RS*) | Disabled |
| Time density (*LPT-RS*) | Disabled |
| NOTE 1: The effective RV sequence is {0,2,3,1} with slot aggregation | | |

* Recommended WF
  + Option 1
    1. Sub-topic 3-5: Test setup for PUCCH for above 10 GHz bands

**Issue 3-5-1: UCI info**

* Proposals
  + Option 1 (Ericsson): Prioritize UCI with HARQ on PUCCH demodulation requirement.
* Recommended WF
  + Option 1.

**Issue 3-5-2: Test parameters**

* Proposals
  + Option 1
    - PUCCH format 0

|  |  |
| --- | --- |
| **Parameter** | **Test** |
| Number of UCI information bits | 1 |
| Number of PRBs | 1 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | N/A for 1 symbol Enabled for 2 symbols |
| First PRB after frequency hopping | The largest PRB index – (Number of PRBs - 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 13 for 1 symbol  12 for 2 symbols |
| Antenna configuration | 1x1, 1x2 |
| Propagation condition | NTN-TDLC5-3000 Low |
| Test metric | 1% of DTX to ACK probability  1% of ACK missed detection probability |

* + - PUCCH format 1

|  |  |
| --- | --- |
| **Parameter** | **Test** |
| Number of information bits | 2 |
| Number of PRBs | 1 |
| Number of symbols | 14 |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index – (nrofPRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Initial cyclic shift | 0 |
| First symbol | 0 |
| Index of orthogonal cover code (*timeDomainOCC*) | 0 |
| Antenna configuration | 1x1, 1x2 |
| Propagation condition | NTN-TDLC5-3000 Low |
| Test metric | 1% of DTX to ACK probability  0.1% of NACK to ACK probability  1% of ACK missed detection probability |

* + - PUCCH format 2 (ACK missed detection)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Modulation order | QSPK |
| Starting RB location | 0 |
| Intra-slot frequency hopping | N/A |
| Number of PRBs | 4 |
| Number of symbols | 1 |
| The number of UCI information bits | 4 |
| First symbol | 13 |
| DM-RS sequence generation | *NID*0=0 |
| Antenna configuration | 1x1, 1x2 |
| Propagation condition | NTN-TDLC5-3000 Low |
| Test metric | 1% of DTX to ACK probability  1% of ACK missed detection probability |

* + - PUCCH format 2 (UCI BLER)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Modulation order | QSPK |
| First PRB prior to frequency hopping | 0 |
| Intra-slot frequency hopping | enabled |
| Frist PRB after frequency hopping | The largest PRB index – (Number of PRBs – 1) |
| Number of PRBs | 9 |
| Number of symbols | 2 |
| The number of UCI information bits | 22 |
| First symbol | 12 |
| DM-RS sequence generation | *NID*0=0 |
| Antenna configuration | 1x1, 1x2 |
| Propagation condition | NTN-TDLC5-3000 Low |
| Test metric | 1% of BLER |

* + - PUCCH format 3

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Test 1** | **Test 2** |
| Modulation order | QPSK | |
| First PRB prior to frequency hopping | 0 | |
| Intra-slot frequency hopping | enabled | |
| First PRB after frequency hopping | The largest PRB index – (Number of PRBs – 1) | |
| Group and sequence hopping | neither | |
| Hopping ID | 0 | |
| Number of PRBs | 1 | 3 |
| Number of symbols | 14 | 4 |
| The number of UCI information bits | 16 | 16 |
| First symbol | 0 | 0 |
| Antenna configuration | 1x1, 1x2 | |
| Propagation condition | NTN-TDLC5-3000 Low | |
| Test metric | 1% of BLER | |

* + - PUCCH format 4

|  |  |
| --- | --- |
| **Parameter** | **Value** |
| Modulation order | QPSK |
| First PRB prior to frequency hopping | 0 |
| Number of PRBs | 1 |
| Intra-slot frequency hopping | enabled |
| First PRB after frequency hopping | The largest PRB index – (Number of PRBs – 1) |
| Group and sequence hopping | neither |
| Hopping ID | 0 |
| Number of symbols | 14 |
| The number of UCI information bits | 22 |
| First symbol | 0 |
| Length of the orthogonal cover code | n2 |
| Index of the orthogonal cover code | n0 |
| Antenna configuration | 1x1, 1x2 |
| Propagation condition | NTN-TDLC5-3000 Low |
| Test metric | 1% of BLER |

* Recommended WF
  + Option 1.
    1. Sub-topic 3-5: Test setup for PRACH for above 10 GHz bands

**Issue 3-5-1: Time error tolerance**

* Proposals
  + Option 1 (Ericsson):

|  |  |  |  |
| --- | --- | --- | --- |
| **PRACH**  **preamble** | **PRACH SCS**  **(kHz)** | **Time error tolerance** | |
| **AWGN** | **NTN-TDLC5** |
| B4, C2 | 60 | 0.13 us | 0.13 us |
| 120 | 0.07 us | 0.07 us |

* + Option 2 (Samsung): where is the largest delay of the propagation channel = 0.06 us
* Recommended WF
  + Further discuss is needed.

