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

**Electronic Meeting, February 21-March 3, 2022 (Revision of R4-2204733)**

**Source:** LG Electronics, Apple, Skyworks Solutions Inc.

**Title:** A-MPR analysis results for NR-U(VLP) considering regulatory parameters in Korea.

**Agenda item:** 9.2.3

**Document for:** Approval

# Introduction

In RAN#92-e meeting, New WI [1] on “Introduction of operation in full unlicensed band 5925-7125MHz” was approved.

In this contribution, based on the WF[4] of RAN4#101-e, we provide A-MPR values for NR-U PC5 VLP considering regulatory parameters in Korea.

TP for PC5 VLP A-MPR table in South Korea to TR 38.849 updating clause 6.1.1.2.2

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* **Start of TP** \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 6 RF requirements

## 6.1 UE specific

### 6.1.1 Transmitter characteristics

This section details specific transmitter characteristics for a UE operating in the lower 6 GHz NR.

Table 6.1.1-1: Summary of NS values.

|  |  |  |  |
| --- | --- | --- | --- |
| Country | Mode | | |
| SP | LPI | VLP |
| Region 1 | | | |
| EU/CEPT | N/A | [NS\_xx] (new) | TBD |
| **Region 2** | | | |
| US | NS\_54 | NS\_53 | N/A |
| Canada | NS\_54 | [NS\_xx] (new) | TBD |
| Brazil | N/A | NS\_53 | TBD |
| Peru | N/A | NS\_53 | N/A |
| Chile | N/A | NS\_53 | N/A |
| Costa Rica | N/A | NS\_01 | TBD |
| Colombia | N/A | NS\_53 | N/A |
| **Region 3** | | | |
| South Korea | N/A | [NS\_xy] (new) | TBD |

## < Unchanged sections are omitted >

6.1.1.2 A-MPR for a NS(s) for the full 6GHz NR unlicensed operation

6.1.1.2.1 Canada

**Table 6.1.1.2.1-1: A-MPR for PC5 LPI in Canada**

|  |  |  |  |
| --- | --- | --- | --- |
| **Pre-coding** | **Modulation** | **Channel bandwidth (Sub-band allocation) / RB Allocation** | |
| **20 MHz** | |
| **Full (dB)** | **Partial (dB)** |
| DFT-s-ODFM | PI/2 BPSK | ≤ 3.0 | ≤ 5.5 |
|  | QPSK | ≤ 3.0 | ≤ 5.5 |
|  | 16 QAM | ≤ 3.0 | ≤ 5.5 |
|  | 64 QAM | ≤ 3.5 | ≤ 5.5 |
|  | 256 QAM | ≤ 5.0 | ≤ 5.5 |
| CP-OFDM | QPSK | ≤ 3.5 | ≤ 5.5 |
|  | 16 QAM | ≤ 4.0 | ≤ 5.5 |
|  | 64 QAM | ≤ 5.5 | ≤ 5.5 |
|  | 256 QAM | ≤ 7.0 | ≤ 7.0 |

6.1.1.2.2 South Korea

**Table 6.1.1.2.2-1: A-MPR for PC5 LPI in South Korea**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Pre-coding** | **Modulation** | **Channel bandwidth (Sub-band allocation) / RB Allocation** | | | | | | | |
| **20 MHz** | | **40 MHz** | | **60 MHz** | | **80 MHz** | |
| **Full (dB)** | **Partial (dB)** | **Full (dB)** | **Partial (dB)** | **Full (dB)** | **Partial (dB)** | **Full (dB)** | **Partial (dB)** |
| DFT-s-ODFM | QPSK | ≤ 6.0 | ≤ 8.5 | ≤ 4.0 | ≤ 5.5 | ≤ 3.5 | ≤ 4.5 | ≤ 3.0 | ≤ 4.5 |
| 16 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 4.0 | ≤ 5.5 | ≤ 4.0 | ≤ 5.0 | ≤ 3.5 | ≤ 5.0 |
| 64 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 4.0 | ≤ 5.5 | ≤ 4.0 | ≤ 5.0 | ≤ 3.5 | ≤ 5.0 |
| 256 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 5.0 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 |
| CP-OFDM | QPSK | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 |
| 16 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 |
| 64 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 |
| 256 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |

Table 6.1.1.2.2-2 contains A-MPR values for the 5945-6425MHz frequency range based on South Korea regulatory requirements.

