**3GPP TSG-RAN WG4 Meeting #98-bis-eR4-2107014**

Electronic Meeting, 12 – 20 April, 2021

**Title:** **Updated link level simulation assumption for gNB positioning measurement performance**

**Source: Huawei, HiSilicon**

**Agenda item: 5.5.2.3.1**

**Document for: Approval**

# Introduction

In RAN4#96-e, the link level simulation assumption for gNB positioning measurement was agreed in [1].

In [1] the following combinations of {comb size, symbol size} are simulated:

* {2, 2}, which gives SRS RE number 12
* {4, 4}, which gives SRS RE number 12
* {8, 8}, which gives SRS RE number 12
* {8, 12}, which gives SRS RE number 18

Based on RAN1/2 design, the number of SRS REs can be

* 6 as minimum, e.g. given by {2,1}
* 36 as maximum, given by {4, 12}

To better understand the impact of {comb size, symbol size} on the accuracy performance, and to decide whether requirements should be agnostic to {comb size, symbol size}, more combinations of {comb size, symbol size} are added to the simulation assumption.

# Updated simulation assumptions

Table 1 lists the updated link simulation assumptions.

**Table 1: Updated link simulation assumptions for gNB positioning measurement**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Value** | | |
|  | | **FR1** | | **FR2** |
| Cell layout | | * 2 cells at distinct locations: <cell 1, cell2>, where cell 1 is the serving cell. * 1 UE in cell 1 transmits p-SRS, received by cell1 and by cell2. | | |
| Network synchronization | | * Synchronous with time shifts <0 (cell 1), 3 us (cell 2)> * Asynchronous with time shifts: <0 (cell 1), 7 symbols (cell 2) > | | |
| Duplex modes | | FDD and TDD | | |
| TDD specific parameters (TDD configuration is in 38.133, section A.3.1.4) | | * TDDConf.1.1 (15 kHz) * TDDConf.2.1 (30/60 kHz) | | * TDDConf.3.1 (60/120 kHz) |
| Load in SRS symbols | | * No other SRS transmissions from other UEs on the same subcarriers of the SRS symbols | | |
| Data and CCH load in non-SRS symbols | | 1. 0% RE utilization 2. 50% RE utilization in time 3. 100% RE utilization | | |
| Cyclic prefix | | Normal | | |
| DRX | | OFF | | |
| Carrier frequency / BW / SCS / duplex mode | | * 2 GHz * 5 MHz, 10 MHz, 20 MHz, 50 MHz * 15 kHz * FDD, TDD * 4 GHz * 20 MHz, 50 MHz, 100 MHz * 30 kHz, 60kHz * FDD, TDD | | * 40 GHz * 50 MHz, 100 MHz, 200 MHz * 120 kHz, 60kHz * TDD |
| Propagation conditions [TS 38.101-4] | | AWGN, | | AWGN, |
| SRS Ês/Iot [dB] | | For cell 1: 3dB  For cell 2: -13dB | | For cell 1: 3dB  For cell 2: -13dB |
| Number of gNB receive antennas | | 2 rx (uncorrelated with equal gain, no rx beamforming) | | |
| gNB measurement bandwidth | | Full carrier bandwidth | | |
| TA | | Constant | | |
| Number of transmit SRS antennas | 1 | | | |
| Number of SRS Resource sets | 1 | | | |
| Number of SRS resources within one SRS resource set | 1 | | 1, TBD | |
| SRS transmission bandwidth (in PRBs) | * 15 kHz: * 24 (5MHz), 52 (10MHz), 104 (20MHz), 264 (50MHz) * 30 kHz: * 48 (20MHz),132 (50MHz), 272 (100MHz) * 60 kHz: * 48 (40MHz), 132 (100MHz) | | * 120 kHz: * 32(50MHz), 64(100MHz),   132 (200MHz)   * 60 kHz:   132 (100MHz), 264 (200MHz) | |
| SRS comb size | comb-2, comb-4, comb-8 | | | |
| Number of symbols | for comb-2, for comb-4, and for comb-8, =1 for comb-2 and = 12 for comb-4 | | | |
| SRS repetition factor | 1 (TS 38.211, clause 6.4.1.4.3) | | | |
| SRS periodicity | 40 ms, 160 ms | | | |
| Sequence or group hopping | Disabled | | | |
| Starting symbol () | for comb-2, for comb-4, for comb-8 | | | |

**Performance Characteristics**

At least the following performance characteristics are to be provided for TgNB-RX:

* TgNB-RX error CDFs for each cell
* 90%-ile of the TgNB-RX errors for each cell

In the above,

* TgNB-RX error = abs(estimated TgNB-RX – ideal TgNB-RX ) (based on perfect channel and UE location knowledge).

At least the following performance characteristics are to be provided for SRS-RSRP:

* RSRP error CDFs for each cell
* 90%-ile of the RSRP errors for each cell

In the above,

* SRS-RSRP error = estimated SRS-RSRP – ideal SRS-RSRP (based on perfect channel knowledge).

# Reference

1. R4-2012142, Link simulation assumptions for deriving positioning SRS configurations, Nokia