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| 3GPP TR38.786 V1.2.0 (2023-11) | |
| Technical Report | |
| 3rd Generation Partnership Project;  Technical Specification Group Radio Access Network;  NR Sidelink evolution;  User Equipment (UE) radio transmission and reception;  (Release 18) | |
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| ***3GPP***  Postal address  3GPP support office address  650 Route des Lucioles - Sophia Antipolis  Valbonne - FRANCE  Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16  Internet  http://www.3gpp.org |
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# Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

**shall** indicates a mandatory requirement to do something

**shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

**should** indicates a recommendation to do something

**should not** indicates a recommendation not to do something

**may** indicates permission to do something

**need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

**can** indicates that something is possible

**cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

**will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

**might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

# 1 Scope

The present document is a technical report for NR sidelink evolution services in Rel-18. The purpose is to specify radio solutions that are necessary for NR to support sidelink services working on unlicensed spectrums.

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TR 30.007: "Guideline on WI/SI for new Operating Bands".

[3] 3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**Con-current operation**: The simultaneous transmission and reception of sidelink and Uu interfaces, irrespective of TDM mode and FDM mode, while operation is agnostic of the service used on each interface.

**Inter-band con-current operation:** Operation of NR Uu carrier and NR Sidelink carrier in different operating bands**.**

**NR SL CA operation:** Aggregation of two or more NR Sidelink component carriers in order to support wider transmission bandwidths.

**Intra-band SL CA UE:** UE that supports NR SL CA operation in a single band

**NR SL inter-band con-current operating Band**：Band combinations of NR Uu carrier and NR Sidelink carrier in different operating bands**.**

**NR SL-U UE:** UE that supports NR Sidelink operation in unlicensed bands (e.g. n46, n96, n102).

**PC5:** The interface for sidelink transmission.

**PC3/PC5 UE:** UE that supports Power class 3 or Power class 5

**UE transmission bandwidth configuration**: Set of resource blocks located within the UE channel bandwidth which may be used for transmitting or receiving by the UE.

***Wideband operation:*** *For a UE that supports shared spectrum channel access, wideband operation refers to operation within a channel larger than 20 MHz in which intra-cell guard bands may be configured to distinguish individual RB-sets*

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

ΔFGlobal Granularity of the global frequency raster

ΔFRaster Band dependent channel raster granularity

ΔfOOB Δ Frequency of Out Of Band emission

ΔPPowerClass Adjustment to maximum output power for a given power class

RB The starting frequency offset between the allocated RB and the measured non-allocated RB

ΔRIB,c Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell *c*

ΔShift Channel raster offset

TC Allowed operating band edge transmission power relaxation

TC,*c*Allowed operating band edge transmission power relaxation for serving cell *c*

∆LCRB Difference RB size between NR Uu RMC and NR SL RMC

BWChannel Channel bandwidth

BWinterferer Bandwidth of the interferer

BWchannel CA The aggregated channel bandwidth of the wanted signal

FC RF reference frequency on the channel raster

FDL\_low The lowest frequency of the downlink *operating band*

FDL\_high The highest frequency of the downlink *operating band*

FUL\_low The lowest frequency of the uplink *operating band*

FUL\_high The highest frequency of the uplink *operating band*

FInterferer (offset) Frequency offset of the interferer (between the center frequency of the interferer and the carrier frequency of the carrier measured)

FInterferer Frequency of the interferer

FIoffset Frequency offset of the interferer (between the center frequency of the interferer and the closest edge of the carrier measured)

Foffset Frequency offset from FC\_high to the *higher edge* or FC\_low to the *lower edge.*

FOOB The boundary between the NR out of band emission and spurious emission domains

Fuw (offset) The frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the interferer

Gpost connector The supported post antenna connector gain

LCRB Transmission bandwidth which represents the length of a contiguous resource block allocation expressed in units of resources blocks

Max() The largest of given numbers

Min() The smallest of given numbers

 Physical resource block number

NRACLR NR ACLR

NR\_SLREFSENS The REFSENS value defined for NR SL

NR\_UuREFSENS The REFSENS value defined for NR Uu

NRB Transmission bandwidth configuration, expressed in units of resource blocks

NRB\_agg The number of the aggregated RBs within the fully allocated aggregated channel bandwidth for carrier 1 to j, where *μ* is defined in TS 38.211

NRB,c The transmission bandwidth configuration of component carrier c, expressed in units of resource blocks for carrier j, where *μ* is defined in TS 38.211

NREF NR Absolute Radio Frequency Channel Number (NR-ARFCN)

NREF-Offs Offset used for calculating NREF

NFV2X Noise figure for V2X

PCMAX The configured maximum UE output power

PCMAX, *c* The configured maximum UE output power for serving cell *c*

PCMAX, *f*, *c* The configured maximum UE output power for carrier *f* of serving cell *c* in each slot

PEMAX Maximum allowed UE output power signalled by higher layers

PEMAX, *c* Maximum allowed UE output power signalled by higher layers for serving cell *c*

PInterferer Modulated mean power of the interferer

Plargest BW Power of the largest transmission bandwidth configuration of the component carriers in the bandwidth combination

PPowerClass PPowerClass is the nominal UE power (i.e., no tolerance)

P-MPR*c* Power Management Maximum Power Reduction for serving cell *c*

PRB The transmitted power per allocated RB, measured in dBm

PUMAX The measured configured maximum UE output power

Puw Power of an unwanted DL signal

Pw Power of a wanted DL signal

PREFSENS\_V2X The REFSENS power for V2X

PREFSENS\_SL The REFSENS power for Sidelink

RBstart Indicates the lowest RB index of transmitted resource blocks

RBend Indicates the highest RB index of transmitted resource blocks

RX\_BW The bandwidth for receiving

REFSENSV2X REFSENS value defined for V2X

SNRV2X Signal-to-Noise Ratio for V2X

T(PCMAX, *f*, *c*) Tolerance for applicable values of PCMAX, *f*, *c* for configured maximum UE output power for carrier *f* of serving cell *c*

SSREF SS block reference frequency position

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ACLR Adjacent Channel Leakage Ratio

ACS Adjacent Channel Selectivity

AGC Automatic Gain Control

A-MPR Additional Maximum Power Reduction

BLER BLock Error Rate

BS Base Station

CBW Channel Bandwidth

CC Component Carriers

CDF Cumulative Distribution Function

CP-OFDM Cyclic Prefix-OFDM

C-IMD [Counter Intermodulation Distortion]

DFT-s-OFDM Discrete Fourier Transform-spread-OFDM

DMRS Demodulation Reference SignalEIRP Equivalent Isotropically Radiated Power

EVM Error Vector Magnitude

FDD Frequency Division Duplex

FDM Frequency Division Multiplexing

FR1 Frequency Range 1

FR2 Frequency Range 2

HD Half Duplex

IM Implementation Margin

ITS Intelligent Transportation SystemLTE Long Term Evolution

LBT Listen before Talk

MPR Maximum Power Reduction

NF Noise Figure

NR New Radio

NR-ARFCN NR Absolute Radio Frequency Channel Number

OLPC Open Loop Power Control

PC Power Control

PRB Physical Resource Block

ProSe Proximity-based Services

PSBCH Physical Sidelink Broadcast CHannel

PSCCH Physical Sidelink Control CHannel

PSFCH Physical Sidelink Feedback CHannel

PSSCH Physical Sidelink Shared CHannelREFSENS Reference Sensitivity

RF Radio Frequency

SCS Sub-Carrier Spacing

SINR Signal to Interference plus Noise Ratio

SL Sidelink

SL-U Sidelink at unlicensed band

SNR Signal-to-Noise Ratio

S-SSB Sidelink Synchronization Signal Block

SEM Spectrum emission mask

TDD Time Division Duplex

TDM Time Division Multiplexing

UE User Equipment

UL Uplink

V2V Vehicle to Vehicle

V2X Vehicle to Everything

# 4 Background

In Rel-16, sidelink communication was developed in RAN mainly to support advanced V2X applications. In Rel-17, SA2 studied and standardized Proximity based service including public safety and commercial related service. As part of Rel-17, power saving solutions (e.g., partial sensing, DRX) and inter-UE coordination have been developed in RAN1 and RAN2 to improve power consumption for battery limited terminals and reliability of sidelink transmissions.

Although NR sidelink was initially developed for V2X applications, there is growing interest in the industry to expand the applicability of NR sidelink to commercial use cases. For commercial sidelink applications, two key requirements have been identified:

* Increased sidelink data rate
* Support of new carrier frequencies for sidelink

Increased sidelink data rate is motivated by applications such as sensor information (video) sharing between vehicles with high degree of driving automation. Commercial use cases could require data rates in excess of what is possible in Rel-17. Increased data rate can be achieved with the support of sidelink carrier aggregation and sidelink over unlicensed spectrum. Furthermore, by enhancing the FR2 sidelink operation, increased data rate can be more efficiently supported on FR2. While the support of new carrier frequencies and larger bandwidths would also allow to improve its data rate, the main benefit would come from making sidelink more applicable for a wider range of applications. More specifically, with the support of unlicensed spectrum and the enhancement in FR2, sidelink will be in a better position to be implemented in commercial devices since utilization of the ITS band is limited to ITS safety related applications.

Another aspect to consider is the V2X deployment scenario where both LTE V2X and NR V2X devices are to coexist in the same frequency channel. For the two different types of devices to coexist while using a common carrier frequency, it is important that there is mechanism to efficiently utilize resource allocation by the two technologies without negatively impacting the operation of each technology. This requirement was also mentioned as part of the input from 5G Automotive Association to the Rel-18 RAN Workshop.

# 5 Operating bands and channel arrangement for SL evolution

## 5.1 Operating bands

### 5.1.1 Operating bands for single carrier operation in unlicensed band

NR Sidelink is designed to operate in the unlicensed operating bands in FR1 defined in Table 5.1.1-1.

Table 5.1.1-1. NR SL-U operating bands in FR1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR SL-U operating band | Sidelink (SL) Transmission operating band | Sidelink (SL) Reception operating band | Duplex Mode | Interface |
| FUL\_low – FUL\_high | FDL\_low – FDL\_high |  |
| n461 | 5150 MHz – 5925 MHz | 5150 MHz – 5925 MHz | HD | PC5 |
| n961,2 | 5925 MHz – 7125 MHz | 5925 MHz – 7125 MHz | HD | PC5 |
| n1021 | 5925 MHz – 6425 MHz | 5925 MHz – 6425 MHz | HD | PC5 |
| NOTE 1: Direct connection between client devices and between vehicular devices in the shared spectrum bands or portions of the shared spectrum bands is subject to country-specific conditions and can be prohibited per region-specific regulatory rules, e.g., in USA and Canada. | | | | |

During the NR SL-U development RAN4 identified at least following regional and country specific restrictions for direct connection between the devices within the targeted un-licensed bands (n46, n96 and n102).

1. Client devices are prohibited from connecting directly to another client device in the frequency range 5850 – 5895 MHz and 5925 – 7125 MHz in USA, and in the frequency range 5925 – 7125 MHz in Canada per regulatory rules. Direct connection between client devices in the shared spectrum band is subject to region-specific regulatory rules.

2. For band n96 in USA, SL-U operation is excluded for vehicular UEs.

### 5.1.2 Operating band combinations for inter-band con-current operation

It has been agreed to use n78@licensed band + n46@unlicensed band as the example band combination for Uu@Licensed and SL@Un-licensed.

The below inter-band con-current operation has been agreed not to be supported in Rel-18.

* + Uu@Un-licensed and SL@Un-licensed
  + Uu@Un-licensed and SL@licensed
  + Intra-band SL@Un-licensed

NR SL operation is designed to operate concurrently with NR uplink/downlink on the operating band combinations listed in Table 5.1.2-1.

* Table 5.1.2-1 Band combinations of inter-band con-current operating bands

|  |  |  |
| --- | --- | --- |
| NR SL inter-band con-current operating Band | NR Band | Interface |
| SL\_n78-n46 | n78 | Uu |
|  | n46 | PC5 |

### 5.1.3 Operating band combinations for NR SL CA operation

NR SL CA operation is designed to operate in the operating bands in FR1 defined in Table 5.1.3-1.

Table 5.1.3-1: Intra-band contiguous CA operating bands for SL CA in FR1

|  |  |  |
| --- | --- | --- |
| NR SL CA Band | NR Band | Interface |
| SL\_n47 | n47 | PC5 |

## 5.2 Channel bandwidth

### 5.2.1 Channel bandwidth for single carrier operation in unlicensed band

Channel bandwidths defined for NR SL-U operating bands are in Table 5.2.1-1.

Table 5.2.1-1 NR SL-U channel bandwidth

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | SL-U band /channel bandwidth | | | | | | | | |
| NR SL-U Operating Band | SCS kHz | 10MHz | 20 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz |
| n46 | 15 |  | 20 |  | 40 |  |  |  |  |  |
| 30 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| 60 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| n96 | 15 |  | 20 |  | 40 |  |  |  |  |  |
| 30 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| 60 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| n102 | 15 |  | 20 |  | 40 |  |  |  |  |  |
| 30 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| 60 |  | 20 |  | 40 |  | 60 | 80 |  | 1001 |
| NOTE 1: This UE channel bandwidth is optional in this release of the specification. | | | | | | | | | | |

Support for 10MHz channel bandwidth is not defined for NR SL-U single carrier operation in bands n46, n96 and n102.

### 5.2.2 Channel bandwidth for inter-band con-current operation

It has been agreed to apply each channel bandwidth that is supported in a band for Uu and a band for SL-U.

For NR SL inter-band con-current operation in FR1, the NR channel bandwidths and SL channel bandwidths for each operating band are specified in Table 5.2.2-1.

Table 5.2.2-1: Inter-band con-current operation configurations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR SL inter-band con-current operating configuration | NR Band | Interface | Channel bandwidth (MHz) (NOTE 1) | Bandwidth combination set |
| SL\_n78A-n46A | n78 | Uu | 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 | 0 |
|  | n46 | PC5 | 20, 40, 60, 80, 1002 |  |
| NOTE 1: The SCS of each channel bandwidth for NR band refers to Table 5.3.5-1 in TS38.101-1.  NOTE 2: This UE channel bandwidth is optional in this release of the specification. | | | | |

### 5.2.3 Channel bandwidth for NR SL CA operation

For NR SL CA operation, the SL CA channel bandwidths for each operating band is specified in Table 5.2.3-1.

Table 5.2.3-1: Intra-band contiguous CA operating bands for SL CA in FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sidelink CA configuration / Bandwidth combination set | | | | | | | |
| Sidelink CA configuration | Sidelink CA configuration for TX | Component carriers in order of increasing carrier frequency | | | | Maximum aggregated  bandwidth [MHz] | Bandwidth combination set |
| Channel bandwidths for carrier [MHz] | Channel bandwidths for carrier [MHz] | Channel bandwidths for carrier [MHz] | **Channel bandwidths for carrier [MHz]** |
| SL\_n47B | SL\_n47B | 10 | 10, 20,30 |  |  | 70 | 0 |
| 20 | 20,30 |  |  |
| 30 | 30,40 |  |  |

## 5.3 Channel arrangement

5.3.1 Channel spacing

The general requirements in clause 5.4.1 of TS 38.101-1 are applied for NR SL-U.

5.3.2 Channel raster

The general requirements in clause 5.4.2 of TS 38.101-1 are applied for SL-U.

NR-ARFCN and channel raster requirements in 5.4.2.1 of TS 38.101-1 are applied for NR SL-U with following exception:

* 7.5kHz frequency raster shift, which can be used in NR V2X in band n47 is not defined for NR SL-U operation in bands n46, n96, n102.
* Channel raster entries for each operating band requirements in clause 5.4.2.3 of TS 38.101 are applied for NR SL-U with following exception: Channel raster points for 10MHz CBW in band n46 as defined in Table 5.4.2.3-2 are not applicable for NR SL-U.

The mapping between the RF reference frequency on the channel raster and the corresponding resource element is given in Table 5.3.2-1 and can be used to identify the RF channel position. The mapping depends on the total number of RBs that are allocated in the channel and applies to both Tx and Rx for SL. The mapping must apply to at least one numerology supported by the UE.

Table 5.3.2-1: Channel raster to resource element mapping

|  |  |  |
| --- | --- | --- |
|  | NRBmod2 = 0 | NRBmod2 = 1 |
| Resource element index | 0 | 6 |
| Physical resource block number |  |  |

5.3.3 Synchronization raster

There is no synchronization raster definition for NR sidelink unlicensed bands n46, n96, n102.

# 6 Transmitter characteristics for NR SL evolution

## 6.1 Tx requirements for NR SL single carrier operation in unlicensed band

### 6.1.1 Maximum output power for NR SL-U

The SL-U UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth in unlicensed bands. The period of measurement shall be at least one sub frame (1ms).

Table 6.1.1-1: SL-U UE Power Class

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR  band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 5 (dBm) | Tolerance (dB) |
| n46 |  |  |  |  |  |  | 20 | +2/-3 |
| n96 |  |  |  |  |  |  | 20 | +2/-3 |
| n102 |  |  |  |  |  |  | 20 | +2/-3 |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance  NOTE 2: Powerclass 5 is the default power class unless otherwise stated. | | | | | | | | |

The SL-U UE shall meet the following additional requirements for maximum mean transmission power density specified in Table 6.2F.1-2 in TS38.101-1 when NS is signalled and when transmission overlaps with any portion of the specified frequency range. In case transmission overlaps multiple frequency ranges, the lowest power density requirement applies.

Table 6.1.1-2: Additional requirements for transmit power density

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR Band | NS value | Channel bandwidth (MHz) | Frequency range (MHz) | Maximum mean power density (dBm/MHz) |
| n46 | NS\_31 | 20 | 5150 - 5230 | 10 |
|  |  |  | 5250 – 5350 |  |
|  |  |  | 5470 – 5725 |  |
|  |  |  | 5725 - 5850 |  |
|  |  |  | 5230 – 5250 | 4 |
|  |  | 40 | 5150 - 5230 | 7 |
|  |  |  | 5250 – 5350 |  |
|  |  |  | 5470 – 5725 |  |
|  |  |  | 5725 - 5850 |  |
|  |  |  | 5230 – 5250 | 4 |
|  |  | 60, 80 | 5150 - 5230 | 4 |
|  |  |  | 5250 – 5350 |  |
|  |  |  | 5470 – 5725 |  |
|  |  |  | 5725 - 5850 |  |
|  |  |  | 5230 – 5250 |  |
| n96 | NS\_53 | 20, 40, 60, 80, 100 | 5925 – 7125 | -1 |
|  | NS\_60 | 20, 40, 60, 80, 100 | 5925 – 7125 | 2 |
|  | NS\_61 | 20, 40, 60, 80 | 5925 - 6425 | 1 |
| n102 | NS\_58 | 20, 40, 60, 80, 100 | 5945 – 6425 | 10 |

### 6.1.2 UE maximum output power reduction for NR SL-U

The following assumption can serve as a starting point for MPR simulation assumptions that are considered to derive MPR requirements for SL-U operation.

