**3GPP TSG-RAN WG4 Meeting #97-e R4-2017470**

Electronic Meeting, 2nd -13th Nov., 2020

**Title:** Simulation assumptions for V2X single link test cases

**Source:** Huawei, HiSilicon

**Agenda item:** 7.3.7.2

**Document for:** Discussion

# Introduction

In this contribution, we provide the simulation assumptions for NR V2X single-link demodulation requirements only for initial simulation results alignment purpose. Companies are encouraged to submit the simulation results for next meeting. The values with different options or [ ] need be updated in the next RAN4 meeting based on further discussion.

# Simulation assumptions

## PSSCH

* Common assumptions for reference receiver:
* CFO estimation: Cross-DMRS symbol CFO estimation.
* CE channel estimation:
	+ Frequency domain interpolation: MMSE interpolation
	+ Time domain interpolation: Linear interpolation
* RX window: CP/2 from GNSS
* Table 1: Simulation assumption for PSSCH demodulation performance

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Unit** | **Value** |
| Test |  | SCH\_Test1 | SCH\_Test2 | SCH\_Test3 |
| Synchronization source |  | GNSS | GNSS | GNSS |
| Propagation condition |  | TDLA30-180 | TDLA30-1400 | Option 1:TDLA30-2700 baselineOption 2:TDLB100-2700 |
| Channel bandwidth | MHz | 20 | 20 | 20 |
| Allocated resource blocks | RB | Option 1: 10Option 2: 20 | 20 | 20 |
| PSCCH resource allocation  |  | 10 RBs with 2 symbols | 10 RBs with 2 symbols | Option 1: 10 RBs with 2 symbols if Propagation condition is TDLA30-2700Option 2: 10 RBs with 3 symbols if Propagation condition is TDLB100-2700 |
| Subcarrier spacing | kHz | 30 | 30 | 30 |
| Timing offset |  | CP/2-12Ts | CP/2-12Ts | CP/2-12Ts |
| Frequency offset | Hz | 600 | 600 | 600 |
| CP-OFDM symbols for slot with PSFCH(Note 1) |  | 9 | 9 | 9 |
| CP-OFDM symbols for slot without PSFCH  |  | 12 | 12 | 12 |
| DMRS symbols for slot with PSFCH |  | 2 | Option 1: 2Option 2: 3 | 3 |
| DMRS symbols for slot without PSFCH |  | 2 | Option 1: 3Option 2: 4 |  4(Note 2) |
| Modulation order |  | 2 | 4 | 6 |
| MCS index |  | 4 | 11 | 17 |
| 2nd stage SCI format 2-A configuration | Payloads | Bits | 35 | 35 | 35 |
| $$α$$ |  | 1 | 1 | 1 |
| $$β\_{offset}$$ |  | [5] | [5] | [3.5] |
| Transport Block Size for slot with PSFCH | Bits |  |  |  |
| Transport Block Size for slot without PSFCH | Bits |  |  |  |
| Transport block CRC | Bits | 24 | 24 | 24 |
| Maximum number of HARQ transmissions |  | 1 | 1 | 1 |
| Binary Channel Bits for slots with PSFCH |  |  |  |  |
| Binary Channel Bits for slots without PSFCH | Bits |  |  |  |
| PSFCH resource period | Slot | Option 1: 1Option 2: 4 | 4 | Option 1: 1Option 2: 4 |
| MinTimeGapPSFCH | Slot | [3] | [3] | [3] |
| Antenna configuration |  | 1x2 | 1x2 | 1x2 |
| Performance metric |  | SNR@10% BLER of PSSCH  |
| Note 1: OFDM symbols is for PSCCH/PSSCH transmission not including first symbol (AGC) and PSFCH symbols.Note 2: It is only applied to cases when PSFCH resource period =1  |

## PSCCH

Table 2 Simulation assumption for PSCCH demodulation performance

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Unit** | **Value** |
| Test |  | CCH\_Test1 |
| Synchronization source |  | GNSS |
| Propagation condition |  | TDLA30-1400 |
| Channel bandwidth | MHz | 20 |
| Allocated resource blocks |  | 10 |
| Subcarrier spacing | kHz | 30 |
| Timing offset |  | CP/2-12Ts |
| Frequency offset | Hz | 600 |
| The number of PSCCH symbols |  | 2 |
| Modulation order |  | QPSK |
| Payload size (without CRC) | Bits | Option 1: 26Option 2: 24 |
| Transport block CRC | Bits | 24 |
| Binary Channel Bits | Bits |  |
| PSCCH performance metric (Note 1) |  | SNRPSCCH@1%BLER |
| Note 1: The performance metric is used for PSCCH simulation evaluation.Note 2: OCC index *i* (in TS 38.211) for PSCCH DMRS is randomly selected between {0, 1, 2} for each PSCCH transmission.Note 3: Two propagation conditions are listed as options for alignment purpose, one of the option will be chosen for defining requirement |

## PSBCH

Table 3 Simulation assumption for PSBCH demodulation performance

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Unit** | **Value** |
| Test |  | BCH\_Test1 |
| SLID |  | 0 |
| Synchronization source |  | S-SSB |
| Propagation condition |  | TDLA30-180 |
| Channel bandwidth | MHz | 20 |
| Number SSB per SL period($N\_{period}^{S-SSB}$) |  | Option 1: 1Option 2: 2 S-SSB with different contents |
| Allocated resource blocks |  | 11 |
| Subcarrier spacing | kHz | 30 |
| Timing offset |  | 0 |
| Frequency offset | Hz | 0 |
| The number of symbols (Note 1) |  | 8 |
| Modulation order |  | QPSK |
| Transport Block Size (without CRC) | Bits | 32 |
| Transport block CRC | Bits | 24 |
| Binary Channel Bits | Bits | 1782 |
| PSBCH performance metric (Note 2) |  | SNR@1%BLER of PSBCH |
| Note 1: The first symbol is for AGC.Note 2: The performance metric is used for PSBCH simulation assumption. |

## PSFCH

* Note: This case is used to test PSFCH performance for UE supporting NACK only feedback mode.

Table 4 Simulation assumption for PSFCH demodulation performance

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Unit** | **Value** |
| Test |  | FCH\_Test1 |
| Synchronization source |  | GNSS |
| Propagation condition |  | TDLA30-180 |
| Channel bandwidth | MHz | 20 |
| Allocated resource blocks |  | 1 |
| Subcarrier spacing | kHz | 30 |
| Timing offset |  | CP/2-12Ts |
| Frequency offset | Hz | 600 |
| The number of PSFCH symbols |  | 2 |
| Number of information bits | bit | 1 |
| PSFCH period | Slot | 1 |
| Cyclic shift pair index |  | 1 |
| PSFCH performance metric (Note 1) |  | SNR@ Pr(NACK miss) =1% and [Pr(DTX to NACK)<1%] |
| Note 1: The performance metric is used for PSFCH simulation assumption.Note 2: The 1st PSFCH which is used for AGC doesn’t need to be considered in performance evaluation. |