**Table 6.1.1.2.2-2: A-MPR for PC5 VLP in South Korea (5945-6425MHz).**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Pre-coding** | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | |
| 20 MHz | | 40 MHz | | 60 MHz | | 80 MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-ODFM | QPSK | ≤ 7.5 | ≤ 10.0 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 16 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 64 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 256 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| CP-OFDM | QPSK | ≤ 7.5 | ≤ 10.0 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 16 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 64 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 | ≤ 6.0 |
| 256 QAM | ≤ 7.5 | ≤ 10.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies. | | | | | | | | | |

Table 6.1.1.2.2-3 contains A-MPR values for the 5925-5945MHz frequency range based on South Korea regulatory requirements.

Table 6.1.1.2.2-3: A-MPR for PC5 VLP in South Korea (5925-5945MHz).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | |
| 20 MHz | | 40 MHz | | 60 MHz | | 80 MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-ODFM | QPSK | ≤ 8.5 | ≤ 11.5 | ≤ 7.0 | ≤ 9.0 | ≤ 6.5 | ≤ 7.5 | ≤ 6.5 | ≤ 7.0 |
| 16 QAM | ≤ 8.5 | ≤ 11.5 | ≤ 7.0 | ≤ 9.0 | ≤ 6.5 | ≤ 7.5 | ≤ 6.5 | ≤ 7.0 |
| 64 QAM | ≤ 8.5 | ≤ 11.5 | ≤ 7.0 | ≤ 9.0 | ≤ 6.5 | ≤ 7.5 | ≤ 6.5 | ≤ 7.0 |
| 256 QAM | ≤ 8.5 | ≤ 11.5 | ≤ 7.0 | ≤ 9.0 | ≤ 6.5 | ≤ 7.5 | ≤ 6.5 | ≤ 7.0 |
| CP-OFDM | QPSK | ≤ 11 | ≤ 12.5 | ≤ 9.0 | ≤ 11.0 | ≤ 7.5 | ≤ 9.5 | ≤ 7.0 | ≤ 8.5 |
| 16 QAM | ≤ 11 | ≤ 12.5 | ≤ 9.0 | ≤ 11.0 | ≤ 7.5 | ≤ 9.5 | ≤ 7.0 | ≤ 8.5 |
| 64 QAM | ≤ 11 | ≤ 12.5 | ≤ 9.0 | ≤ 11.0 | ≤ 7.5 | ≤ 9.5 | ≤ 7.0 | ≤ 8.5 |
| 256 QAM | ≤ 11 | ≤ 12.5 | ≤ 9.0 | ≤ 11.0 | ≤ 7.5 | ≤ 9.5 | ≤ 7.0 | ≤ 8.5 |
| NOTE 1: Full allocation A-MPR applies when all RB’s in a 20 MHz channel or all RB’s in all sub-bands for wideband operation are fully allocated and all sub-bands are transmitted. Partial allocation A-MPR applies when one or more RB’s in one or more sub-bands are not allocated but when all sub-bands within the channel are transmitted. When not all sub-bands within the channel are transmitted, the A-MPR associated with the channel bandwidth according to the bandwidth of the contiguously transmitted sub-bands and according to the allocation type applies.  NOTE 2: This table is applicable when the channel raster point is extended so that first 20MHz, i.e. 5925-5945MHz, can be used by NR-U. | | | | | | | | | |

##### 6.1.1.2.3 Peru and Chile

Table 6.1.1.2.3-1: A-MPR for PC5 LPI in Peru and Chile

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | |
| 20 MHz | | 40 MHz | | 60 MHz | | 80 MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| DFT-s-ODFM | QPSK | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 3.0 | ≤ 5.5 |
| 16 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 3.0 | ≤ 5.5 |
| 64 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 3.0 | ≤ 5.5 |
| 256 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 5.0 | ≤ 6.5 | ≤ 5.0 | ≤ 5.5 |
| CP-OFDM | QPSK | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 |
| 16 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 |
| 64 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 6.5 | ≤ 5.5 | ≤ 5.5 |
| 256 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 7.0 | ≤ 8.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |

The A-MPR results for PC5 LPI in Peru and Chile are mostly identical to the A-MPR results defined by NS\_53 (LPI in US). In some cases, A-MPR results are 0.5-1dB relaxed comparing to NS\_53. Thus, accounting for the marginal difference between these A-MPR values and NS\_53, the latter can be re-used to support Peru and Chile.

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