* Basic RF parameters for MPR of single carrier SL-U UE
  + Waveforms: CP-OFDM for SL-U
  + Supported CBW: 20/40/60/80/100MHz.
  + Modulation: QPSK/16-QAM/64-QAM/256-QAM
  + SCS: 15/30kHz
  + C-IMD: 45dBc or 60dBc
  + EVM and impairments

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Modulation** | **SystemEVM** | **PA only** | **Image** |  |
| QPSK | 17.5% | 10% | 34dB |  |
| 16QAM | 12.5% | 8% | 34dB |  |
| 64QAM | 8% | 4% | 34dB |  |
| 256QAM | 3.5% | 1.8% | 34dB |  |

* + IBE and impairment exceptions are same as NR-U
* Reuse IBE mask from TS38.101-1 Table 6.4F.2.3-1
* Image/carrier exceptions position and specific test according to interlaces.
  + ACLR: 27dBc for both PC3/PC5 UE with NR MBW
  + SEM according to 38.101-1 clause 6.5F.2.2 as well as Table 6.1.2-4
  + PA calibration & PA configuration:
* Power class 5 (single PA): 1dB MPR and DFT-s-OFDM QPSK 100RB3 20MHz waveform with 27dB ACLR
  + MPR table format can be reused the MPR format of NR-U according to each transmitted channel e.g.PSSCH/PSCCH transmission, PSFCH transmission and PSBCH transmission if any issue is not seen..
  + The MPR will be applied to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.
  + Follow the RB interlaced allocation based on Table 6.2F.2-1 and Table 6.2F.2-2 in TS38.101-1. Also refer the interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214. FFS on the inter-laced RB allocation for PSFCH, and on the repeated RB allocation for S-SSB by RAN1

For SL-U in single CC operation, the simultaneous transmission of PSCCH and PSSCH in the same sub-frame is supported and the following constraints in Table 6.1.2-1 can be assumed.

Table 6.1.2-1: SL-U operation’s MPR simulation assumptions

|  |  |
| --- | --- |
| Items | Assumption |
| Allowed sub-channel sizes | Support {10, 12, 15, 20, 25, 50, 75, 100} PRBs for possible sub-channel size. |
| Allowed LCRB allocation | 10,12,15,20,24,25,30,36,40,45,48,50,60,70,72,75,80,84,90,96,100,105,108,110,120,125,130,132,135,140,144,150,156,160,165,168,170,175,180,190,192,195,200,204,210,216,220,225,228,230,240,250,252,255,260,264,270  The Allowed LCRB will be decided by the supported SCS. |
| Regarding PSCCH / PSSCH multiplexing | 라인, 스크린샷, 텍스트, 그래프이(가) 표시된 사진  자동 생성된 설명 |
| PSCCH size | 10RB\*3 Symbols |
| PSD offset of X dB between PSCCH and PSSCH | 0dB |

For simultaneous transmission of PSFCH transmission for SL-U operation, RAN4 assumed as follow

Table 6.1.2-2: SL-U UE’s MPR simulation assumptions for PSFCH transmission

|  |  |
| --- | --- |
| Items | Assumption |
| Modulation for PSSCH | QPSK |
| PSFCH | ZC sequence |
| Structure of Slot | Baseline is to follow RAN1 agreements |
| RB allocation | - Power per RB is same in PSFCH for all users  - Total power is 20dBm  - Single RB-set and multiple RB-sets will be considered based on RAN1 decision.  For single RB-set, RAN4 consider interlacing RBs for PSFCH  For multiple RB-sets, RAN4 considers both contiguous RB sets and non-contiguous RB sets.  - N gap from RBstart to RBend of interlaced transmission should meet at least 80% of channel bandwidth in a single RB-set , Ngap = RBend – RBstart .  - For common interlaced RB allocation, P\_common <= P\_dedicated  - RB allocation method as NR SL legacy RB allocation is also considered. |

For S-SSB transmission for SL-U operation, RAN4 assumed as follow

Table 6.1.2-3: SL-U UE’s MPR simulation assumptions for S-SSB transmission

|  |  |
| --- | --- |
| Items | Assumption |
| Modulation for PSBCH | QPSK |
| S-PSS | M-sequence |
| S-SSS | Golden-sequence |
| S-SSB structure |  |
| RB allocation | - Single RB-set and multiple RB-sets will be considered based on RAN1 decision. For single RB set, the 11RB will be repeated *N* time in a RB set. For the multiple RB-sets, RAN4 consider both contiguous RB sets and non-contiguous RB sets.  - N gap from RBstart to RBend of repeated S-SSB transmission should meet at least 80% of channel bandwidth.in a single RB-set ,Ngap = RBend – RBstart. |

For MPR and A-MPR for SL-U wideband operation, RAN4 assumed in-carrier SEM as follows.

In the case of non-transmitted 20 MHz channel(s) on the edges of an assigned channel bandwidth the spectrum emission mask for operation with shared spectrum channel access, specified in Table 6.5F.2.2.0-1, is applied by using the total bandwidth of the remaining transmitted channels. The spectrum emission mask for non-transmitted channels is floored at -28dBr inside the assigned channel bandwidth and continues at same level until the channel bandwidth mask is intercepted, i.e. until ΔfOOB, as defined in 38.101-1 Clause 6.5F.2.2.0, equals BWChannel / 2. When ΔfOOB > BWChannel / 2 requirements in clause 6.5F.2.2.0 apply.

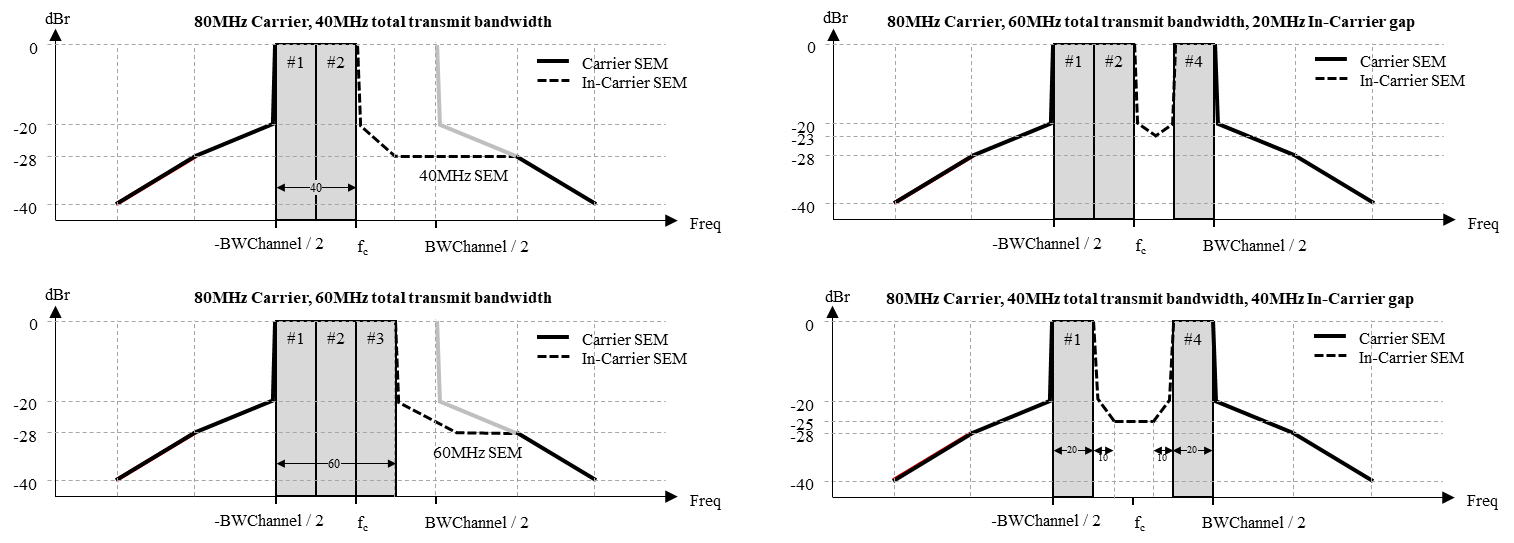
The In-Carrier SEM in gap between transmitted channels is defined in Table 6.1.2-4 and some examples are shown in Figure 6.1.2-1.

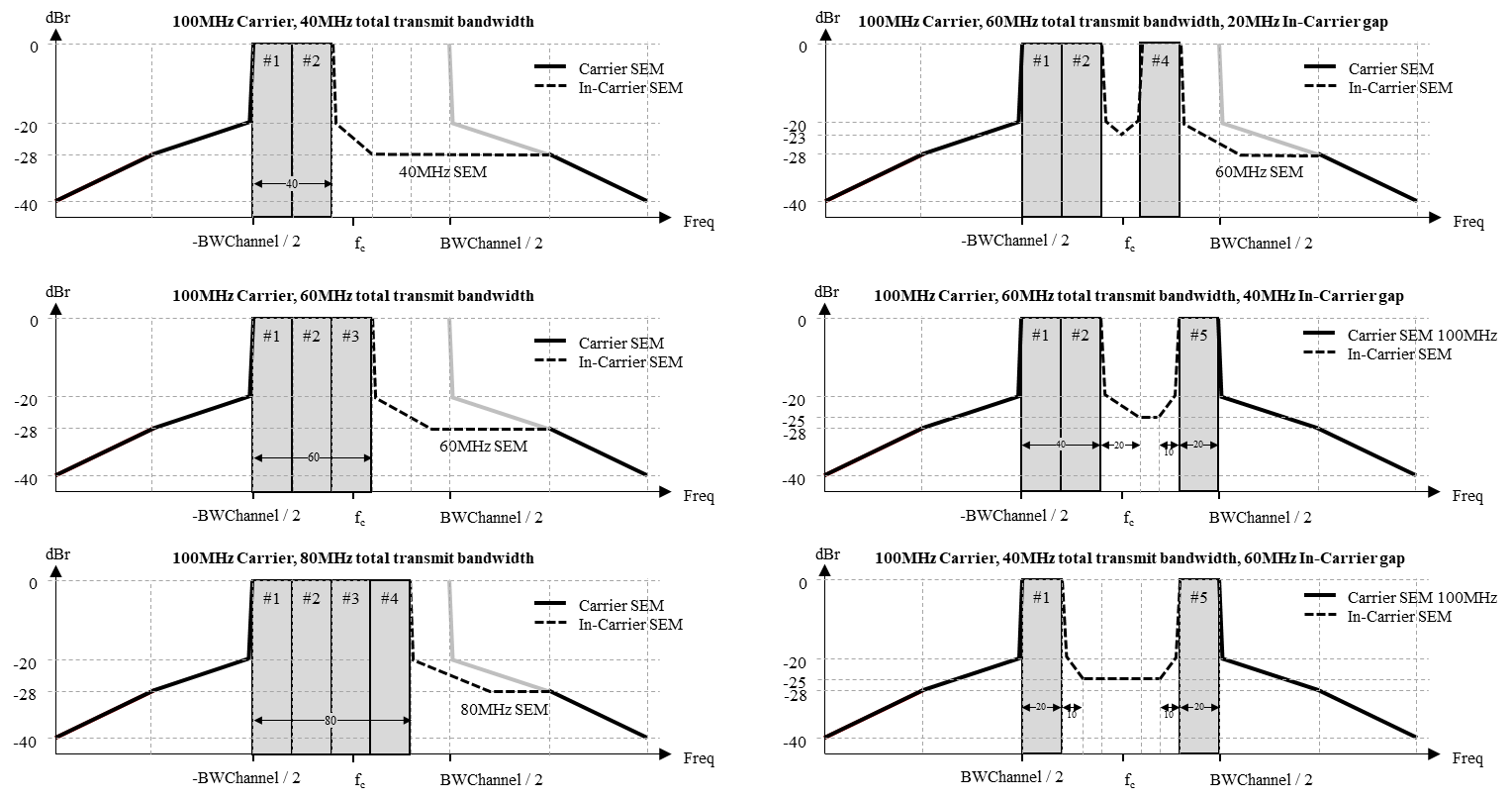
The relative power of any UE emission shall not exceed the most stringent levels given by the spectrum emission mask for operation with shared spectrum channel access with full channel bandwidth and the spectrum emission mask for non-transmitted channels with the channel bandwidth of the transmitted channels in the case of non-transmitted channels at the edge of an assigned channel bandwidth or spectrum emission mask defined for gaps between the transmitted channels.

An exception to the spectrum emission mask for non-transmitted channels allows a single 2 MHz bandwidth to extend to -28 dBc relative to total transmit power, or -20 dBm, whichever is the greatest.

Table 6.1.2-4: In-Carrier SEM in gap between transmitted channels for SL-U wideband operation

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carrier BW (MHz) | TX bitmap | TX BW (MHz) | Gap (MHz) | |ΔFrequency| in gap from transmitted channel and mask levels | | | | | Unit |
| 0 | 1 | 10 | 20 | 30 | MHz |
| 60 | 101 | 40 | 20 | 0 | -20 | -23 |  |  | dBr |
| 80 | 1101  1011 | 60 | 20 | 0 | -20 | -23 |  |  | dBr |
| 1001 | 40 | 40 | 0 | -20 | -25 | -25 |  | dBr |
| 100 | 10100  01010  00101 | 40 | 20 | 0 | -20 | -23 |  |  | dBr |
| 10110  11010  01101  01011 | 60 | 20 | 0 | -20 | -23 |  |  | dBr |
| 10111  11011  11101 | 80 | 20 | 0 | -20 | -23 |  |  | dBr |
| 11001  10011 | 60 | 40 (adjacent from ’11’) | 0 | -20 |  | -25 |  | dBr |
| 60 | 40  (adjacent from’1’) | 0 | -20 | -25 |  |  | dBr |
| 10001 | 40 | 60 | 0 | -20 | -25 | -25 | -25 | dBr |





**Figure 6.1.2-1: In-Carrier SEM in gap between transmitted channels for SL-U wideband operation**

#### 6.1.2.1 MPR for SL-U operation in single CC

##### 6.1.2.1.1 MPR for simultaneous PSSCH/PSCCH transmission

6.1.2.1.1.1 LG Electronics’ simulation results (R4-2315542)

The following simulation scenarios are considered as Table 6.1.2.1.1.1-1.

Table 6.1.2.1.1.1-1: SL-U PSSCH/PSCCH MPR/A-MPR simulation scenarios

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Scenario | Waveform | BW | RB Setup | SCS |
| Full Allocation | 1 | CP-OFDM | 20 | 105RB0 | 15 |
| 2 | CP-OFDM | 20 | 50RB0 | 30 |
| 3 | CP-OFDM | 40 | 216RB0 | 15 |
| 4 | CP-OFDM | 60 | 160RB0 | 30 |
| 5 | CP-OFDM | 80 | 216RB0 | 30 |
| 6 | CP-OFDM | 100 | 270RB0 | 30 |
| Interlaced Allocation  (Interlace\_0) | 7 | CP-OFDM | 20 | 1 RB0 every 10RBs | 15 |
| 8 | CP-OFDM | 20 | 1RB0 every 5RBs | 30 |
| 9 | CP-OFDM | 40 | 1RB0 every 10RBs | 15 |
| 10 | CP-OFDM | 60 | 1RB0 every 5RBs | 30 |
| 11 | CP-OFDM | 80 | 1RB0 every 5RBs | 30 |
| 12 | CP-OFDM | 100 | 1RB0 every 5RBs | 30 |
| Wide band  Full  operation | 13 | CP-OFDM | 40 | Bitmap 10 | 15 |
| 14 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 15 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 16 | CP-OFDM | 60 | Bitmap 010 | 30 |
| 17 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 18 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 19 | CP-OFDM | 80 | Bitmap 1110 | 30 |
| 20 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 21 | CP-OFDM | 80 | Bitmap 0110 | 30 |
| 22 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 23 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 24 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 25 | CP-OFDM | 100 | Bitmap 11110 | 30 |
| 26 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 27 | CP-OFDM | 100 | Bitmap 01100 | 30 |
| 28 | CP-OFDM | 100 | Bitmap 01110 | 30 |
| 29 | CP-OFDM | 100 | Bitmap 00100 | 30 |
| Wide band  Interlaced  Operation  (Interlace\_0) | 30 | CP-OFDM | 40 | Bitmap 10 | 15 |
| 31 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 32 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 33 | CP-OFDM | 60 | Bitmap 010 | 30 |
| 34 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 35 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 36 | CP-OFDM | 80 | Bitmap 1110 | 30 |
| 37 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 38 | CP-OFDM | 80 | Bitmap 0110 | 30 |
| 39 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 40 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 41 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 42 | CP-OFDM | 100 | Bitmap 11110 | 30 |
| 43 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 44 | CP-OFDM | 100 | Bitmap 01100 | 30 |
| 45 | CP-OFDM | 100 | Bitmap 01110 | 30 |
| 46 | CP-OFDM | 100 | Bitmap 00100 | 30 |

Here, for RB set, ‘105RB0’ means that RB starts at RB index ‘0’ and transmitted RB size is 105 RB. And, Bitmap ‘1’ means the corresponding RB set is transmitted, and ‘0’ means the corresponding RB set is not transmitted for wide band operation.

Table 6.1.2.1.1.1-2 shows the all possible bitmap of sub-band configuration for wide band operation. The wide band operation can be aggregated with multiple of 20MHz based sub-band. For the SL-U PSSCH/PSCCH MPR simulation, only contiguous RB set bitmaps are considered.

Table 6.1.2.1.1.1-2: All possible RB set Bitmap of sub-band configuration

|  |  |  |
| --- | --- | --- |
|  | Contiguous RB sets Bit map | Non-contiguous RB sets Bit map |
| 20MHz | N/A | N/A |
| 40MHz | 11, 10, 01 | N/A |
| 60MHz | 111, 110, 011, 100, 001, 010 | 101 |
| 80MHz | 1111, 1110, 0111, 1100, 0011, 1000, 0001, 0110, 0100, 0010 | 1001, 1101, 1011, 1010, 0101 |
| 100MHz | 11111, 11110, 01111, 11100, 00111, 11000, 00011, 10000, 00001, 01110, 01100, 00110, 01000, 00010, 00100 | 10001, 11011, 11010, 01011, 11001, 10011, 10101, 10110, 01101, 10100, 00101, 10010, 01001, 01010, 11101, 10111 |

Table 6.1.2.1.1.1-3 and Figure 6.1.2.1.1.1-1 show the MPR simulation results for the scenarios.

Table 6.1.2.1.1.1-3: PSSCH/PSCCH MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.83 | 2.15 | 2.49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.83 | 2.16 | 2.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.83 | 3.18 | 2.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.88 | 5.08 | 5.89 | 5.49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.48 | 2.81 | 2.81 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.48 | 2.81 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.48 | 2.81 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 5.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.47 | 2.13 | 0.00 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.47 | 2.13 | 0.36 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.17 | 2.48 | 3.17 | 2.47 | 3.16 | 2.47 | 3.16 | 2.45 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.88 | 5.07 | 5.47 | 5.07 | 5.88 | 5.07 | 5.88 | 5.46 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.15 | 2.47 | 2.47 | 2.47 | 2.47 | 2.46 | 0.00 | 2.13 | 0.00 |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.15 | 2.47 | 2.47 | 2.47 | 2.47 | 2.46 | 0.10 | 2.13 | 0.63 |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.48 | 3.17 | 2.15 | 2.81 | 2.48 | 3.16 | 2.48 | 3.15 | 2.12 | 3.16 | 2.46 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.06 | 5.47 | 5.07 | 5.47 | 5.07 | 5.88 | 5.07 | 5.46 | 5.05 | 5.88 | 5.06 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.48 | 2.47 | 2.47 | 2.47 | 2.47 | 2.13 | 0.00 | 2.46 | 0.00 | 2.46 | 0.13 | 2.13 | 0.00 |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.48 | 2.47 | 2.47 | 2.47 | 2.47 | 2.13 | 0.35 | 2.46 | 0.63 | 2.47 | 0.64 | 2.13 | 0.10 |
| '64QAM' | 3.16 | 2.48 | 3.17 | 2.48 | 3.17 | 2.47 | 3.16 | 2.47 | 2.81 | 2.47 | 3.16 | 2.13 | 3.16 | 2.46 | 3.16 | 2.47 | 3.15 | 2.12 |
| '256QAM' | 5.88 | 5.06 | 5.47 | 5.08 | 5.47 | 5.06 | 5.47 | 5.07 | 5.47 | 5.06 | 5.47 | 5.06 | 5.47 | 5.06 | 5.47 | 5.06 | 5.46 | 5.06 |

Figure 6.1.2.1.1.1-1: PSSCH/PSCCH MPR simulation results for SL-U power class 5

Considering the inner RB set bitmaps and the outer RB set bitmaps on top of the Full/Partial RB allocation, the PSSCH/PSCCH MPR for SL-U power class 5 can be proposed as Table 6.1.2.1.1.1-4 based on the simulation results.