**Issue 3-5-2: Requirements under AWGN channel**

* Proposals
  + Option 1 (Ericsson): Not consider
* Recommended WF
  + Further discuss is needed.
    1. Sub-topic 3-6: Test setup for PUSCH with DM-RS bundling for FR1 UL coverage enhancement

**Issue 3-6-1: Timing drift**

* Proposals
  + Option 1 (Ericsson): Do not define timing/frequency drift model for NTN PUSCH with DM-RS bundling in FR1.
  + Option 2 (Huawei): Do not consider additional actual model for timing drift for ideal simulation collection for PUSCH with DMRS bundling and the timing drift impact can be considered into the impairment results by companies.
* Recommended WF
  + Do not consider timing drift.

**Issue 3-6-2: Antenna configuration**

* Proposals
  + Option 1 (Nokia): 1Tx1Rx
  + Option 2 (Huawei): Consider both 1Tx1Rx and 1Tx2Rx for PUSCH with DMRS bundling demodulation requirements. Apply the same test applicability for 1T1Rx and 1Tx2Rx performance test.
* Recommended WF
  + Further discuss is needed.

**Issue 3-6-3: Channel model**

* Proposals
  + Option 1 (Nokia): NTN-TDLC5-200
  + Option 2 (Samsung, Huawei): NTN-TDLA100-200
* Recommended WF
  + Further discuss is needed.

**Issue 3-6-4: MCS**

* Proposals
  + Option 1 (CATT, Samsung, Huawei): MCS 4 in Table 1
* Recommended WF
  + Option 1.

**Issue 3-6-5: Additional DM-RS position**

* Proposals
  + Option 1 (CATT, Nokia, Ericsson, Samsung, Huawei): pos1
* Recommended WF
  + Option 1.

**Issue 3-6-6: RB assignment**

* Proposals
  + Option 1 (CATT, Ericsson, Huawei): Full applicable test bandwidth
  + Option 2 (Samsung): 6RBs for both 15KHz and 30KHz
* Recommended WF
  + Further discuss is needed.

**Issue 3-6-7: PUSCH mapping type**

* Proposals
  + Option 1 (CATT): B
  + Option 2 (Ericsson, Samsung): A
  + Option 3 (Huawei): A and B
* Recommended WF
  + Further discuss is needed.

**Issue 3-6-8: Allocation length**

* Proposals
  + Option 1 (CATT): 10
  + Option 2 (Ericsson, Samsung, Huawei): 14
* Recommended WF
  + Agree with Option 2 as per majority view?

**Issue 3-6-9: PTRS configuration**

* Proposals
  + Option 1 (CATT): Do not configure
* Recommended WF
  + Option 1.

**Issue 3-6-10: RV sequence**

* Proposals
  + Option 1 (CATT, Ericsson, Huawei): 0,0,0,0
  + Option 2 (Samsung): 0,3,0,3
* Recommended WF
  + Agree with Option 1 as per majority view?

**Issue 3-6-11: PUSCH aggregation factor**

* Proposals
  + Option 1 (CATT, Ericsson, Huawei): n8
  + Option 2 (Samsung): 2 or 4 for FDD, 2 for TDD
* Recommended WF
  + Agree with Option 1 as per majority view?

**Issue 3-6-12: pusch-TimeDomainWindowLength**

* Proposals
  + Option 1 (CATT, Ericsson, Huawei): 8
  + Option 2 (Samsung): 2 or 4 for FDD, 2 for TDD
* Recommended WF
  + Further discuss is needed.

**Issue 3-6-13: Other parameters**

* Proposals
  + Option 1

|  |  |  |
| --- | --- | --- |
| **Parameter** | | **Value** |
| Transform precoding | | Disabled |
| HARQ | Maximum number of HARQ transmissions | 4 |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| Additional DM-RS position | pos1 |
| Number of DM-RS CDM group(s) without data | 2 |
| Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
| DM-RS port | 0 |
| DM-RS sequence generation | NID0=0, nSCID =0 |
| Time domain resource assignment | Start symbol | 0 |
| Frequency domain resource assignment | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| Note 1: The effective RV sequence is {0, 2, 3, 1} with slot aggregation. | | |

* Recommended WF
  + Option 1

1. Topic #4: Documents and suggested status

|  |  |  |
| --- | --- | --- |
| **TDoc** | **Suggest status** | **Comments** |
| [**R4-2400043**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400043.zip) | Noted |  |
| [**R4-2400253**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400253.zip) | Noted |  |
| [**R4-2400254**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400254.zip) | Noted |  |
| [**R4-2400461**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400461.zip) | Noted |  |
| [**R4-2400735**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400735.zip) | Noted |  |
| [**R4-2400736**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2400736.zip) | Noted |  |
| [**R4-2401402**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401402.zip) | Noted |  |
| [**R4-2401403**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401403.zip) | Noted |  |
| [**R4-2401556**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401556.zip) | Noted |  |
| [**R4-2401557**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401557.zip) | Noted |  |
| [**R4-2401579**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401579.zip) | Noted |  |
| [**R4-2401716**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401716.zip) | Noted |  |
| [**R4-2401717**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401717.zip) | Noted |  |
| [**R4-2401718**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110/Docs/R4-2401718.zip) | Noted |  |
| R4-2401719 | Approved |  |
| R4-2402660 | Noted |  |
| R4-2402865 | Approved |  |