**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 (TTD 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: 3dBFor cell 2: -13dB | For cell 1: 3dBFor 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:
* 52 (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