Table 6.1.2.1.1.1-4 Maximum power reduction (MPR) for SL-U UE power class 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation | | | | |
|  |  | Outer RB set configuration5 | | Inner RB set configuration5 | |  |
|  |  | Full2 (dB) | Partial3 (dB) | Full2 (dB) | Partial3 (dB) | Exception for 100MHz Full4 (dB) |
| CP-OFDM | QPSK | ≤ 3.5 | ≤ 3.5 | ≤ 3.5 | ≤ 1.5 | ≤ 4.5 |
|  | 16 QAM | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 | ≤ 3.0 | ≤ 4.5 |
|  | 64 QAM | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 |  |
|  | 256 QAM | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |  |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: The MPR for Full RB allocation applies to all RB’s in all transmitted 20 MHz or larger channels that are fully allocated or all RB’s in all transmitted sub-bands for wideband operation that are fully allocated excluding the wideband configurations of Table 6.2F.2-2.  NOTE 3: The MPR for Partial RB allocation applies to interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214 [10] or transmitted sub-bands for wideband operation are transmitted according to the wideband configurations of Table 6.2F.2-2.  NOTE 4: Exception for 100MHz Full RB allocation MPR applies when all RB’s in all sub-bands for 100MHz wideband operation are fully allocated and sub-bands are transmitted according to the wideband configurations of Table 6.2F.2-2.  NOTE 5: Contiguous outer sub-band configuration and contiguous inner sub-band configuration in Table 6.1.2.1.1.1-5 apply. | | | | | | |

Table 6.1.2.1.1.1-5: Outer/Inner sub-band configuration for SL-U wideband operation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Wideband operation channel bandwidth (MHz) | **Contiguous sub-band configuration** | | **Non-contiguous sub-band configuration** | |
| **Outer** | **Inner** | **Outer** | **Inner** |
| 40 | 11, 10, 01 | N/A | N/A | N/A |
| 60 | 111, 110, 011, 100, 001 | 010 | 101 | N/A |
| 80 | 1111, 1110, 0111, 1100, 0011, 1000, 0001 | 0110, 0100, 0010 | 1101, 1011, 1010, 0101, 1001 | N/A |
| 100 | 11111, 11110, 01111, 11100, 00111, 11000, 00011, 10000, 00001 | 01110, 01100, 00110, 01000, 00010, 00100 | 11011, 11010, 01011, 11001, 10011, 10101, 10110, 01101, 10100, 00101, 10010, 01001, 11101, 10111, 10001 | 01010 |
| NOTE 1: The sub-band configuration is represented as a bitmap where ‘1’ indicates that a sub-band is transmitted and ‘0’ indicates a sub-band is not transmitted. The bitmap is ordered with MSB mapped to the lowest frequency sub-band and LSB mapped to highest frequency sub-band within the wideband channel. | | | | |

6.1.2.1.1.2 OPPO’s simulation results (R4-2316119)

With the agreement above, the simulation cases are updated with 60kHz deleted. For each case, the QPSK, 16QAM, 64QAM and 256QAM will be simulated.

Table 6.1.2.1.1.2-1 simulation cases

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | case | Waveform | BW | RB Setup | SCS |
| Full Allocation  Single CC | 1 | CP-OFDM | 20 | 105RB0 | 15 |
| 2 | CP-OFDM | 20 | 50RB0 | 30 |
| 3 | CP-OFDM | 40 | 216RB0 | 15 |
| 4 | CP-OFDM | 40 | 105RB0 | 30 |
| 5 | CP-OFDM | 60 | 160RB0 | 30 |
| 6 | CP-OFDM | 80 | 216RB0 | 30 |
| 7 | CP-OFDM | 100 | 270RB0 | 30 |
| Interlaced Allocation  Single CC | 8 | CP-OFDM | 20 | 1 RB0 every 10RBs | 15 |
| 9 | CP-OFDM | 20 | 1RB0 every 5RBs | 30 |
| 10 | CP-OFDM | 40 | 1RB0 every 10RBs | 15 |
| 11 | CP-OFDM | 40 | 1RB0 every 5RBs | 30 |
| 12 | CP-OFDM | 60 | 1RB0 every 5RBs | 30 |
| 13 | CP-OFDM | 80 | 1RB0 every 5RBs | 30 |
| 14 | CP-OFDM | 100 | 1RB0 every 5RBs | 30 |
| Wide band operation  contiguous RB allocation | 15 | CP-OFDM | 40 | Bitmap 10 | 30 |
| 16 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 17 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 18 | CP-OFDM | 60 | Bitmap 010 | 30 |
| 19 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 20 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 21 | CP-OFDM | 80 | Bitmap 1110 | 30 |
| 22 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 23 | CP-OFDM | 80 | Bitmap 0110 | 30 |
| 24 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 25 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 26 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 27 | CP-OFDM | 100 | Bitmap 11110 | 30 |
| 28 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 29 | CP-OFDM | 100 | Bitmap 01100 | 30 |
| 30 | CP-OFDM | 100 | Bitmap 01110 | 30 |
| 31 | CP-OFDM | 100 | Bitmap 00100 | 30 |
| Wide band operation  Interlaced RB allocation | 32 | CP-OFDM | 40 | Bitmap 10 | 30 |
| 33 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 34 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 35 | CP-OFDM | 60 | Bitmap 010 | 30 |
| 36 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 37 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 38 | CP-OFDM | 80 | Bitmap 1110 | 30 |
| 39 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 40 | CP-OFDM | 80 | Bitmap 0110 | 30 |
| 41 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 42 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 43 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 44 | CP-OFDM | 100 | Bitmap 11110 | 30 |
| 45 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 46 | CP-OFDM | 100 | Bitmap 01100 | 30 |
| 47 | CP-OFDM | 100 | Bitmap 01110 | 30 |
| 48 | CP-OFDM | 100 | Bitmap 00100 | 30 |

Corresponding MPR results are shown as below for case 1 to 14:

Table 6.1.2.1.1.2-2 MPR for single CC

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 3.2 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.4 | 3.1 | 3.3 | 3.2 | 3.2 | 3.3 | 3.2 |
| 16QAM | 3.7 | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 3.4 | 3.1 | 3.3 | 3.2 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.0 | 5.2 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 4.1 | 4.3 | 4.1 | 4.4 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 6.6 | 7.5 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.2.1.1.2-3 MPR for Wideband operation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 1000 | 10000 | 010 | 0100 | 01000 | 00100 | 110 | 1100 | 11000 | 0110 | 01100 | 1110 | 11100 | 01110 | 11110 |
| Contiguous | QPSK | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| 16QAM | 3.5 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.7 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.7 | 3.6 |
| 64QAM | 5.1 | 5.1 | 4.8 | 5.2 | 4.7 | 5.1 | 4.9 | 5.1 | 4.9 | 5.1 | 4.7 | 4.8 | 5.0 | 5.1 | 4.8 | 5.0 | 5.2 |
| 256QAM | 7.4 | 7.5 | 7.7 | 8.5 | 7.3 | 7.4 | 8.0 | 7.5 | 8.5 | 7.4 | 7.3 | 7.6 | 8.0 | 7.4 | 7.7 | 8.5 | 8.5 |
| Interlace | QPSK | 2.6 | 2.6 | 2.7 | 2.8 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.7 | 2.8 | 2.6 |
| 16QAM | 2.9 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 3.0 | 2.8 | 2.9 | 3.0 | 3.0 | 2.8 |
| 64QAM | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.0 | 4.1 | 4.2 | 4.1 | 4.1 |
| 256QAM | 6.5 | 6.6 | 6.8 | 6.6 | 6.8 | 6.6 | 6.7 | 6.6 | 6.8 | 6.6 | 6.8 | 6.7 | 6.6 | 6.6 | 6.8 | 6.7 | 6.5 |

Figure 6.1.2.1.1.2-1, Contiguous and Interlaced Single CC MPR

Figure 6.1.2.1.1.2-2, Contiguous and Interlaced Wideband MPR

The case 15, 16, 17, 19, 20, 22, 24, 25, 26, 28, 29 can apply 8dB limit while the rest of the cases should apply 9dB limit.

So the exception bitmap can be listed as below:

Table 6.1.2.1.1.2-4 exception cases mapping to bitmap

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 15 | CP-OFDM | 40 | Bitmap 10 | 30 |
| 16 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 17 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 19 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 20 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 22 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 24 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 25 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 26 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 28 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 29 | CP-OFDM | 100 | Bitmap 01100 | 30 |

The Exception MPR mapping for wideband operation is proposed as below:

Table 6.1.2.1.1.2-5: Exception bitmap mapping

|  |  |
| --- | --- |
| Wideband operation channel bandwidth (MHz) | Sub-band configuration exceptions |
| 40 | 10, 01 |
| 60 | 110, 011 |
| 80 | 1000, 1100, 0100, 0010, 0011, 0001 |
| 100 | 10000, 11000, 11100, 01000, 01100, 00110, 00010, 00111, 00011, 00001 |

6.1.2.1.1.3 Huawei’s simulation results (R4-2315226)

Referring to the simulation cases listed in Table 6.1.2.1.1.3-1, the MPR value are shown in Table 6.1.2.1.1.3-2 and Table 6.1.2.1.1.3-3 for below.

Table 6.1.2.1.1.3-1 Simulation cases for SL-U

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | case | Waveform | BW | RB Setup | SCS |
| **Full Allocation**  **Single CC** | 1 | CP-OFDM | 20 | 105RB0 | 15 |
| 2 | CP-OFDM | 20 | 50RB0 | 30 |
| 3 | CP-OFDM | 40 | 216RB0 | 15 |
| 4 | CP-OFDM | 60 | 160RB0 | 30 |
| 5 | CP-OFDM | 80 | 216RB0 | 30 |
| 6 | CP-OFDM | 100 | 270RB0 | 30 |
| **Interlaced Allocation**  **Single CC** | 7 | CP-OFDM | 20 | 1 RB0 every 10RBs | 15 |
| 8 | CP-OFDM | 20 | 1RB0 every 5RBs | 30 |
| 9 | CP-OFDM | 40 | 1RB0 every 10RBs | 15 |
| 10 | CP-OFDM | 60 | 1RB0 every 5RBs | 30 |
| 11 | CP-OFDM | 80 | 1RB0 every 5RBs | 30 |
| 12 | CP-OFDM | 100 | 1RB0 every 5RBs | 30 |
| **Wide band operation** | 13 | CP-OFDM | 40 | Bitmap 10 | 15 |
| 14 | CP-OFDM | 60 | Bitmap 100 | 30 |
| 15 | CP-OFDM | 60 | Bitmap 110 | 30 |
| 16 | CP-OFDM | 80 | Bitmap 1000 | 30 |
| 17 | CP-OFDM | 80 | Bitmap 1100 | 30 |
| 18 | CP-OFDM | 80 | Bitmap 1110 | 30 |
| 19 | CP-OFDM | 80 | Bitmap 0100 | 30 |
| 20 | CP-OFDM | 80 | Bitmap 0110 | 30 |
| 21 | CP-OFDM | 100 | Bitmap 10000 | 30 |
| 22 | CP-OFDM | 100 | Bitmap 11000 | 30 |
| 23 | CP-OFDM | 100 | Bitmap 11100 | 30 |
| 24 | CP-OFDM | 100 | Bitmap 11110 | 30 |
| 25 | CP-OFDM | 100 | Bitmap 01000 | 30 |
| 26 | CP-OFDM | 100 | Bitmap 01100 | 30 |
| 27 | CP-OFDM | 100 | Bitmap 01110 | 30 |
| 28 | CP-OFDM | 100 | Bitmap 00100 | 30 |

Table 6.1.2.1.1.3-2 Maximum power reduction (MPR) for SL-U with Full Allocation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Modulation** | **Case: Bandwidth/SCS** | | | | | |
| **20MHz/15k** | **20MHz/30k** | **40MHz/15k** | **60MHz/30k** | **80MHz/30k** | **100MHz/30k** |
| **QPSK** | 4.0 | 3.8 | 4.1 | 4.0 | 4.0 | 4.1 |
| **16 QAM** | 4.1 | 3.9 | 4.1 | 4.1 | 3.8 | 4.2 |
| **64 QAM** | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 | 6.1 |
| **256 QAM** | 7.5 | 7.7 | 7.6 | 7.8 | 7.5 | 7.9 |

Table 6.1.2.1.1.3-3 Maximum power reduction (MPR) for SL-U with Interlaced Allocation

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Modulation | Case: Bandwidth/SCS | | | | | |
| 20MHz/15k | 20MHz/30k | 40MHz/15k | 60MHz/30k | 80MHz/30k | 100MHz/30k |
| QPSK | 4.0 | 4.1 | 4.0 | 4.1 | 4.1 | 4.1 |
| 16 QAM | 4.1 | 4.2 | 4.2 | 4.1 | 4.2 | 4.2 |
| 64 QAM | 5.8 | 5.9 | 5.7 | 5.6 | 5.9 | 6.1 |
| 256 QAM | 7.0 | 7.3 | 7.1 | 7.4 | 7.7 | 7.4 |

Table 6.1.2.1.1.3-4 Maximum power reduction (MPR) for SL-U with Wide band operation

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Modulation** | **Case: Bandwidth/Bitmap pattern** | | | | | | | | | | | |
| **40MHz** | **60MHz** | | **80MHz** | | | **100MHz** | | | | | |
| **10** | **100** | **110** | **1000** | **1110** | **0110** | **10000** | **11110** | **01000** | **01100** | **01110** | **00100** |
| **QPSK** | 4.0 | 3.7 | 3.9 | 3.8 | 4.0 | 3.8 | 3.9 | 4.1 | 3.0 | 3.2 | 3.9 | 3.4 |
| **16 QAM** | 4.0 | 3.9 | 4.1 | 3.9 | 4.1 | 3.9 | 3.9 | 4.2 | 3.7 | 3.8 | 4.0 | 3.7 |
| **64 QAM** | 5.1 | 5.1 | 5.5 | 5.2 | 5.7 | 5.7 | 5.1 | 5.8 | 5.4 | 6.0 | 5.9 | 5.5 |
| **256 QAM** | 6.4 | 6.8 | 6.9 | 6.3 | 7.0 | 7.1 | 6.5 | 7.3 | 6.7 | 7.4 | 7.3 | 7.0 |

**Table 6.1.2.1.1.3-5: Proposed MPR for SL-U with single CC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Precoding** | **Modulation** | **Full** | **Partial** |
| **CP-OFDM** | **QPSK** | ≤ 4.1 | ≤ 4.1 |
| **16 QAM** | ≤ 4.2 | ≤ 4.2 |
| **64 QAM** | ≤ 6.1 | ≤ 6.1 |
| **256 QAM** | ≤ 8.0 | ≤ 7.7 |

6.1.2.1.1.4 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.2.1.1.4-1: Power class 5 PSSCH/PSCCH MPR simulation results**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | case | Precoding | BW |  | RB Setup | SCS | QPSK and 16QAM MPR | 64 QAM MPR | 256 QAM MPR |
| Full Allocation  Single CC | 1 | CP-OFDM | 20 |  | 105RB0 | 15 | 3.5 | 3.8 | 6.2 |
| 2 | CP-OFDM | 20 |  | 50RB0 | 30 | 3.5 | 3.8 | 6.0 |
| 3 | CP-OFDM | 40 |  | 216RB0 | 15 | 3.6 | 3.7 | 6.0 |
| 4 | CP-OFDM | 60 |  | 160RB0 | 30 | 3.5 | 3.6 | 6.0 |
| 5 | CP-OFDM | 80 |  | 216RB0 | 30 | 3.6 | 3.7 | 6.2 |
| 6 | CP-OFDM | 100 |  | 270RB0 | 30 |  |  |  |
| Interlaced Allocation  Single CC | 7 | CP-OFDM | 20 |  | 1 RB0 every 10RBs | 15 | 3.5 | 3.7 | 6.2 |
| 8 | CP-OFDM | 20 |  | 1RB0 every 5RBs | 30 | 3.6 | 3.7 | 6.1 |
| 9 | CP-OFDM | 40 |  | 1RB0 every 10RBs | 15 | 3.6 | 3.9 | 6.4 |
| 10 | CP-OFDM | 60 |  | 1RB0 every 5RBs | 30 | 3.5 | 3.7 | 6.3 |
| 11 | CP-OFDM | 80 |  | 1RB0 every 5RBs | 30 | 3.7 | 3.9 | 6.5 |
| 12 | CP-OFDM | 100 |  | 1RB0 every 5RBs | 30 | 3.6 | 4.1 | 6.6 |
| Wide band Full  operation | 13 | CP-OFDM | 40 |  | Bitmap 10 | 15 | 3.6 | 3.7 | 6.0 |
| 14 | CP-OFDM | 60 |  | Bitmap 100 | 30 | 3.1 | 3.6 | 6.0 |
| 15 | CP-OFDM | 60 |  | Bitmap 110 | 30 | 3.3 | 3.7 | 6.0 |
| 16 | CP-OFDM | 80 |  | Bitmap 1000 | 30 | 3.1 | 3.6 | 6.0 |
| 17 | CP-OFDM | 80 |  | Bitmap 1100 | 30 | 3.3 | 3.7 | 6.0 |
| 18 | CP-OFDM | 80 |  | Bitmap 1110 | 30 | 3.4 | 3.6 | 6.0 |
| 19 | CP-OFDM | 80 |  | Bitmap 0100 | 30 | 1.3 | 3.6 | 6.0 |
| 20 | CP-OFDM | 80 |  | Bitmap 0110 | 30 | 1.3 | 3.5 | 5.9 |
| 21 | CP-OFDM | 100 |  | Bitmap 10000 | 30 | 3.1 | 3.6 | 6.0 |
| 22 | CP-OFDM | 100 |  | Bitmap 11000 | 30 | 3.3 | 3.7 | 6.0 |
| 23 | CP-OFDM | 100 |  | Bitmap 11100 | 30 | 3.4 | 3.6 | 6.0 |
| 24 | CP-OFDM | 100 |  | Bitmap 11110 | 30 | 3.4 | 3.7 | 6.2 |
| 25 | CP-OFDM | 100 |  | Bitmap 01000 | 30 |  |  |  |
| 26 | CP-OFDM | 100 |  | Bitmap 01100 | 30 | 1.4 | 3.5 | 5.9 |
| 27 | CP-OFDM | 100 |  | Bitmap 01110 | 30 | 1.5 | 3.8 | 6.5 |
| 28 | CP-OFDM | 100 |  | Bitmap 00100 | 30 |  |  |  |
| Wide band  Interlaced  operation | 29 | CP-OFDM | 40 |  | Bitmap 10 | 15 | 3.5 | 3.7 | 6.0 |
| 30 | CP-OFDM | 60 |  | Bitmap 100 | 30 | 3.2 | 3.8 | 6.1 |
| 31 | CP-OFDM | 60 |  | Bitmap 110 | 30 | 3.5 | 4.0 | 6.6 |
| 32 | CP-OFDM | 80 |  | Bitmap 1000 | 30 | 3.2 | 3.8 | 6.1 |
| 33 | CP-OFDM | 80 |  | Bitmap 1100 | 30 | 3.5 | 4.0 | 6.6 |
| 34 | CP-OFDM | 80 |  | Bitmap 1110 | 30 | 3.5 | 4.0 | 6.6 |
| 35 | CP-OFDM | 80 |  | Bitmap 0100 | 30 | 1.4 | 3.8 | 6.1 |
| 36 | CP-OFDM | 80 |  | Bitmap 0110 | 30 | 1.6 | 4.0 | 6.5 |
| 37 | CP-OFDM | 100 |  | Bitmap 10000 | 30 | 3.2 | 3.8 | 6.1 |
| 38 | CP-OFDM | 100 |  | Bitmap 11000 | 30 | 3.5 | 4.1 | 6.6 |
| 39 | CP-OFDM | 100 |  | Bitmap 11100 | 30 | 3.5 | 4.0 | 6.6 |
| 40 | CP-OFDM | 100 |  | Bitmap 11110 | 30 | 3.6 | 3.9 | 6.5 |
| 41 | CP-OFDM | 100 |  | Bitmap 01000 | 30 | 1.4 | 3.8 | 6.1 |
| 42 | CP-OFDM | 100 |  | Bitmap 01100 | 30 | 1.6 | 4.0 | 6.5 |
| 43 | CP-OFDM | 100 |  | Bitmap 01110 | 30 | 1.6 | 4.0 | 6.6 |
| 44 | CP-OFDM | 100 |  | Bitmap 00100 | 30 |  |  |  |

**The power class 5 PSSCH/PSCCH simulation results in the table should be considered in the discussion of MPR requirements.**

6.1.2.1.1.5 Xiaomi’s simulation results (R4-2315440)

Table 6.1.2.1.1.5-1 and Figure 6.1.2.1.1.5-1 show the MPR values for different modulations for PSCCH and PSSCH in single CC operation with full allocation:

**Table 6.1.2.1.1.5-1 MPR for PSCCH and PSSCH in single CC operation**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | case | Waveform | BW | RB Setup | SCS | MPR | | | |
| QPSK | 16QAM | 64QAM | 256QAM |
| Full Allocation  Single CC | 1 | CP-OFDM | 20 | 105RB0 | 15 | 3.2 | 3.4 | 5.1 | 14 |
| 2 | CP-OFDM | 20 | 50RB0 | 30 | 3.2 | 3.5 | 5.5 | 14.5 |
| 3 | CP-OFDM | 40 | 216RB0 | 15 | 3.5 | 3.5 | 5.1 | 14 |
| 4 | CP-OFDM | 60 | 160RB0 | 30 | 3.3 | 3.5 | 5.5 | 14.2 |
| 5 | CP-OFDM | 80 | 216RB0 | 30 | 3.2 | 3.5 | 5.1 | 14 |
| 6 | CP-OFDM | 100 | 270RB0 | 30 | 3.5 | 3.5 | 5.5 | 14.2 |

**Figure 6.1.2.1.1.5-1** **MPR for PSCCH and PSSCH in single CC operation with full allocation**

Based on above simulation results for full allocation in single CC, we proposed:

The MPR of full allocation for PC5 SL-U shall be as below table 6.1.2.1.1.5-2.

**Table 6.1.2.1.1.5-2 Proposed MPR for PSCCH and PSSCH in single CC operation.**

|  |  |  |  |
| --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation | |
|  |  | Full (dB) |
| CP-OFDM | QPSK | 4 |
|  | 16 QAM | 4 |
|  | 64 QAM | 6 |
|  | 256 QAM | 14 |

##### 6.1.2.1.2 MPR for S-SSB transmission

6.1.2.1.2.1 LG Electronics’ simulation results (R4-2315542)

Tx Power for multiple S-SSBs

* The equal power per each S-SSB is assumed for MPR and A-MPR simulation.

For S-SSB MPR/A-MPR, the following simulation scenarios of Table 6.1.2.1.2.1-1 are considered.

Table 6.1.2.1.2.1-1: SL-U S-SSB MPR/A-MPR simulation scenarios

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sub-band RB sets | Scenario | Bitmap | S-SSB {11RBs}xN repeated RB location index | N  (Repeated#) | SCS(kHz) |
| 1 (20MHz) | 1 | 1 | {0 11 22 33 44 55 66 77 88} | 9 | 15 |
| 2 | 1 | {0 23 46 69 92} | 5 | 15 |
| 3 | 1 | {0 95} | 2 | 15 |
| 4 | 1 | {0 11 22 33} | 4 | 30 |
| 5 | 1 | {0 39} | 2 | 30 |
| 2 (40MHz) | 6 | 11 | {0 11 22 33 44 55 66 77 88 111 122 133 144 155 166 177 188 199} | 18 | 15 |
| 7 | 11 | {0 23 46 69 92 111 134 157 180 203} | 10 | 15 |
| 8 | 11 | {0 94 111 205} | 4 | 15 |
| 9 | 10 | {0 11 22 33 44 55 66 77 88} | 9 | 15 |
| 10 | 10 | {0 23 46 69 92 } | 5 | 15 |
| 11 | 10 | {0 94} | 2 | 15 |
| 3 (60MHz) | 12 | 111 | {0 11 22 33 56 67 78 89 112 123 134 145} | 12 | 30 |
| 13 | 111 | {0 38 56 94 112 150} | 6 | 30 |
| 14 | 110 | {0 11 22 33 56 67 78 89} | 8 | 30 |
| 15 | 110 | {0 38 56 94 } | 4 | 30 |
| 16 | 100 | {0 11 22 33} | 4 | 30 |
| 17 | 100 | {0 38} | 2 | 30 |
| 18 | 010 | {56 67 78 89 } | 4 | 30 |
| 19 | 010 | {56 94} | 2 | 30 |
| 20 | 101 | {0 11 22 33 112 123 134 145} | 8 | 30 |
| 21 | 101 | {0 38 112 150} | 4 | 30 |
| 4 (80MHz) | 22 | 1111 | {0 11 22 33 56 67 78 89 111 122 133 144 167 178 189 200} | 16 | 30 |
| 23 | 1111 | {0 38 56 94 111 149 167 205} | 8 | 30 |
| 24 | 1110 | {0 11 22 33 56 67 78 89 111 122 133 144} | 12 | 30 |
| 25 | 1110 | {0 38 56 94 111 149 } | 6 | 30 |
| 26 | 1100 | {0 11 22 33 56 67 78 89} | 8 | 30 |
| 27 | 1100 | {0 38 56 94} | 4 |  |
| 28 | 1000 | {0 11 22 33} | 4 | 30 |
| 29 | 1000 | {0 38} | 2 | 30 |
| 30 | 0110 | {56 67 78 89 111 122 133 144} | 8 | 30 |
| 31 | 0110 | {56 94 111 49} | 4 | 30 |
| 32 | 0100 | {56 67 78 89} | 4 | 30 |
| 33 | 0100 | {56 94} | 2 | 30 |
| 34 | 1101 | {0 11 22 33 56 67 78 89 167 178 189 200} | 12 | 30 |
| 35 | 1101 | {0 38 56 94 167 205} | 6 | 30 |
| 36 | 1010 | {0 11 22 33 111 122 133 144} | 8 | 30 |
| 37 | 1010 | {0 38 111 149} | 4 | 30 |
| 38 | 1001 | {0 11 22 33 167 178 189 200} | 8 | 30 |
| 39 | 1001 | {0 38 167 205} | 4 | 30 |
| 5 (100MHz) | 40 | 11111 | {0 11 22 33 56 67 78 89 112 123 134 145 167 178 189 200 223 234 245 256} | 20 | 30 |
| 41 | 11111 | {0 38 56 94 112 148 167 205 223 261} | 10 | 30 |
| 42 | 11110 | {0 11 22 33 56 67 78 89 112 123 134 145 167 178 189 200} | 16 | 30 |
| 43 | 11110 | {0 38 56 94 112 148 167 205} | 8 | 30 |
| 44 | 11100 | {0 11 22 33 56 67 78 89 112 123 134 145} | 12 | 30 |
| 45 | 11100 | {0 38 56 94 112 148} | 6 | 30 |
| 46 | 11000 | {0 11 22 33 56 67 78 89} | 8 | 30 |
| 47 | 11000 | {0 38 56 94} | 4 | 30 |
| 48 | 10000 | {0 11 22 33} | 4 | 30 |
| 49 | 10000 | {0 38} | 2 | 30 |
| 50 | 01110 | {56 67 78 89 112 123 134 145 167 178 189 200} | 12 | 30 |
| 51 | 01110 | {56 94 112 148 167 205} | 6 | 30 |
| 52 | 01100 | {56 67 78 89 112 123 134 145} | 8 | 30 |
| 53 | 01100 | {56 94 112 148} | 4 | 30 |
| 54 | 01000 | {56 67 78 89} | 4 | 30 |
| 55 | 01000 | {56 94} | 2 | 30 |
| 56 | 00100 | {112 123 134 145} | 4 | 30 |
| 57 | 00100 | {112 148} | 2 | 40 |
| 58 | 11011 | {0 11 22 33 56 67 78 89 167 178 189 200 223 234 245 256} | 16 | 30 |
| 59 | 11011 | {0 38 56 94 167 205 223 261} | 8 | 30 |
| 60 | 11010 | {0 11 22 33 56 67 78 89 167 178 189 200} | 12 | 30 |
| 61 | 11010 | {0 38 56 94 167 205} | 6 | 30 |
| 62 | 11001 | {0 11 22 33 56 67 78 89 223 234 245 256} | 12 | 30 |
| 63 | 11001 | {0 38 56 94 223 261} | 6 | 30 |
| 64 | 10101 | {0 11 22 33 112 123 134 145 223 234 245 256} | 12 | 30 |
| 65 | 10101 | {0 38 112 148 223 261} | 6 | 30 |
| 66 | 10110 | {0 11 22 33 112 123 134 145 167 178 189 200} | 12 | 30 |
| 67 | 10110 | {0 38 112 148 167 205} | 6 | 30 |
| 68 | 10100 | {0 11 22 33 112 123 134 145} | 8 | 30 |
| 69 | 10100 | {0 38 112 148} | 4 | 30 |
| 70 | 10010 | {0 11 22 33 167 178 189 200} | 8 | 30 |
| 71 | 10010 | {0 38 167 205} | 4 | 30 |
| 72 | 10001 | {0 11 22 33 223 234 245 256} | 8 | 30 |
| 73 | 10001 | {0 38 223 261} | 4 | 30 |
| 74 | 01010 | {56 67 78 89 167 178 189 200} | 8 | 30 |
| 75 | 01010 | {56 94 167 205} | 4 | 30 |
| 76 | 11101 | {0 11 22 33 56 67 78 89 112 123 134 145 223 234 245 256} | 16 | 30 |
| 77 | 11101 | {0 38 56 94 112 148 223 261} | 8 | 30 |

Here, for S-SSB {11RBs}xN repeated RB location index, ‘0’ means that {11RB} start RB index = 0. And, Bitmap ‘1’ means the corresponding RB set is transmitted, and ‘0’ means the corresponding RB set is not transmitted for wide band operation.

Table 6.1.2.1.2.1-2 and Figure 6.1.2.1.2.1-1 show the MPR simulation results for the scenarios.

Table 6.1.2.1.2.1-2: S-SSB MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.24 | 6.62 | 3.98 | 5.69 | 3.92 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.17 | 8.63 | 5.56 | 9.02 | 6.95 | 3.94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.29 | 6.72 | 7.87 | 5.31 | 5.57 | 3.94 | 4.54 | 3.52 | 7.67 | 5.49 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 10.34 | 6.86 | 8.81 | 5.60 | 7.67 | 5.38 | 5.68 | 4.06 | 6.11 | 4.12 | 4.42 | 3.52 | 8.92 | 5.97 | 7.55 | 5.21 | 7.63 | 5.31 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 11.15 | 6.75 | 10.18 | 5.56 | 9.44 | 5.91 | 7.75 | 5.22 | 5.79 | 3.91 | 6.02 | 3.44 | 5.60 | 3.35 | 4.43 | 3.53 | 4.43 | 3.53 | 10.18 | 7.03 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 9.18 | 6.32 | 8.95 | 6.04 | 8.61 | 4.98 | 9.08 | 4.99 | 7.67 | 5.10 | 7.87 | 5.45 | 7.62 | 5.41 | 6.90 | 4.60 | 10.68 | 5.79 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.2.1.2.1-2: S-SSB MPR simulation results for SL-U power class 5

Table 6.1.2.1.2.1-3 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration and the number of S-SSB repetition per RB set.

Table 6.1.2.1.2.1-3 : S-SSB MPR simulation results for SL-U power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | 11.17 | 6.86 | 6.11 | 4.12 |
| Non-contiguous sub-band RB sets | 10.68 | 7.03 | 6.90 | 4.60 |

The S-SSB MPR for SL-U power class 5 can be proposed as Table 6.1.2.1.2.1-4 or Table 6.1.2.1.2.1-5 based on the simulation results when considering implementation margin.

Table 6.1.2.1.2.1-4 : S-SSB MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | ≤ 13.5 | ≤ 9.5 | ≤ 8.5 | ≤ 6.5 |
| Non-contiguous sub-band RB sets | ≤ 13.5 | ≤ 9.5 | ≤ 9.5 | ≤ 7.0 |
| NOTE 1: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply. | | | | |

Table 6.1.2.1.2.1-5 : S-SSB MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 13.5 | ≤ 9.5 | ≤ 9.5 | ≤ 7.0 |
| NOTE 1: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply. | | | | |

6.1.2.1.2.2 Huawei simulation results (R4-2319500)

The evaluation scenarios and MPR results for PSFCH are illustrated in Table 6.1.2.1.2.2-1

Table 6.1.2.1.2.2-1 Evaluation scenarios and MPR for SSB on shared spectrum

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Case** | **BW/SCS** | **RB\_length/ RB\_start** | **S-SSB repetition** | **MPR** |
| **1** | 20MHz/ 30kHz | 44RB0 | 4 | 7.8 |
| **2** | 44RB3 | 4 | 7.3 |
| **3** | 20MHz/ 15kHz | 88RB0 | 8 | 10.7 |
| **4** | 88RB8 | 8 | 10.1 |

Figure 6.1.2.1.2.2-1 PSD and SEM for Case 1

Figure 6.1.2.1.2.2-2 PSD and SEM for Case 4

According to the simulation evaluation, we propose the MPR for S-SSB on shared spectrum to be 11dB taken margin into consideration.

##### 6.1.2.1.3 MPR for PSFCH transmission

6.1.2.1.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For PSFCH MPR/A-MPR, the following simulation scenarios of Table 6.1.2.1.3.1-1 are considered based on Alt 1-1b.

Table 6.1.2.1.3.1-1: SL-U PSFCH MPR/A-MPR simulation scenarios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sub-band RB sets | Scenario | Bitmap | PSFCH RB location index | SCS(kHz) |
| 1 (20MHz) | 1 | 1 | {0 10 20 30 40 50 60 70 80 90 100 104} | 15 |
| 2 | 1 | {0 5 10 15 20 25 30 35 40 45 49} | 30 |
| 2 (40MHz) | 3 | 11 | {0 10 20 30 40 50 60 70 80 90 100 104 111 121 131 141 151 161 171 181 191 201 211 215} | 15 |
| 4 | 10 | {0 10 20 30 40 50 60 70 80 90 100 104} | 15 |
| 3 (60MHz) | 5 | 111 | {0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 6 | 110 | {0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 7 | 100 | {0 5 10 15 20 25 30 35 40 45 49} | 30 |
| 8 | 010 | {56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 9 | 101 | {0 5 10 15 20 25 30 35 40 45 49 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 4 (80MHz) | 10 | 1111 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 111 116 121 126 131 136 141 146 151 156 160 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 11 | 1110 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 111 116 121 126 131 136 141 146 151 156 160} | 30 |
| 12 | 1100 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 13 | 1000 | { 0 5 10 15 20 25 30 35 40 45 49} | 30 |
| 14 | 0110 | { 56 61 66 71 76 81 86 91 96 101 105 111 116 121 126 131 136 141 146 151 156 160} | 30 |
| 15 | 0100 | { 56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 16 | 1101 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 17 | 1010 | { 0 5 10 15 20 25 30 35 40 45 49 111 116 121 126 131 136 141 146 151 156 160} | 30 |
| 18 | 1001 | { 0 5 10 15 20 25 30 35 40 45 49 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 5 (100MHz) | 19 | 11111 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161 167 172 177 182 187 192 197 202 207 212 216 223 228 233 238 243 248 253 258 263 268 272} | 30 |
| 20 | 11110 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 21 | 11100 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 22 | 11000 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 23 | 10000 | { 0 5 10 15 20 25 30 35 40 45 49} | 30 |
| 24 | 01110 | { 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 25 | 01100 | { 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 26 | 01000 | { 56 61 66 71 76 81 86 91 96 101 105} | 30 |
| 27 | 00100 | { 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 28 | 11011 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 167 172 177 182 187 192 197 202 207 212 216 223 228 233 238 243 248 253 258 263 268 272} | 30 |
| 29 | 11010 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 30 | 11001 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 223 228 233 238 243 248 253 258 263 268 272} | 30 |
| 31 | 10101 | { 0 5 10 15 20 25 30 35 40 45 49 112 117 122 127 132 137 142 147 152 157 161 223 228 233 238 243 248 253 258 263 268 272} | 30 |
| 32 | 10110 | { 0 5 10 15 20 25 30 35 40 45 49 112 117 122 127 132 137 142 147 152 157 161 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 33 | 10100 | { 0 5 10 15 20 25 30 35 40 45 49 112 117 122 127 132 137 142 147 152 157 161} | 30 |
| 34 | 10010 | { 0 5 10 15 20 25 30 35 40 45 49 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 35 | 10001 | { 0 5 10 15 20 25 30 35 40 45 49 223 228 233 238 243 248 253 258 263 268 272} | 30 |
| 36 | 01010 | { 56 61 66 71 76 81 86 91 96 101 105 167 172 177 182 187 192 197 202 207 212 216} | 30 |
| 37 | 11101 | { 0 5 10 15 20 25 30 35 40 45 49 56 61 66 71 76 81 86 91 96 101 105 112 117 122 127 132 137 142 147 152 157 161 223 228 233 238 243 248 253 258 263 268 272} | 30 |

Here, for PSFCH RB location index, ‘0’ means that RB index = 0. And, Bitmap ‘1’ means the corresponding RB set is transmitted, and ‘0’ means the corresponding RB set is not transmitted for wide band operation.

Table 6.1.2.1.3.1-2shows the MPR simulation results for the scenarios.

Table 6.1.2.1.3.1-2: PSFCH MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 7.98 | 7.60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 9.39 | 7.94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.65 | 9.05 | 7.67 | 7.43 | 9.31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 9.43 | 9.83 | 9.09 | 7.57 | 9.04 | 7.35 | 11.51 | 9.39 | 9.32 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.2.1.3.1-3 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.2.1.3.1-3 : PSFCH MPR simulation results for SL-U power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration5 | Inner RB set configuration5 |
| Contiguous sub-band RB sets | 9.83 | 9.04 |
| Non-contiguous sub-band RB sets | 11.51 | 9.22 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH MPR for SL-U power class 5 can be proposed as Table 6.1.2.1.3.1-4 or Table 6.1.2.1.3.1-5 based on the simulation results when considering implementation margin.

Table 6.1.2.1.3.1-5 PSFCH MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous sub-band RB sets | ≤ 11.5 | ≤ 10.0 |
| Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.0 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply. | | |

Table 6.1.2.1.3.1-6 PSFCH MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.0 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply. | | |

6.1.2.1.3.2 Huawei simulation results (R4-2319500)

The evaluation scenarios and MPR results for PSFCH are illustrated in Table 6.1.2.1.3.2-1

Table 6.1.2.1.3.2-1 Evaluation scenarios and MPR for PSFCH on shared spectrum

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Case** | **BW/SCS** | **Common interlaced RB allocation/** RB index | **Dedicated RB allocation/** RB index | **MPR** |
| **1** | 20MHz/  30kHz | {1,6,11,16,21,26,31,36,41,46} | {50} | 10 |
| **2** | {1,6,11,16,21,26,31,36,41,46} | {48,49,50} | 9.7 |
| **3** | 20MHz/  15kHz | {1, 11, 21, 31, 41,51,61,71,81,91,101} | {105} | 10 |
| **4** | {1, 11, 21, 31, 41,51,61,71,81,91,101} | {103, 104,105} | 10 |

Figure 6.1.2.1.3.2-1 PSD and SEM for Case 1

Figure 6.1.2.1.3.2-2 PSD and SEM for Case 3

6.1.2.1.2.2a Huawei’s simulation results (R4-2319501)

The updated scenarios with P\_common< P\_dedicated is as follows.

Table 6.1.2.1.2.2a-1 Evaluation scenarios and MPR for PSFCH on shared spectrum

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Case** | **BW/SCS** | **Common interlaced RB allocation/** RB index | **Dedicated RB allocation/** RB index | **P\_dedicated/P\_common**  (ratio/dB) | **MPR** |
| **1** | 20MHz/  30kHz | {1,6,11,16,21,26,31,36,41,46} | {50} | 0dB | 10 |
| **2** | 3dB | 9.5 |
| **3** | 6dB | 9.1 |
| **4** | {1,6,11,16,21,26,31,36,41,46} | {48,49,50} | 0dB | 9.7 |
| **5** | 3dB | 9.5 |
| **6** | 6dB | 9.1 |
| **7** | 20MHz/  15kHz | {1, 11, 21, 31, 41,51,61,71,81,91,101} | {105} | 0dB | 10 |
| **8** | 3dB | 9.6 |
| **9** | 6dB | 9.1 |
| **10** | {1, 11, 21, 31, 41,51,61,71,81,91,101} | {103, 104,105} | 0dB | 10 |
| **11** | 3dB | 9.6 |
| **12** | 6dB | 9.1 |

Figure 6.1.2.1.2.2a-1 PSD and SEM for Case 1

Figure 6.1.2.1.2.2a-2 PSD for Case 3 and case 4

### 6.1.3 UE additional maximum output power reduction for NR SL-U

Based on the NR-U agreement for the additional spectrum emission mask in clause 6.5F.2.3 in TS38.101-1, RAN4 do not consider the additional spectrum emission mask.

For the additional spurious emission requirements for SL-U, RAN4 will consider the NR-U additional spurious emission requirements in clause 6.5F.3.3 in TS38.101-1.

To derive A-MPR requirements for SL-U operation in single CC, RAN4 will assume the basic simulation parameters and assumptions in section 6.1.2 and the additional spurious emission requirements in clause 6.5F.3.3 in TS38.101-1 will be considered.

#### 6.1.3.1 A-MPR for SL-U with NS\_28

##### 6.1.3.1.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.1.1.1 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.3.1.1.1-1: Simulation results for NS\_28 Allocation Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_28 A-MPR** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤8.0** | **≤8.1** | **≤7.7** | **≤8.0** | **≤7.1** | **≤7.8** | **≤6.9** | **≤7.8** |
| **16 QAM** | **≤8.0** | **≤8.3** | **≤7.4** | **≤8.3** | **≤7.3** | **≤8.1** | **≤6.9** | **≤8.1** |
| **64 QAM** | **≤8.1** | **≤8.7** | **≤7.4** | **≤8.7** | **≤7.3** | **≤8.2** | **≤7.0** | **≤8.2** |
| **256 QAM** | **≤8.2** | **≤8.8** | **≤7.4** | **≤8.8** | **≤7.3** | **≤8.2** | **≤7.1** | **≤8.1** |

The power class 5 PSSCH A-MPR in the tables should be considered in the discussion of MPR requirements.

##### 6.1.3.1.2 A-MPR for S-SSB transmission

##### 6.1.3.1.3 A-MPR for PSFCH transmission

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.2 A-MPR for SL-U with NS\_29

##### 6.1.3.2.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.2.2 A-MPR for S-SSB transmission

##### 6.1.3.2.3 A-MPR for PSFCH transmission

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.3 A-MPR for SL-U with NS\_30

##### 6.1.3.3.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.3.1.1 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.3.3.1.1-1: Simulation results for NS\_30 Allocation Note 2 Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_30 A-MPR**  **Allocation Note2** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤10.7** | **≤10.9** | **≤10.4** | **≤11.0** | **≤9.3** | **≤10.3** | **≤9.1** | **≤10.4** |
| **16 QAM** | **≤10.8** | **≤9.0** | **≤10.1** | **≤11.1** | **≤9.6** | **≤10.5** | **≤9.2** | **≤10.5** |
| **64 QAM** | **≤10.9** | **≤11.4** | **≤10.1** | **≤11.4** | **≤9.6** | **≤10.6** | **≤9.3** | **≤10.6** |
| **256 QAM** | **≤11.0** | **≤11.5** | **≤10.0** | **≤11.5** | **≤9.7** | **≤10.6** | **≤9.4** | **≤10.5** |

**Table 6.1.3.3.1.1-2: Simulation results for NS\_30 Allocation Note 3 Full and partial allocations.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NS\_30 A-MPR**  **Allocation Note3** | **20M** | **20M** | **40M** | **40M** |
|  | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤8.3** | **≤8.4** | **≤5.9** | **≤6.2** |
| **16 QAM** | **≤8.1** | **≤8.7** | **≤5.8** | **≤6.3** |
| **64 QAM** | **≤8.3** | **≤9.0** | **≤5.8** | **≤6.3** |
| **256 QAM** | **≤8.4** | **≤8.9** | **≤5.8** | **≤6.3** |

The power class 5 PSSCH A-MPR in the tables should be considered in the discussion of MPR requirements.

##### 6.1.3.3.2 A-MPR for S-SSB transmission

##### 6.1.3.3.3 A-MPR for PSFCH transmission

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.4 A-MPR for SL-U with NS\_31

##### 6.1.3.4.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.4.1.1 LG Electronics’ simulation results (R4-2315542)

Table 6.1.3.4.1.1-6 and Figure 6.1.3.4.1.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.4.1.1-1: NS\_31-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 4.67 | 5.08 | 4.67 | 5.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 4.67 | 5.08 | 4.67 | 5.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 4.67 | 5.07 | 4.67 | 5.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.89 | 5.49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 4.28 | 4.67 | 4.66 | 5.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 4.28 | 4.67 | 4.67 | 5.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.90 | 4.67 | 4.67 | 5.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 5.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 3.90 | 4.28 | 4.67 | 5.89 | 4.28 | 4.67 | 3.16 | 5.88 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 3.90 | 4.28 | 4.67 | 5.89 | 4.28 | 4.67 | 3.16 | 5.88 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.90 | 4.29 | 4.66 | 5.89 | 4.27 | 4.67 | 3.15 | 5.88 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.88 | 5.07 | 5.47 | 5.89 | 5.88 | 5.07 | 5.88 | 5.87 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 3.53 | 4.28 | 4.67 | 5.89 | 4.28 | 4.67 | 3.89 | 4.28 | 3.16 | 5.88 | 1.81 | 2.81 |  |  |  |  |  |  |
| '16QAM' | 3.53 | 4.28 | 4.67 | 5.90 | 4.28 | 4.67 | 3.90 | 4.28 | 3.16 | 5.87 | 1.81 | 2.80 |  |  |  |  |  |  |
| '64QAM' | 3.53 | 4.28 | 4.67 | 5.89 | 4.28 | 4.67 | 3.90 | 4.28 | 3.16 | 5.88 | 3.16 | 2.80 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.06 | 5.47 | 5.90 | 5.47 | 5.07 | 5.47 | 5.07 | 5.46 | 5.87 | 5.88 | 5.06 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 3.17 | 3.90 | 4.66 | 5.89 | 4.27 | 4.67 | 3.89 | 4.28 | 3.53 | 4.28 | 3.16 | 5.88 | 1.81 | 2.80 | 2.47 | 3.16 | 3.16 | 5.88 |
| '16QAM' | 3.17 | 3.90 | 4.66 | 5.89 | 4.28 | 4.67 | 3.90 | 4.28 | 3.52 | 4.28 | 3.15 | 5.88 | 1.81 | 2.80 | 2.47 | 3.16 | 3.51 | 5.88 |
| '64QAM' | 3.17 | 3.90 | 4.67 | 5.89 | 4.27 | 4.67 | 3.89 | 4.28 | 3.53 | 4.28 | 3.52 | 5.88 | 3.15 | 2.80 | 3.16 | 3.16 | 3.52 | 5.88 |
| '256QAM' | 5.88 | 5.06 | 5.47 | 5.88 | 5.47 | 5.07 | 5.88 | 5.06 | 5.88 | 5.06 | 5.46 | 5.88 | 5.88 | 5.06 | 5.88 | 5.06 | 5.88 | 5.88 |



Figure 6.1.3.4.1.1-1: NS\_31-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

Table 6.1.3.4.1.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration and Full/Partial RB allocation.

Table 6.1.3.4.1.1-2 : NS\_31-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation | | | |
|  |  | Outer RB set configuration | | Inner RB set configuration | |
|  |  | Full (dB) | Partial (dB) | Full(dB) | Partial (dB) |
| CP-OFDM | QPSK | 4.67 | 6.32 | 3.52 | 6.30 |
|  | 16 QAM | 4.68 | 6.32 | 3.52 | 6.30 |
|  | 64 QAM | 4.67 | 6.32 | 3.52 | 6.30 |
|  | 256 QAM | 5.48 | 6.32 | 5.88 | 6.30 |

The inner RB set configuration needs to considered when defining the SL-U A-MPR requirements.

Based on the results, Table 6.1.3.4.1.1-3 can be considered for NS\_31 A-MPR for SL-U UE power class 5.

Table 6.1.3.4.1.1-3. NS\_31 additional maximum power reduction (A-MPR) for SL-U UE power class 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 4) | | | | RB Allocation (Note 3) |
|  |  | Outer RB set configuration5 | | Inner RB set configuration5 | |
|  |  | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full/Partial |
| CP-OFDM | QPSK | ≤ 5.5 | ≤ 6.5 | ≤ 4.5 | ≤ 6.5 | Follow SL-U MPR table |
|  | 16 QAM | ≤ 5.5 | ≤ 7.0 | ≤ 4.5 | ≤ 7.0 |
|  | 64 QAM | ≤ 5.5 | ≤ 7.0 | ≤ 4.5 | ≤ 7.0 |
|  | 256 QAM | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: 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 or when not all transmitted sub-bands for wideband operation are transmitted.  NOTE 3: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 4: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 3.  NOTE 5: Contiguous outer sub-band configuration and contiguous inner sub-band configuration in Table 6.1.2.1.1.1-5 apply. | | | | | | |

##### 6.1.3.4.1.2 OPPO’s simulation results (R4-2316119)

For PSD = 10dBm/MHz：

Table 6.1.3.4.1.2-1 A-MPR for single CC PSD=10 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 4.4 | 4.4 | 3.5 | 3.5 | 3.2 | 3.2 | 3.2 | 4.5 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 16QAM | 4.4 | 4.4 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 4.5 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.0 | 5.2 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 4.5 | 4.6 | 4.1 | 4.4 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 6.6 | 7.5 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.4.1.2-2 A-MPR for Wideband operation PSD=10 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 110 | 010 | 1100 | 1000 | 1110 | 0100 | 0110 | 10000 | 11000 | 11100 | 11110 | 01000 | 01100 | 01110 | 00100 |
| Contiguous | QPSK | 3.5 | 3.0 | 3.0 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| 16QAM | 3.5 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.7 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.7 | 3.6 |
| 64QAM | 5.1 | 5.1 | 4.8 | 5.2 | 4.7 | 5.1 | 4.9 | 5.1 | 4.9 | 5.1 | 4.7 | 4.8 | 5.0 | 5.1 | 4.8 | 5.0 | 5.2 |
| 256QAM | 7.4 | 7.5 | 7.7 | 8.5 | 7.3 | 7.4 | 8.0 | 7.5 | 8.5 | 7.4 | 7.3 | 7.6 | 8.0 | 7.4 | 7.7 | 8.5 | 8.5 |
| Interlace | QPSK | 3.7 | 3.1 | 3.1 | 2.8 | 2.7 | 2.8 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.7 | 2.8 | 2.6 |
| 16QAM | 3.7 | 3.1 | 3.1 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 3.0 | 2.8 | 2.9 | 3.0 | 3.0 | 2.8 |
| 64QAM | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.0 | 4.1 | 4.2 | 4.1 | 4.1 |
| 256QAM | 6.5 | 6.6 | 6.8 | 6.6 | 6.8 | 6.6 | 6.7 | 6.6 | 6.8 | 6.6 | 6.8 | 6.7 | 6.6 | 6.6 | 6.8 | 6.7 | 6.5 |

For PSD = 7dBm/MHz：

Table 6.1.3.4.1.2-3 A-MPR for single CC PSD=7 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 4.4 | 4.4 | 3.5 | 3.5 | 3.2 | 3.2 | 3.2 | 4.5 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 16QAM | 4.4 | 4.4 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 4.5 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.0 | 5.2 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 4.5 | 4.6 | 4.1 | 4.4 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 6.6 | 7.5 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.4.1.2-4 A-MPR for Wideband operation PSD=7 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 110 | 010 | 1100 | 1000 | 1110 | 0100 | 0110 | 10000 | 11000 | 11100 | 11110 | 01000 | 01100 | 01110 | 00100 |
| Contiguous | QPSK | 3.5 | 3.0 | 3.0 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| 16QAM | 3.5 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.7 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.7 | 3.6 |
| 64QAM | 5.1 | 5.1 | 4.8 | 5.2 | 4.7 | 5.1 | 4.9 | 5.1 | 4.9 | 5.1 | 4.7 | 4.8 | 5.0 | 5.1 | 4.8 | 5.0 | 5.2 |
| 256QAM | 7.4 | 7.5 | 7.7 | 8.5 | 7.3 | 7.4 | 8.0 | 7.5 | 8.5 | 7.4 | 7.3 | 7.6 | 8.0 | 7.4 | 7.7 | 8.5 | 8.5 |
| Interlace | QPSK | 3.7 | 3.1 | 3.1 | 3.0 | 2.7 | 2.9 | 2.6 | 2.9 | 2.6 | 2.9 | 2.7 | 2.7 | 2.7 | 2.9 | 2.7 | 2.8 | 3.0 |
| 16QAM | 3.7 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.8 | 3.0 | 3.0 | 3.0 | 3.0 |
| 64QAM | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.0 | 4.1 | 4.2 | 4.1 | 4.1 |
| 256QAM | 6.5 | 6.6 | 6.8 | 6.6 | 6.8 | 6.6 | 6.7 | 6.6 | 6.8 | 6.6 | 6.8 | 6.7 | 6.6 | 6.6 | 6.8 | 6.7 | 6.5 |

For PSD = 4dBm/MHz：

Table 6.1.3.4.1.2-5 A-MPR for single CC PSD=4 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 4.4 | 4.4 | 3.5 | 3.5 | 3.2 | 3.2 | 3.2 | 5.6 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 16QAM | 4.4 | 4.4 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 5.7 | 4.6 | 3.5 | 3.5 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.0 | 5.2 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 5.7 | 4.6 | 4.1 | 4.4 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 6.6 | 7.5 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.4.1.2-6 A-MPR for NS\_02S Wideband operation PSD=4 dBm/MHz

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 110 | 010 | 1100 | 1000 | 1110 | 0100 | 0110 | 10000 | 11000 | 11100 | 11110 | 01000 | 01100 | 01110 | 00100 |
| Contiguous | QPSK | 3.5 | 3.5 | 3.0 | 3.6 | 2.8 | 3.5 | 2.8 | 3.5 | 2.8 | 3.5 | 2.8 | 2.8 | 2.8 | 3.5 | 2.8 | 2.8 | 3.6 |
| 16QAM | 3.5 | 3.5 | 3.6 | 3.6 | 3.6 | 3.5 | 3.6 | 3.5 | 3.7 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.7 | 3.6 |
| 64QAM | 5.1 | 5.1 | 4.8 | 5.2 | 4.7 | 5.1 | 4.9 | 5.1 | 4.9 | 5.1 | 4.7 | 4.8 | 5.0 | 5.1 | 4.8 | 5.0 | 5.2 |
| 256QAM | 7.4 | 7.5 | 7.7 | 8.5 | 7.3 | 7.4 | 8.0 | 7.5 | 8.5 | 7.4 | 7.3 | 7.6 | 8.0 | 7.4 | 7.7 | 8.5 | 8.5 |
| Interlace | QPSK | 5.9 | 5.9 | 3.1 | 6.0 | 2.9 | 5.9 | 2.6 | 5.9 | 2.9 | 5.9 | 2.9 | 2.7 | 2.7 | 5.9 | 3.0 | 2.8 | 6.0 |
| 16QAM | 6.0 | 6.0 | 3.1 | 6.0 | 3.0 | 6.0 | 3.0 | 6.0 | 3.0 | 5.9 | 3.0 | 3.0 | 2.8 | 6.0 | 3.0 | 3.0 | 6.0 |
| 64QAM | 6.0 | 6.0 | 4.2 | 6.0 | 4.2 | 5.9 | 4.1 | 5.9 | 4.2 | 5.9 | 4.2 | 4.1 | 4.0 | 6.0 | 4.2 | 4.1 | 5.9 |
| 256QAM | 6.5 | 6.6 | 6.8 | 6.6 | 6.8 | 6.6 | 6.7 | 6.6 | 6.8 | 6.6 | 6.8 | 6.7 | 6.6 | 6.6 | 6.8 | 6.7 | 6.5 |

From the table 6.1.3.4.1.2-1 to table 6.1.3.4.1.2-6 above, it can be found that even though the PSD requirement is different from 10 to 7 to 4 dBm/MHz, the A-MPR simulation result for both single CC and wide-band operation are the same. The reason here is that the PSD requirement is not the dominate factor and it is the SEM and EVM for some of the 256QAM. The figure 6.1.3.4.1.2-1 and figure 6.1.3.4.1.2-2 below show the A-MPR.

Figure 6.1.3.4.1.2-1 Single CC A-MPR

Figure 6.1.3.4.1.2-2 Wideband A-MPR

Note : NS\_02S is equal to NS\_31.

##### 6.1.3.4.1.3 Qualcomm’s simulation results (R4-2316791)

We performed simulations for the full and partial allocations and computed the A-MPR for NS\_31. The results are shown in the tables below.

**Table 6.1.3.4.1.3: Simulation results for NS\_31 Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_31 A-MPR** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | ≤ 5.2 | ≤ 5.7 | ≤ 8.3 | ≤ 8.6 | ≤ 8.0 | NA | ≤ 8.0 | ≤ 8.1 |
| **16 QAM** | ≤ 5.6 | ≤ 5.8 | ≤ 8.0 | ≤ 9.0 | ≤ 8.0 | NA | ≤ 8.0 | ≤ 8.3 |
| **64 QAM** | ≤ 5.5 | ≤ 6.0 | ≤ 8.0 | ≤ 9.3 | ≤ 8.1 | NA | ≤ 8.1 | ≤ 8.5 |
| **256 QAM** | ≤ 5.6 | ≤ 5.9 | ≤ 8.0 | ≤ 9.5 | ≤ 8.0 | NA | ≤ 8.0 | ≤ 8.5 |

The power class 5 PSSCH A-MPR in the table should be considered in the discussion of MPR requirements.

##### 6.1.3.4.2 A-MPR for S-SSB transmission

##### 6.1.3.4.2.1 LG Electronics’ simulation results (R4-2315542)

For NS\_31, Table 6.1.3.4.2.1-1 and Figure 6.1.3.4.2.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.4.2.1-1: NS\_31-S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.43 | 7.90 | 6.82 | 6.81 | 6.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.05 | 8.92 | 7.45 | 9.20 | 8.17 | 7.11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.36 | 7.58 | 8.19 | 6.46 | 6.69 | 7.21 | 4.76 | 7.20 | 8.18 | 6.79 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 9.92 | 7.41 | 8.95 | 6.78 | 7.97 | 6.48 | 6.89 | 7.19 | 5.98 | 4.31 | 4.61 | 7.12 | 9.04 | 6.62 | 7.85 | 6.61 | 7.79 | 6.47 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 10.91 | 7.19 | 9.59 | 6.61 | 9.54 | 6.67 | 7.99 | 6.53 | 6.80 | 7.20 | 6.12 | 4.95 | 5.66 | 4.09 | 4.70 | 7.28 | 4.56 | 7.16 | 9.97 | 7.47 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 8.85 | 6.62 | 9.14 | 6.54 | 8.62 | 6.08 | 8.80 | 5.83 | 8.04 | 6.48 | 7.86 | 6.46 | 8.13 | 6.49 | 7.49 | 6.35 | 10.15 | 6.31 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.3.4.2.1-13: NS\_31-S-SSB A-MPR simulation results for SL-U power class 5

Table 6.1.3.4.2.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.4.2.1-2 : NS\_31 S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | 11.05 | 7.58 | 6.12 | 7.28 |
| Non-contiguous sub-band RB sets | 10.15 | 7.47 | 7.49 | 6.35 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the S-SSB A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.4.2.1-3 or Table 6.1.3.4.2.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.4.2.1-3: NS\_31 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | ≤ 13.5 | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 |
| Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.0 | ≤ 10.0 | ≤ 9.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 3: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 2. | | | | |

Table 6.1.3.4.2.1-4: NS\_31 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 13.5 | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 3: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 2. | | | | |

##### 6.1.3.4.3 A-MPR for PSFCH transmission

##### 6.1.3.4.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For NS\_31, Table 6.1.3.4.3.1-1shows the A-MPR simulation results for the scenarios.

Table 6.1.3.4.3.1-1: NS\_31-PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 8.38 | 8.31 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 9.34 | 8.38 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.65 | 9.05 | 8.27 | 6.51 | 8.96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 9.43 | 9.83 | 9.05 | 8.28 | 8.56 | 6.86 | 9.82 | 9.00 | 8.95 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.3.4.3.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.4.3.1-2 : NS\_31 PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration | Inner RB set configuration |
| Contiguous sub-band RB sets | 9.83 | 8.56 |
| Non-contiguous sub-band RB sets | 9.82 | 9.63 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.4.3.1-3 or Table 6.1.3.4.3.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.4.3.1-3 NS\_31 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.5 |
| Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 11.5 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply.  NOTE 3: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 4: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 3. | | |

Table 6.1.3.4.3.1-4 NS\_31 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 11.5 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply.  NOTE 3: Applicable for 20 MHz channels centered at the nearest NR-ARFCN corresponding to 5180, 5200, 5220, 5280, 5300, 5320, 5500, 5520, 5540, 5560, 5580, 5600, 5620, 5640, 5660, 5680, 5745, 5765, 5785, and 5805 MHz.  NOTE 4: Applicable for all valid channels and bandwidths other than those enumerated in NOTE 3. | | |

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.5 A-MPR for SL-U with NS\_53

##### 6.1.3.5.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.5.1.1 LG Electronics’ simulation results (R4-2315542)

For NS\_53, Table 6.1.3.5.1.1-9 and Figure 6.1.3.5.1.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.5.1.1-1: NS\_53-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 8.50 | 10.84 | 8.51 | 10.85 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 8.50 | 10.84 | 8.51 | 10.84 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 8.50 | 10.84 | 8.51 | 10.84 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 8.50 | 10.83 | 8.51 | 10.84 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 5.47 | 7.61 | 8.50 | 10.83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 5.47 | 8.06 | 8.50 | 10.83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 5.47 | 8.06 | 8.50 | 10.83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 8.05 | 8.50 | 10.83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 3.90 | 5.89 | 8.51 | 11.31 | 5.47 | 8.06 | 8.50 | 11.29 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 3.90 | 5.89 | 8.51 | 11.32 | 5.47 | 8.06 | 8.50 | 11.30 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.90 | 6.31 | 8.96 | 11.30 | 5.47 | 8.06 | 8.50 | 11.29 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 6.30 | 8.96 | 11.31 | 5.47 | 8.06 | 8.50 | 11.29 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 2.82 | 4.67 | 8.50 | 11.30 | 5.47 | 8.06 | 3.53 | 6.31 | 8.50 | 11.29 | 5.47 | 8.05 |  |  |  |  |  |  |
| '16QAM' | 2.82 | 4.67 | 8.50 | 11.31 | 5.47 | 8.05 | 3.53 | 6.31 | 8.50 | 11.29 | 5.47 | 8.05 |  |  |  |  |  |  |
| '64QAM' | 2.82 | 4.67 | 8.51 | 11.30 | 5.47 | 8.06 | 3.53 | 6.30 | 8.96 | 11.29 | 5.47 | 8.05 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 8.96 | 11.31 | 5.47 | 8.06 | 5.47 | 6.31 | 8.50 | 11.29 | 5.47 | 8.05 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 3.17 | 3.90 | 8.50 | 11.30 | 5.47 | 8.06 | 3.52 | 6.30 | 2.47 | 4.67 | 8.50 | 11.30 | 5.47 | 8.05 | 3.52 | 5.88 | 8.50 | 11.30 |
| '16QAM' | 3.17 | 3.90 | 8.50 | 11.32 | 5.47 | 8.06 | 3.52 | 6.31 | 2.47 | 5.06 | 8.50 | 11.29 | 5.47 | 8.05 | 3.52 | 6.30 | 8.96 | 11.30 |
| '64QAM' | 3.17 | 3.90 | 8.96 | 11.31 | 5.47 | 8.06 | 3.53 | 6.31 | 2.81 | 4.67 | 8.50 | 11.29 | 5.47 | 8.05 | 3.52 | 5.88 | 8.96 | 11.29 |
| '256QAM' | 5.47 | 5.07 | 8.51 | 11.32 | 5.47 | 8.06 | 5.47 | 6.30 | 5.47 | 5.06 | 8.50 | 11.30 | 5.46 | 8.05 | 5.47 | 6.30 | 8.96 | 11.29 |



Figure 6.1.3.5.1.1-1: NS\_53-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

Table 6.1.3.5.1.1-2 shows the maximum value of simulation results considering Full/Partial RB allocation.

Table 6.1.3.5.1.1-2 : NS\_53-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | 8.51 | 11.31 | 5.47 | 8.06 | 3.90 | 6.31 | 2.82 | 4.67 | 3.17 | 3.90 |
| 16 QAM | 8.96 | 11.32 | 5.47 | 8.06 | 3.90 | 6.31 | 2.82 | 5.06 | 3.17 | 3.90 |
| *64 QAM* | 8.96 | 11.31 | 5.47 | 8.06 | 3.90 | 6.31 | 2.82 | 4.67 | 3.17 | 3.90 |
| 256 QAM | 8.96 | 11.32 | 5.47 | 8.06 | 5.47 | 6.31 | 5.47 | 5.07 | 5.47 | 5.07 |

Table 6.1.3.5.1.1-3 can be considered for NS\_53 A-MPR for SL-U UE power class 5.

Table 6.1.3.5.1.1-3. NS\_53 additional maximum power reduction (A-MPR) for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 | ≤ 4.0 | ≤ 4.5 |
| 16 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 4.5 | ≤ 6.5 | ≤ 4.0 | ≤ 5.5 | ≤ 4.0 | ≤ 4.5 |
| *64 QAM* | ≤ 9.0 | ≤ 12.0 | ≤ 6.5 | ≤ 8.5 | ≤ 5.5 | ≤ 6.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 |
| 256 QAM | ≤ 9.0 | ≤ 12.0 | ≤ 7.0 | ≤ 8.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: 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. | | | | | | | | | | | |

##### 6.1.3.5.1.2 OPPO’s simulation results (R4-2316119)

Case 1,2,8,9 are for 20MHz; 3,4,10,11 are for 40MHz; 5,12 are for 60MHz; 6,13 are for 80MHz and 7,14 are for 100MHz.

Table 6.1.3.5.1.2-1 A-MPR for single CC

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 8.4 | 8.6 | 5.4 | 5.5 | 3.8 | 3.2 | 3.2 | 9.8 | 10.9 | 6.6 | 7.8 | 6.0 | 4.5 | 3.9 |
| 16QAM | 8.4 | 8.6 | 5.4 | 5.6 | 3.9 | 3.9 | 3.8 | 9.8 | 10.9 | 6.6 | 7.8 | 6.0 | 4.5 | 3.9 |
| 64QAM | 8.3 | 8.5 | 5.5 | 5.4 | 5.6 | 5.5 | 5.5 | 9.8 | 10.9 | 6.7 | 7.8 | 6.1 | 4.6 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 9.8 | 10.9 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.5.1.2-2 A-MPR for Wideband

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 010 | 1000 | 0100 | 10000 | 01000 | 00100 | 110 | 1100 | 0110 | 11000 | 01100 | 1110 | 11100 | 01110 | 11110 |
| Contiguous | QPSK | 8.5 | 8.5 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 | 8.6 | 5.8 | 5.5 | 5.5 | 5.5 | 5.8 | 4.0 | 4.0 | 4.0 | 2.8 |
| 16QAM | 8.5 | 8.5 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 | 8.6 | 5.8 | 5.6 | 5.6 | 5.6 | 5.7 | 4.0 | 4.0 | 4.0 | 3.6 |
| 64QAM | 8.5 | 8.5 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 5.8 | 5.5 | 5.5 | 5.5 | 5.7 | 4.9 | 4.8 | 5.0 | 5.0 |
| 256QAM | 8.5 | 8.5 | 8.6 | 8.5 | 8.6 | 8.6 | 8.5 | 8.6 | 7.7 | 7.3 | 7.3 | 7.3 | 8.5 | 8.0 | 7.6 | 8.5 | 8.0 |
| Interlace | QPSK | 10.9 | 10.9 | 11.0 | 10.9 | 10.9 | 10.9 | 10.9 | 11.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 6.2 | 6.4 | 6.4 | 5.1 |
| 16QAM | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 6.3 | 6.5 | 6.3 | 5.1 |
| 64QAM | 11.0 | 11.0 | 11.0 | 10.9 | 11.0 | 10.9 | 11.0 | 10.9 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 6.3 | 6.4 | 6.3 | 5.2 |
| 256QAM | 11.0 | 11.0 | 11.0 | 10.9 | 11.0 | 10.9 | 11.0 | 11.0 | 8.1 | 8.0 | 8.0 | 8.0 | 8.0 | 6.7 | 6.7 | 6.7 | 6.6 |

Figure 6.1.3.5.1.2-1 Single CC A-MPR

Figure 6.1.3.5.1.2-2 Wide-band A-MPR

Note : NS\_03S is equal to NS\_53.

##### 6.1.3.5.1.3 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.3.5.1.3-1: Simulation results for NS\_53 Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_53 A-MPR** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤7.5** | **≤7.6** | **≤7.0** | **≤7.3** | **≤6.7** | **≤7.4** | **≤6.4** | **≤7.4** |
| **16 QAM** | **≤7.5** | **≤7.8** | **≤6.9** | **≤7.4** | **≤6.8** | **≤7.6** | **≤6.4** | **≤7.6** |
| **64 QAM** | **≤7.5** | **≤8.0** | **≤7.0** | **≤7.6** | **≤6.8** | **≤7.8** | **≤6.5** | **≤7.8** |
| **256 QAM** | **≤7.5** | **≤8.0** | **≤7.0** | **≤7.5** | **≤6.8** | **≤7.7** | **≤6.6** | **≤7.7** |

The power class 5 PSSCH A-MPR in the table should be considered in the discussion of MPR requirements.

##### 6.1.3.5.2 A-MPR for S-SSB transmission

##### 6.1.3.5.2.1 LG Electronics’ simulation results (R4-2315542)

For NS\_53, Table 6.1.3.5.2.1-1 and Figure 6.1.3.5.2.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.5.2.1-1: NS\_53-S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.43 | 11.16 | 15.09 | 9.13 | 12.21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.05 | 8.92 | 12.11 | 9.20 | 11.24 | 15.09 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.36 | 7.58 | 8.19 | 9.19 | 9.12 | 12.22 | 9.09 | 12.22 | 8.18 | 9.12 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 9.92 | 7.32 | 8.95 | 7.43 | 7.99 | 9.19 | 9.19 | 12.23 | 6.36 | 9.21 | 9.22 | 12.13 | 9.03 | 7.47 | 8.09 | 9.10 | 8.31 | 9.20 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 11.13 | 7.20 | 9.76 | 6.37 | 9.55 | 7.44 | 8.15 | 9.21 | 9.24 | 12.28 | 6.04 | 7.38 | 6.28 | 9.18 | 9.22 | 12.19 | 9.13 | 12.22 | 10.26 | 7.48 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 9.47 | 7.36 | 8.74 | 7.40 | 8.46 | 7.45 | 8.90 | 7.44 | 8.10 | 9.19 | 8.09 | 9.14 | 8.08 | 9.29 | 7.62 | 9.18 | 10.07 | 6.45 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.3.5.2.1-1: NS\_53 S-SSB A-MPR simulation results for SL-U power class 5

Table 6.1.3.5.2.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.5.2.1-2 : NS\_53 S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | 11.16 | 15.09 | 11.05 | 15.09 | 9.36 | 12.22 | 9.92 | 12.23 | 11.13 | 11.13 |
| Non-contiguous | - | - | - | - | 8.18 | 9.12 | 9.03 | 9.20 | 10.26 | 9.29 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the S-SSB A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.5.2.1-3 or Table 6.1.3.5.2.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.5.2.1-3: NS\_53 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation / (dB) | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | ≤13.5 | ≤17.5 | ≤13.5 | ≤17.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤13.5 |
| Non-contiguous | N/A | N/A | N/A | N/A | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

Table 6.1.3.5.2.1-4: NS\_53 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous | ≤13.5 | ≤17.5 | ≤13.5 | ≤17.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤13.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

##### 6.1.3.5.3 A-MPR for PSFCH transmission

##### 6.1.3.5.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For NS\_53, Table 6.1.3.5.3.1-1shows the A-MPR simulation results for the scenarios.

Table 6.1.3.5.3.1-1: NS\_53-PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 7.98 | 7.60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 9.32 | 7.94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.65 | 9.05 | 7.67 | 6.51 | 8.96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 9.43 | 9.83 | 9.01 | 7.57 | 8.56 | 6.86 | 9.82 | 9.00 | 8.95 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.3.5.3.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.5.3.1-2 : NS\_53 PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | 7.98 | 9.32 | 9.83 | 9.43 | 9.55 |
| Non-contiguous | N/A | 9.0 | 9.82 | 9.63 | N/A |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.5.3.1-3 or Table 6.1.3.5.3.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.5.3.1-3 NS\_53 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| Non-contiguous | N/A | ≤12.5 | ≤12.5 | ≤12.5 | N/A |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

Table 6.1.3.5.3.1-4 NS\_53 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous/Non-contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

#### 6.1.3.6 A-MPR for SL-U with NS\_54

##### 6.1.3.6.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.6.2 A-MPR for S-SSB transmission

##### 6.1.3.6.3 A-MPR for PSFCH transmission

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.7 A-MPR for SL-U with NS\_58

##### 6.1.3.7.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.7.1.1 LG Electronics’ simulation results (R4-2315542)

For NS\_58, Table 6.1.3.7.1.1-1 and Figure 6.1.3.7.1.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.7.1.1-1: NS\_58-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.83 | 2.15 | 2.50 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.83 | 2.15 | 2.49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.83 | 3.18 | 2.49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.48 | 5.09 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.82 | 2.81 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.82 | 2.81 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.82 | 2.81 | 2.82 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 5.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.48 | 2.13 | 0.10 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.47 | 2.47 | 2.47 | 2.13 | 0.36 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.17 | 2.48 | 3.16 | 2.48 | 3.16 | 2.48 | 3.16 | 2.12 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 5.08 | 5.47 | 5.07 | 5.88 | 5.06 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.15 | 2.47 | 2.48 | 2.47 | 2.48 | 2.46 | 0.10 | 2.13 | 0.00 |  |  |  |  |  |  |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.15 | 2.47 | 2.47 | 2.47 | 2.48 | 2.46 | 0.36 | 2.13 | 0.37 |  |  |  |  |  |  |
| '64QAM' | 2.82 | 2.48 | 3.16 | 2.15 | 2.81 | 2.48 | 3.16 | 2.48 | 3.16 | 2.12 | 3.16 | 2.46 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 5.07 | 5.47 | 5.06 | 5.47 | 5.07 | 5.46 | 5.06 | 5.47 | 5.06 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.48 | 2.47 | 2.48 | 2.47 | 2.47 | 2.13 | 0.10 | 2.46 | 0.00 | 2.47 | 1.20 | 2.13 | 0.10 |
| '16QAM' | 2.48 | 2.48 | 2.14 | 2.48 | 2.47 | 2.48 | 2.47 | 2.47 | 2.47 | 2.48 | 2.13 | 0.36 | 2.46 | 0.63 | 2.47 | 1.20 | 2.13 | 0.36 |
| '64QAM' | 2.82 | 2.48 | 3.17 | 2.48 | 3.16 | 2.47 | 3.16 | 2.47 | 2.81 | 2.48 | 3.15 | 2.12 | 3.16 | 2.46 | 3.16 | 2.47 | 3.16 | 2.12 |
| '256QAM' | 5.47 | 5.06 | 5.47 | 5.07 | 5.47 | 5.07 | 5.47 | 5.06 | 5.47 | 5.06 | 5.46 | 5.06 | 5.46 | 5.06 | 5.47 | 5.06 | 5.46 | 5.05 |



Figure 6.1.3.7.1.1-2: NS\_58-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

Table 6.1.3.7.1.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration and Full/Partial RB allocation.

Table 6.1.3.7.1.1-2 : NS\_58-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation | | | |
|  |  | Outer RB set configuration | | Inner RB set configuration | |
|  |  | Full (dB) | Partial (dB) | Full(dB) | Partial (dB) |
| CP-OFDM | QPSK | 2.81 | 2.83 | 2.47 | 1.20 |
|  | 16 QAM | 2.81 | 2.83 | 2.47 | 1.20 |
|  | 64 QAM | 3.18 | 2.83 | 3.16 | 2.47 |
|  | 256 QAM | 5.48 | 5.09 | 5.88 | 5.06 |

The inner RB set configuration needs to considered when defining the SL-U A-MPR requirements.

Based on the results, Table 6.1.3.7.1.1-3 can be considered for NS\_58 A-MPR for SL-U UE power class 5.

Table 6.1.3.7.1.1-3. NS\_58 additional maximum power reduction (A-MPR) for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | RB Allocation (Note 4) | | | |
|  |  | Outer RB set configuration5 | | Inner RB set configuration5 | |
|  |  | Full (dB)2 | Partial (dB)3 | Full (dB) 2 | Partial (dB) 3 |
| CP-OFDM | QPSK | ≤ 3.5 | ≤ 4.5 | ≤ 3.5 | ≤ 2.5 |
|  | 16 QAM | ≤ 4.0 | ≤ 4.5 | ≤ 4.0 | ≤ 3.0 |
|  | 64 QAM | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 |
|  | 256 QAM | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: The A-MPR for Full RB allocation applies to all RB’s in all transmitted 20 MHz or larger channels that are fully allocated or all RB’s in all transmitted sub-bands for wideband operation that are fully allocated excluding the wideband configurations of Table 6.2F.2-2.  NOTE 3: The A-MPR for Partial RB allocation applies to interlaced allocations with uplink resource allocation type 2 as specified in TS 38.214 [10] or transmitted sub-bands for wideband operation are transmitted according to the wideband configurations of Table 6.2F.2-2.  NOTE 4: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For all other channels, A-MPR is zero and MPR applies.  NOTE 5: Contiguous outer sub-band configuration and contiguous inner sub-band configuration in Table 6.1.2.1.1.1-5 apply. | | | | | |

##### 6.1.3.7.1.2 OPPO’s simulation results (R4-2316119)

The A-MPR requirement is captured in sub-clause 6.2F.3.10 and the requirement is differentiated by different channel bandwidth as captured below:

Table 6.1.3.7.1.2-1 A-MPR for single CC

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 5.4 | 5.6 | 3.5 | 3.5 | 3.2 | 3.2 | 3.2 | 6.7 | 8.0 | 3.5 | 4.7 | 3.2 | 3.3 | 3.2 |
| 16QAM | 5.4 | 5.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 6.8 | 8.0 | 3.5 | 4.8 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.3 | 5.6 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 6.8 | 8.0 | 4.1 | 4.7 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 7.9 | 8.0 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.7.1.2-2 A-MPR for wideband

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 010 | 1000 | 0100 | 10000 | 01000 | 00100 | 110 | 1100 | 0110 | 11000 | 01100 | 1110 | 11100 | 01110 | 11110 |
| Contiguous | QPSK | 5.5 | 5.5 | 5.6 | 5.5 | 5.5 | 5.5 | 5.5 | 5.6 | 3.0 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| 16QAM | 5.5 | 5.5 | 5.6 | 5.5 | 5.5 | 5.5 | 5.5 | 5.6 | 3.6 | 3.6 | 3.7 | 3.6 | 3.6 | 3.6 | 3.5 | 3.7 | 3.6 |
| 64QAM | 5.5 | 5.5 | 5.6 | 5.5 | 5.5 | 5.5 | 5.5 | 5.6 | 4.8 | 4.7 | 4.9 | 4.7 | 4.8 | 4.9 | 4.8 | 5.0 | 5.0 |
| 256QAM | 7.4 | 7.5 | 8.5 | 7.4 | 7.5 | 7.4 | 7.4 | 8.5 | 7.7 | 7.3 | 8.5 | 7.3 | 7.7 | 8.0 | 7.6 | 8.5 | 8.0 |
| Interlace | QPSK | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 3.1 | 3.3 | 3.4 | 2.7 |
| 16QAM | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 5.1 | 5.0 | 5.0 | 5.0 | 5.1 | 3.2 | 3.5 | 3.3 | 2.8 |
| 64QAM | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 5.1 | 5.1 | 5.1 | 5.1 | 5.1 | 4.1 | 4.1 | 4.1 | 4.0 |
| 256QAM | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.7 | 6.7 | 6.7 | 6.6 |

Figure 6.1.3.7.1.2-1 Single CC A-MPR

Figure 6.1.3.7.1.2-2 Wideband CC A-MPR

Note : NS\_04S is equal to NS\_58.

##### 6.1.3.7.1.3 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.3.7.1.3-1: Simulation results for NS\_58 Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_58 A-MPR** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤5.2** | **≤5.4** | **≤5.9** | **≤6.0** | **≤5.6** | **≤5.8** | **≤5.4** | **≤5.7** |
| **16 QAM** | **≤5.3** | **≤5.6** | **≤5.8** | **≤6.2** | **≤5.7** | **≤5.9** | **≤5.6** | **≤5.8** |
| **64 QAM** | **≤5.3** | **≤5.8** | **≤5.8** | **≤6.2** | **≤5.6** | **≤5.9** | **≤5.6** | **≤5.8** |
| **256 QAM** | **≤5.4** | **≤5.8** | **≤5.8** | **≤6.2** | **≤5.7** | **≤5.9** | **≤5.6** | **≤5.8** |

The power class 5 PSSCH A-MPR in the table should be considered in the discussion of MPR requirements.

##### 6.1.3.7.2 A-MPR for S-SSB transmission

##### 6.1.3.7.2.1 LG Electronics’ simulation results (R4-2315542)

For NS\_58, Table 6.1.3.7.2.1-1 and Figure 6.1.3.7.2.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.7.2.1-1: NS\_58-S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.43 | 7.90 | 6.82 | 6.81 | 6.08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.05 | 8.92 | 7.45 | 9.20 | 8.17 | 7.11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.36 | 7.58 | 8.19 | 6.46 | 6.69 | 7.21 | 4.76 | 7.20 | 8.18 | 6.79 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 9.92 | 7.41 | 8.95 | 6.78 | 7.97 | 6.48 | 6.89 | 7.19 | 5.98 | 4.31 | 4.61 | 7.12 | 9.04 | 6.62 | 7.85 | 6.61 | 7.79 | 6.47 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 10.91 | 7.19 | 9.59 | 6.61 | 9.54 | 6.67 | 7.99 | 6.53 | 6.80 | 7.20 | 6.12 | 4.95 | 5.66 | 4.09 | 4.70 | 7.28 | 4.56 | 7.16 | 9.97 | 7.47 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 8.85 | 6.62 | 9.14 | 6.54 | 8.62 | 6.08 | 8.80 | 5.83 | 8.04 | 6.48 | 7.86 | 6.46 | 8.13 | 6.49 | 7.49 | 6.35 | 10.15 | 6.31 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.3.7.2.1-1: NS\_58-S-SSB A-MPR simulation results for SL-U power class 5

Table 6.1.3.7.2.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.7.2.1-2 : NS\_58 S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | 10.91 | 6.86 | 6.11 | 3.98 |
| Non-contiguous sub-band RB sets | 9.94 | 7.22 | 6.93 | 4.82 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the S-SSB A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.7.2.1-3 or Table 6.1.3.7.2.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.7.2.1-3: NS\_58 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous sub-band RB sets | ≤ 13.5 | ≤ 9.5 | ≤ 8.5 | ≤ 6.5 |
| Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.0 | ≤ 9.5 | ≤ 7.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For all other channels, A-MPR is zero and MPR applies. | | | | |

Table 6.1.3.7.2.1-4: NS\_58 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RB Allocation | | | |
| Outer RB set configuration | | Inner RB set configuration | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 13.5 | ≤ 10.0 | ≤ 9.5 | ≤ 7.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For all other channels, A-MPR is zero and MPR applies. | | | | |

##### 6.1.3.7.3 A-MPR for PSFCH transmission

##### 6.1.3.7.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For NS\_58, Table 6.1.3.7.3.1-1 shows the A-MPR simulation results for the scenarios.

Table 6.1.3.7.3.1-1: NS\_58-PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 7.98 | 7.60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 9.32 | 7.94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.65 | 9.05 | 7.67 | 6.51 | 8.96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 9.43 | 9.83 | 9.01 | 7.57 | 8.56 | 6.86 | 9.82 | 9.00 | 8.95 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.3.7.3.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.7.3.1-2 : NS\_58 PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration | Inner RB set configuration |
| Contiguous sub-band RB sets | 9.83 | 8.56 |
| Non-contiguous sub-band RB sets | 9.82 | 8.08 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.7.3.1-3 or Table 6.1.3.7.3.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.7.3.1-3 NS\_58 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.5 |
| Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.0 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply.  NOTE 3: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For all other channels, A-MPR is zero and MPR applies. | | |

Table 6.1.3.7.3.1-4 NS\_58 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |
| --- | --- | --- |
|  | RB Allocation | |
| Outer RB set configuration2 | Inner RB set configuration2 |
| Contiguous/Non-contiguous sub-band RB sets | ≤ 12.5 | ≤ 10.5 |
| NOTE 1: The MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel.  NOTE 2: Outer sub-band configuration and inner sub-band configuration in Table 2-5 apply.  NOTE 3: The A-MPR applies instead of MPR for 20 MHz channel centered at the nearest NR-ARFCN corresponding to 5955 MHz, 40 MHz channel at the nearest NR-ARFCN corresponding to 5965 MHz, 60 MHz channel at the nearest NR-ARFCN corresponding to 5975 MHz, and 80 MHz channel at the nearest NR-ARFCN corresponding to 5985 MHz. For all other channels, A-MPR is zero and MPR applies. | | |

#### 6.1.3.8 A-MPR for SL-U with NS\_59

##### 6.1.3.8.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.8.2 A-MPR for S-SSB transmission

##### 6.1.3.8.3 A-MPR for PSFCH transmission

*<Editor Note> A-MPR requirements will be added*

#### 6.1.3.9 A-MPR for SL-U with NS\_60

##### 6.1.3.9.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.9.1.1 LG Electronics’ simulation results (R4-2315542)

For NS\_60, Table 6.1.3.9.1.1-1 and Figure 6.1.3.9.1.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.9.1.1-1: NS\_60-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 5.47 | 7.62 | 5.89 | 7.63 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 5.47 | 8.07 | 5.89 | 8.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 5.47 | 8.06 | 5.89 | 7.63 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 8.06 | 5.89 | 8.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 2.48 | 4.67 | 5.47 | 7.62 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 2.48 | 4.67 | 5.47 | 8.06 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 2.82 | 4.68 | 5.47 | 8.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.47 | 8.05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 3.90 | 4.28 | 5.88 | 8.07 | 2.47 | 5.07 | 5.88 | 8.05 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 3.90 | 4.28 | 5.88 | 8.07 | 2.47 | 5.07 | 5.88 | 8.05 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 3.90 | 4.28 | 5.88 | 8.52 | 2.82 | 5.06 | 5.88 | 8.05 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.88 | 5.48 | 5.89 | 8.07 | 5.47 | 5.07 | 5.88 | 8.04 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 2.82 | 3.53 | 5.88 | 8.06 | 2.47 | 5.07 | 2.81 | 3.53 | 5.88 | 8.05 | 2.46 | 5.06 |  |  |  |  |  |  |
| '16QAM' | 2.82 | 3.53 | 5.88 | 8.06 | 2.47 | 5.07 | 2.81 | 3.53 | 5.88 | 8.49 | 2.46 | 5.06 |  |  |  |  |  |  |
| '64QAM' | 2.82 | 3.53 | 5.89 | 8.06 | 2.81 | 5.07 | 3.16 | 3.53 | 5.88 | 8.05 | 3.16 | 5.06 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.07 | 5.88 | 8.06 | 5.47 | 5.07 | 5.47 | 5.07 | 5.88 | 8.51 | 5.46 | 5.06 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 3.17 | 3.90 | 5.89 | 8.07 | 2.47 | 5.07 | 2.47 | 3.16 | 2.47 | 3.17 | 5.88 | 8.04 | 2.46 | 5.05 | 2.47 | 3.16 | 5.88 | 8.05 |
| '16QAM' | 3.17 | 3.90 | 5.88 | 8.51 | 2.47 | 5.07 | 2.47 | 3.17 | 2.47 | 3.17 | 5.88 | 8.49 | 2.46 | 5.05 | 2.46 | 3.16 | 5.88 | 8.05 |
| '64QAM' | 3.17 | 3.90 | 5.88 | 8.51 | 2.81 | 5.06 | 3.16 | 3.16 | 2.81 | 3.17 | 5.47 | 8.05 | 3.16 | 5.05 | 3.16 | 3.16 | 5.88 | 8.05 |
| '256QAM' | 5.47 | 5.06 | 5.89 | 8.52 | 5.47 | 5.07 | 5.47 | 5.06 | 5.47 | 5.06 | 5.88 | 8.05 | 5.47 | 5.06 | 5.47 | 5.46 | 5.88 | 8.05 |



Figure 6.1.3.9.1.1-1: NS\_60-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

Table 6.1.3.9.1.1-2 shows the maximum value of simulation results considering Full/Partial RB allocation.

Table 6.1.3.9.1.1-2 : NS\_60-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | 5.89 | 8.07 | 2.48 | 5.07 | 3.90 | 4.28 | 2.82 | 3.53 | 3.17 | 3.90 |
| 16 QAM | 5.89 | 8.51 | 2.48 | 5.07 | 3.90 | 4.28 | 2.82 | 3.53 | 3.17 | 3.90 |
| *64 QAM* | 5.89 | 8.52 | 3.16 | 5.07 | 3.90 | 4.28 | 2.82 | 3.53 | 3.17 | 3.90 |
| 256 QAM | 5.89 | 8.52 | 5.47 | 5.07 | 5.88 | 5.48 | 5.47 | 5.07 | 5.47 | 5.06 |

Based on the results, Table 6.1.3.9.1.1-3 can be considered for NS\_60 A-MPR for SL-U UE power class 5.

Table 6.1.3.9.1.1-3. NS\_60 additional maximum power reduction (A-MPR) for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 |
| 16 QAM | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.0 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 | ≤ 4.5 | ≤ 5.5 |
| *64 QAM* | ≤ 6.0 | ≤ 8.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 | ≤ 5.5 |
| 256 QAM | ≤ 7~~.~~0 | ≤ 8.5 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: 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 | | | | | | | | | | | |

##### 6.1.3.9.1.2 OPPO’s simulation results (R4-2316119)

The A-MPR requirement is captured in sub-clause 6.2F.3.10 and the requirement is differentiated by different channel bandwidth as captured below:

Table 6.1.3.9.1.1-1 A-MPR for single CC

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 6.4 | 6.6 | 3.4 | 3.5 | 3.5 | 3.5 | 3.5 | 7.8 | 8.9 | 4.5 | 5.8 | 4.0 | 3.6 | 3.5 |
| 16QAM | 6.4 | 6.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 7.8 | 9.0 | 4.5 | 5.8 | 4.0 | 3.6 | 3.5 |
| 64QAM | 6.3 | 6.6 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 7.8 | 9.0 | 4.6 | 5.8 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 7.9 | 9.0 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.9.1.1-2 A-MPR for wideband

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 010 | 1000 | 0100 | 10000 | 01000 | 00100 | 110 | 1100 | 0110 | 11000 | 01100 | 1110 | 11100 | 01110 | 11110 |
| Contiguous | QPSK | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 | 6.5 | 6.5 | 6.6 | 3.7 | 3.5 | 3.7 | 3.5 | 3.7 | 3.0 | 2.8 | 2.8 | 3.2 |
| 16QAM | 6.5 | 6.5 | 6.6 | 6.5 | 6.6 | 6.5 | 6.5 | 6.7 | 3.7 | 3.6 | 3.7 | 3.6 | 3.7 | 3.6 | 3.5 | 3.7 | 3.6 |
| 64QAM | 6.6 | 6.5 | 6.6 | 6.6 | 6.5 | 6.6 | 6.6 | 6.6 | 4.8 | 4.7 | 4.9 | 4.7 | 4.8 | 4.9 | 4.8 | 5.0 | 5.0 |
| 256QAM | 7.4 | 7.5 | 8.5 | 7.4 | 7.5 | 7.4 | 7.4 | 8.5 | 7.7 | 7.3 | 8.5 | 7.3 | 7.7 | 8.0 | 7.6 | 8.5 | 8.0 |
| Interlace | QPSK | 8.9 | 9.0 | 9.0 | 9.0 | 8.9 | 9.0 | 8.9 | 9.0 | 6.0 | 5.9 | 5.9 | 5.9 | 6.0 | 4.2 | 4.4 | 4.4 | 3.2 |
| 16QAM | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 6.0 | 6.0 | 5.9 | 6.0 | 6.0 | 4.3 | 4.5 | 4.3 | 3.3 |
| 64QAM | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 4.3 | 4.4 | 4.3 | 4.0 |
| 256QAM | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 6.8 | 6.8 | 6.8 | 6.8 | 6.8 | 6.7 | 6.7 | 6.7 | 6.6 |

Figure 6.1.3.9.1.1-1 Single CC A-MPR

Figure 6.1.3.9.1.1-2 Wideband A-MPR

Note : NS\_05S is equal to NS\_60.

##### 6.1.3.9.1.3 Qualcomm’s simulation results (R4-2316791)

**Table 6.1.3.9.1.3-1: Simulation results for NS\_60 Full and partial allocations.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NS\_53 A-MPR** | **20M** | **20M** | **40M** | **40M** | **60M** | **60M** | **80M** | **80M** |
|  | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** | **Full** | **Partial** |
| **QPSK** | **≤7.5** | **≤7.6** | **≤7.0** | **≤7.3** | **≤6.7** | **≤7.4** | **≤6.4** | **≤7.4** |
| **16 QAM** | **≤7.5** | **≤7.8** | **≤6.9** | **≤7.4** | **≤6.8** | **≤7.6** | **≤6.4** | **≤7.6** |
| **64 QAM** | **≤7.5** | **≤8.0** | **≤7.0** | **≤7.6** | **≤6.8** | **≤7.8** | **≤6.5** | **≤7.8** |
| **256 QAM** | **≤7.5** | **≤8.0** | **≤7.0** | **≤7.5** | **≤6.8** | **≤7.7** | **≤6.6** | **≤7.7** |

The power class 5 PSSCH A-MPR in the table should be considered in the discussion of MPR requirements.

##### 6.1.3.9.2 A-MPR for S-SSB transmission

##### 6.1.3.9.2.1 LG Electronics’ simulation results (R4-2315542)

For NS\_60, Table 6.1.3.9.2.1-1 and Figure 6.1.3.9.2.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.9.2.1-1: NS\_60-S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.24 | 8.17 | 12.15 | 6.16 | 9.19 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.31 | 8.63 | 9.09 | 9.02 | 8.17 | 12.15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.29 | 7.05 | 7.87 | 6.15 | 6.20 | 9.21 | 6.20 | 9.21 | 7.67 | 6.25 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 10.34 | 6.86 | 8.81 | 5.70 | 7.67 | 6.08 | 6.19 | 9.19 | 6.11 | 6.15 | 6.23 | 9.09 | 8.92 | 6.11 | 7.97 | 6.13 | 7.51 | 6.23 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 10.92 | 6.67 | 9.86 | 5.49 | 9.44 | 5.56 | 7.59 | 6.17 | 6.22 | 9.19 | 5.89 | 4.50 | 5.39 | 6.18 | 6.21 | 9.20 | 6.14 | 9.18 | 10.54 | 7.21 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 9.60 | 6.16 | 8.72 | 6.14 | 8.26 | 5.82 | 9.16 | 5.30 | 7.74 | 6.16 | 7.76 | 6.05 | 7.72 | 6.12 | 7.20 | 6.22 | 9.94 | 6.23 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.3.9.2.1-1: NS\_60 S-SSB A-MPR simulation results for SL-U power class 5

Table 6.1.3.9.2.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.9.2.1-2 : NS\_60 S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | 9.24 | 12.15 | 11.31 | 12.15 | 9.29 | 9.21 | 10.34 | 9.19 | 10.92 | 10.92 |
| Non-contiguous | - | - | - | - | 7.67 | 6.25 | 8.92 | 6.23 | 10.54 | 7.21 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the S-SSB A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.9.2.1-3 or Table 6.1.3.9.2.1-4 based on the simulation results when considering implementation margin.

Table 2-66: NS\_60 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation / (dB) | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | ≤13.5 | ≤14.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 |
| Non-contiguous | N/A | N/A | N/A | N/A | ≤10.0 | ≤9.0 | ≤11.5 | ≤9.0 | ≤13.0 | ≤10.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

Table 2-67: NS\_60 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous | ≤13.5 | ≤14.5 | ≤13.5 | ≤14.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

##### 6.1.3.9.3 A-MPR for PSFCH transmission

##### 6.1.3.9.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For NS\_60, Table 6.1.3.9.3.1-1 shows the A-MPR simulation results for the scenarios.

Table 6.1.3.9.3.1-1: NS\_60-PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 8.40 | 7.83 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 9.32 | 7.94 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.65 | 9.05 | 7.78 | 7.76 | 8.96 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 9.43 | 9.83 | 9.01 | 7.71 | 8.56 | 7.61 | 9.82 | 9.00 | 8.95 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.3.9.3.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.9.3.1-2 : NS\_60 PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | 8.40 | 9.32 | 9.83 | 9.43 | 9.55 |
| Non-contiguous | N/A | 9.63 | 9.82 | 8.34 | N/A |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.9.3.1-3 or Table 6.1.3.9.3.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.9.3.1-3 NS\_60 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| Non-contiguous | N/A | ≤12.5 | ≤12.5 | ≤12.5 | N/A |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

Table 6.1.3.9.3.1-4 NS\_60 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous/Non-contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

#### 6.1.3.10 A-MPR for SL-U with NS\_61

##### 6.1.3.10.1 A-MPR for simultaneous PSSCH/PSCCH transmission

##### 6.1.3.10.1.1 LG Electronics’ simulation results (R4-2315542)

For NS\_61, Table 6.1.3.10.1.1-1 and Figure 6.1.3.10.1.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.10.1.1-1: NS\_61-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '20MHz' | Scenario # | #1 | #7 | #2 | #8 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 6.31 | 8.98 | 6.73 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 6.30 | 8.97 | 6.74 | 8.98 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 6.31 | 8.98 | 6.74 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 6.31 | 8.98 | 6.74 | 8.98 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '40MHz' | Scenario # | #3 | #9 | #13 | #30 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 4.66 | 5.89 | 6.30 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 4.67 | 5.89 | 6.30 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 4.67 | 5.89 | 6.30 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.89 | 6.30 | 8.97 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| '60MHz' | Scenario # | #4 | #10 | #14 | #31 | #15 | #32 | #16 | #33 |  |  |  |  |  |  |  |  |  |  |
| 'QPSK' | 5.06 | 5.47 | 6.73 | 9.44 | 4.67 | 5.89 | 6.73 | 8.95 |  |  |  |  |  |  |  |  |  |  |
| '16QAM' | 5.07 | 5.47 | 6.73 | 9.43 | 4.67 | 5.89 | 6.73 | 9.41 |  |  |  |  |  |  |  |  |  |  |
| '64QAM' | 5.07 | 5.47 | 6.73 | 9.43 | 4.67 | 5.89 | 6.73 | 9.42 |  |  |  |  |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.47 | 6.73 | 9.43 | 5.47 | 5.88 | 6.73 | 9.42 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | Scenario # | #5 | #11 | #17 | #34 | #18 | #35 | #19 | #36 | #20 | #37 | #21 | #38 |  |  |  |  |  |  |
| 'QPSK' | 4.67 | 5.47 | 6.74 | 9.44 | 4.67 | 5.89 | 5.06 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 |  |  |  |  |  |  |
| '16QAM' | 4.67 | 5.47 | 6.73 | 9.43 | 4.66 | 5.89 | 5.06 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 |  |  |  |  |  |  |
| '64QAM' | 4.67 | 5.47 | 6.73 | 9.43 | 4.67 | 5.89 | 4.67 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 |  |  |  |  |  |  |
| '256QAM' | 5.47 | 5.47 | 6.73 | 9.43 | 5.47 | 5.89 | 5.47 | 5.47 | 6.73 | 9.42 | 5.47 | 5.88 |  |  |  |  |  |  |
| '100MHz' | Scenario # | #6 | #12 | #22 | #39 | #23 | #40 | #24 | #41 | #25 | #42 | #26 | #43 | #27 | #44 | #28 | #45 | #29 | #46 |
| 'QPSK' | 4.67 | 5.47 | 6.73 | 9.43 | 4.67 | 5.89 | 4.66 | 5.47 | 4.66 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 | 2.81 | 3.89 | 6.73 | 8.96 |
| '16QAM' | 4.67 | 5.47 | 6.73 | 9.43 | 4.66 | 5.89 | 5.06 | 5.47 | 4.67 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 | 2.81 | 3.89 | 6.73 | 9.41 |
| '64QAM' | 4.67 | 5.47 | 6.74 | 9.44 | 4.67 | 6.30 | 4.66 | 5.47 | 4.66 | 5.47 | 6.73 | 9.42 | 3.52 | 5.88 | 3.16 | 3.89 | 6.73 | 9.42 |
| '256QAM' | 5.47 | 5.47 | 6.73 | 9.43 | 5.47 | 6.31 | 5.47 | 5.47 | 5.47 | 5.47 | 6.73 | 9.42 | 5.47 | 5.88 | 5.47 | 5.47 | 6.73 | 9.41 |



Figure 6.1.3.10.1.1-1: NS\_61-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

Table 6.1.3.10.1.1-2 shows the maximum value of simulation results considering Full/Partial RB allocation.

Table 6.1.3.10.1.1-2 : NS\_61-PSSCH/PSCCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | 6.74 | 9.44 | 4.67 | 5.89 | 5.06 | 5.47 | 4.67 | 5.47 | 4.67 | 5.47 |
| 16 QAM | 6.74 | 9.43 | 4.67 | 5.89 | 5.07 | 5.47 | 4.67 | 5.47 | 4.67 | 5.47 |
| *64 QAM* | 6.74 | 9.44 | 4.67 | 6.30 | 5.07 | 5.47 | 4.67 | 5.47 | 4.67 | 5.47 |
| 256 QAM | 6.74 | 9.43 | 5.47 | 6.31 | 5.47 | 5.47 | 5.47 | 5.47 | 5.47 | 5.47 |

For NS\_61, the maximum output power is limited with 14dBm. Therefore, basically, A-MPR should be met with the following equation considering power class 5, 20dBm.

* NS\_61 A-MPR = max{Table 6.1.3.10.1.1-2 + implementation margin, 6 dB}.

Based on the results, Table 6.1.3.10.1.1-3 can be considered for NS\_61 A-MPR for SL-U UE power class 5.

Table 6.1.3.10.1.1-3. NS\_61 additional maximum power reduction (A-MPR) for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pre-coding | Modulation | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) | Full (dB) | Partial (dB) |
| CP-OFDM | QPSK | ≤ 7.5 | ≤ 10.0 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 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 | ≤ 6.0 | ≤ 6.0 |
| *64 QAM* | ≤ 7.5 | ≤ 10.5 | ≤ 6.5 | ≤ 6.5 | ≤ 6.0 | ≤ 6.0 | ≤ 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 | ≤ 7.0 | ≤ 7.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously allocated in the channel.  NOTE 2: 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 | | | | | | | | | | | |

##### 6.1.3.10.1.2 OPPO’s simulation results (R4-2316119)

The A-MPR requirement is captured in sub-clause 6.2F.3.10 and the requirement is differentiated by different channel bandwidth as captured below:

Table 6.1.3.10.1.1-1 A-MPR for single CC

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| case | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| QPSK | 3.2 | 3.1 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.1 | 3.3 | 3.2 | 3.2 | 3.3 | 3.2 |
| 16QAM | 3.7 | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 | 3.6 | 3.2 | 3.1 | 3.3 | 3.2 | 3.2 | 3.3 | 3.2 |
| 64QAM | 5.0 | 5.2 | 5.1 | 5.0 | 5.2 | 5.1 | 5.1 | 4.4 | 4.3 | 4.1 | 4.4 | 4.1 | 3.9 | 4.0 |
| 256QAM | 8.8 | 8.6 | 8.6 | 8.8 | 8.6 | 8.5 | 8.7 | 7.9 | 7.5 | 7.6 | 7.9 | 6.6 | 6.5 | 6.8 |

The wide-band operation simulation result is further provided below:

Table 6.1.3.10.1.1-2 A-MPR for wideband

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Bitmap | 10 | 100 | 110 | 010 | 1100 | 1000 | 1110 | 0100 | 0110 | 10000 | 11000 | 11100 | 11110 | 01000 | 01100 | 01110 | 00100 |
| Contiguous | QPSK | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 |
| 16QAM | 3.5 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.7 | 3.5 | 3.6 | 3.5 | 3.6 | 3.5 | 3.6 | 3.7 | 3.6 |
| 64QAM | 5.1 | 5.1 | 4.8 | 5.2 | 4.7 | 5.1 | 4.9 | 5.1 | 4.9 | 5.1 | 4.7 | 4.8 | 5.0 | 5.1 | 4.8 | 5.0 | 5.2 |
| 256QAM | 7.4 | 7.5 | 7.7 | 8.5 | 7.3 | 7.4 | 8.0 | 7.5 | 8.5 | 7.4 | 7.3 | 7.6 | 8.0 | 7.4 | 7.7 | 8.5 | 8.5 |
| Interlace | QPSK | 2.6 | 2.6 | 2.7 | 2.8 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 | 2.7 | 2.7 | 2.6 | 2.7 | 2.8 | 2.6 |
| 16QAM | 2.9 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 2.9 | 3.0 | 3.0 | 2.8 | 2.9 | 3.0 | 3.0 | 2.8 |
| 64QAM | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.1 | 4.1 | 4.2 | 4.1 | 4.2 | 4.1 | 4.0 | 4.1 | 4.2 | 4.1 | 4.1 |
| 256QAM | 6.5 | 6.6 | 6.8 | 6.6 | 6.8 | 6.6 | 6.7 | 6.6 | 6.8 | 6.6 | 6.8 | 6.7 | 6.6 | 6.6 | 6.8 | 6.7 | 6.5 |

Figure 6.1.3.10.1.1-1 Single CC A-MPR

Figure 6.1.3.10.1.1-2 Wideband A-MPR

Note : NS\_06S is equal to NS\_61.

##### 6.1.3.10.2 A-MPR for S-SSB transmission

##### 6.1.3.10.2.1 LG Electronics’ simulation results (R4-2315542)

For NS\_61, Table 6.1.3.10.2.1-1 and Figure 6.1.3.10.2.1-1 show the A-MPR simulation results for the scenarios.

Table 6.1.3.10.2.1-1: NS\_61-S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 | #3 | #4 | #5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 9.24 | 9.14 | 13.08 | 7.15 | 10.19 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 11.18 | 9.58 | 10.10 | 9.02 | 9.23 | 13.09 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 9.84 | 7.13 | 8.68 | 7.13 | 7.13 | 10.21 | 7.12 | 10.20 | 8.88 | 7.69 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |
| '80MHz' | 10.20 | 8.27 | 9.35 | 6.64 | 8.49 | 7.23 | 7.20 | 10.22 | 5.69 | 7.14 | 7.21 | 10.21 | 9.98 | 7.65 | 9.34 | 7.52 | 9.37 | 7.37 |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |
| '100MHz' | 11.00 | 8.15 | 10.53 | 7.12 | 9.82 | 6.71 | 8.24 | 7.20 | 7.14 | 10.13 | 5.89 | 5.43 | 5.38 | 7.07 | 7.21 | 10.23 | 7.22 | 10.11 | 10.29 | 8.04 |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 |  |  |
| '100MHz' | 9.71 | 7.67 | 9.11 | 7.74 | 9.93 | 7.32 | 9.09 | 6.12 | 9.01 | 7.48 | 8.77 | 7.30 | 9.14 | 7.23 | 8.29 | 7.18 | 10.66 | 7.41 |  |  |



1. 20MHz, 40MHz, and 60MHz



1. 80MHz



1. 100MHz

Figure 6.1.3.10.2.1-1: NS\_61 S-SSB A-MPR simulation results for SL-U power class 5

Table 6.1.3.10.2.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.10.2.1-2 : NS\_61 S-SSB A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | 9.24 | 13.08 | 11.18 | 13.09 | 9.84 | 10.21 | 10.20 | 10.22 | 11.00 | 11.00 |
| Non-contiguous | - | - | - | - | 8.88 | 7.69 | 9.98 | 7.65 | 10.66 | 8.04 |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the S-SSB A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.10.2.1-3 or Table 6.1.3.10.2.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.10.2.1-3: NS\_61 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation / (dB) | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous | ≤13.5 | ≤15.5 | ≤13.5 | ≤15.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 |
| Non-contiguous | N/A | N/A | N/A | N/A | ≤11.5 | ≤11.0 | ≤12.5 | ≤11.0 | ≤13.0 | ≤11.0 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

Table 6.1.3.10.2.1-4: NS\_61 S-SSB A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | | | | | | |
| 20MHz | | 40MHz | | 60MHz | | 80MHz | | 100MHz | |
| # of S-SSB repetition/RBset | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 | > 2 | 2 |
| Contiguous/Non-contiguous | ≤13.5 | ≤15.5 | ≤13.5 | ≤15.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 | ≤13.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | | | | | | |

##### 6.1.3.10.3 A-MPR for PSFCH transmission

##### 6.1.3.10.3.1 LG Electronics’ simulation results (R4-2315542 and R4-2321771)

For NS\_61, Table 6.1.3.10.3.1-1 shows the A-MPR simulation results for the scenarios.

Table 6.1.3.10.3.1-1: NS\_61-PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario # | #1 | #2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘20MHz’ | 8.28 | 8.71 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #3 | #4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘40MHz’ | 10.21 | 8.28 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #5 | #6 | #7 | #8 | #9 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ‘60MHz’ | 10.63 | 9.76 | 8.68 | 8.62 | 9.55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 |  |  |  |  |  |  |  |  |  |  |
| '80MHz' | 10.19 | 10.69 | 9.74 | 8.72 | 8.56 | 8.73 | 10.50 | 9.56 | 9.56 |  |  |  |  |  |  |  |  |  |  |
| Scenario # | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 |
| '100MHz' | 10.29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6.1.3.10.3.1-2 shows the maximum value of simulation results considering combinations of Outer/Inner sub-band configuration.

Table 6.1.3.10.3.1-2 : NS\_61 PSFCH A-MPR simulation results for SL-U power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | 8.73 | 10.21 | 10.69 | 10.19 | 10.29 |
| Non-contiguous | N/A | 9.56 | 10.50 | 9.94 | N/A |

Considering the inner RB set bitmaps and the outer RB set bitmaps, the PSFCH A-MPR for SL-U power class 5 can be proposed as Table 6.1.3.10.3.1-3 or Table 6.1.3.10.3.1-4 based on the simulation results when considering implementation margin.

Table 6.1.3.10.3.1-3 NS\_61 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| Non-contiguous | N/A | ≤11.5 | ≤12.5 | ≤12.5 | N/A |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

Table 6.1.3.10.3.1-4 NS\_61 PSFCH A-MPR for SL-U UE power class 5

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| RB set configuration | Channel bandwidth (Sub-band allocation) / RB Allocation | | | | |
| 20MHz | 40MHz | 60MHz | 80MHz | 100MHz |
| Contiguous/Non-contiguous | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 | ≤12.5 |
| NOTE 1: The A-MPR shall apply to all SCS in all active 20 MHz sub-bands contiguously or non-contiguously allocated in the channel. | | | | | |

### 6.1.4 Configured transmitted power for NR SL-U

The configured transmitted power for NR-U is defined in clause 6.2F.4 of TS 38.101-1 and the normal NR requirement in clause 6.2.4 of TS 38.101-1 apply. For NR V2X, PCMAX is defined for PSSCH\PSCCH, S-SSB and PSFCH in clause 6.2E.4 specifically.

It has been agreed to reuse the NR V2X Configured transmitted power requirements in 38.101-1 clause 6.2E.4 for NR SL-U.

### 6.1.5 Minimum output power for NR SL-U

The Minimum output power of NR-U is defined in clause 6.3F.1 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC minimum requirements in 38.101-1 clause 6.3.1 for NR SL-U.

### 6.1.6 Transmit OFF power for NR SL-U

The Transmit OFF power of NR-U is defined in clause 6.3F.2 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC minimum requirements in 38.101-1 clause 6.3.2 for NR SL-U.

### 6.1.7 ON/OFF time mask for NR SL-U

Definition of ON/OFF time mask can be divided into two parts. First part defines the transition from OFF to ON and the second part transition from ON to OFF. For the ON to OFF part, it was agreed that 10us transient period is located inside the guard period. For the OFF to ON part at the beginning of the transmission, whether to put the whole 15 us transient period inside the CP-E or to reuse the NR-U mask that only put 10us inside the CP-E was discussed and following this discussion, and information from RAN1 that 16us or 25us LBT time preceding the CP-E already includes 5us ramp-up time, it was agreed to reuse the NR-U approach where first 5us of the OFF tot ON transient period is located before the CP-E.

ON/OFF masks for NR SL-U PSSCH and PSCCH and S-SSB that are in line with the above agreements are shown in figures below.



Guard

Period



N+1 Slot (incl. transmission gap)



CP

-

E

N

+2

Slot

5us

10us

10us

Transient Period

Transient Period

End of OFF

Power Requirement

N

0

Slot

Start of N

+1

power

End of N

+1

power

Start of OFF power

requirement

Figure 6.1.7-1 General ON/OFF time mask for SL-U PSSCH and PSCCH



Figure 6.1.7-2 ON/OFF time mask for SL-U S-SSB

### 6.1.8 Power control for NR SL-U

The power control of NR-U is defined in clause 6.3F.4 of TS 38.101-1 and the power control of NR V2X is defined in clause 6.3E.4. Since only absolute power control requirement is defined for NR V2X, it has been agreed that only absolute power control requirement is defined for NR SL-U.

During the NR-U discussion it was agreed that absolute requirement applies at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 40 ms. Gap duration of 40ms is larger than 20ms, which is defined in generic requirements in Clause 6.3.4.2. of TS 38.101-1. This extension of gap duration is in line with eLAA requirement in 36.101 and is defined to maintain power control accuracy over longer periods of no transmission due to the uncertainty introduced by LBT. Therefore NR SL-U can reuse NR-U absolute power control requirement as defined in Clause 6.3F.4.2.

### 6.1.9 Transmit signal quality for NR SL-U

6.1.9.1 Frequency Error

The Frequency error for NR-U is defined in clause 6.4F.1 of TS 38.101-1 and the normal NR requirement in clause 6.4.1 of TS 38.101-1 apply. For NR V2X, frequency error is defined in clause 6.4E,1 as ±0.1 PPM accuracy observed over a period of 1 ms against GNSS.”

It has been agreed to reuse the NR V2X Frequency error requirements in 38.101-1 clause 6.4E.1 for NR SL-U.

6.1.9.2 EVM

The EVM of NR-U is defined in clause 6.4F.2 of TS 38.101-1 and the normal NR requirement in clause 6.4.2.1 of TS 38.101-1 apply. For NR V2X, EVM is defined in clause 6.4E.2.2 with other than the Pi/2-BPSK modulation, which is not supported for NR V2X.

It has been agreed to reuse the NR V2X EVM requirements in 38.101-1 clause 6.4E.2.2 for NR SL-U.

* For NR V2X the EVM requirements in clause 6.4.2.1 are valid for PSCCH, PSSCH and PSBCH physical channels with other than pi/2-BPSK modulation, which is not supported for NR V2X, and excluding the guard symbol at the end of transmitted slots

6.1.9.3 Carrier Leakage

The Carrier Leakage of NR-U is defined in clause 6.4.2.2 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC carrier leakage requirements in 38.101-1 clause 6.4.2.2 for NR SL-U.

6.1.9.4 Equalizer spectrum flatness

The Equalizer spectrum flatness of NR-U is referred to clause 6.4.2.4 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC Equalizer spectrum flatness requirements in 38.101-1 clause 6.4.2.4 for NR SL-U.

6.1.9.5 In-band Emission

The In-band Emission of NR-U is defined in clause 6.4F.2.3 of TS 38.101-1. For NR V2X, In-band Emission is defined in clause 6.4E,2.4 where normal NR requirement of clause 6.4.2.3 apply.

It has been agreed to reuse the NR-U In-band emission requirements in 38.101-1 Table 6.4F.2.3-1 for NR SL-U. Minimum requirements for in-band emissions for NR SL-U PSCCH, PSSCH and PSBCH transmissions over the measurement interval that takes into account guard period at the end of the transmit slot.

### 6.1.10 Spectrum emission mask for NR SL-U

6.1.10.1 Occupied Bandwidth

The Occupied Bandwidth of NR-U is defined in clause 6.5.1 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC Occupied Bandwidth requirements in 38.101-1 clause 6.5.1 for NR SL-U.

6.1.10.2 SEM

The SEM of NR-U is defined in clause 6.5F.2.2 of TS 38.101-1. For NR V2X, In-band Emission is defined in clause 6.5E,2.2 where normal NR requirement of clause 6.5.2.2 apply.

It has been agreed to reuse the NR-U SEM requirements in 38.101-1 Table 6.4F.2.3-1 for NR SL-U.

6.1.10.3 A-SEM

Additional spectrum emission mask requirements are not defined for NR-U.

It is agreed not to define A-SEM requirements for NR SL-U when operating in bands n46, n96 and n102.

### 6.1.11 ACLR requirements for NR SL-U

The ACLR of NR-U is defined in clause 6.5F.2.4 of TS 38.101-1. For NR V2X, ACLR is defined in clause 6.5E.2.4 where normal NR requirement of clause 6.5.2.4 apply. The ACLR requirement was optimized for operation in un-licensed band during the development of the NR-U requirements.

It has been agreed to reuse the NR-U ACLR requirements in 38.101-1 clause 6.5F.2.4 for NR SL-U.

### 6.1.12 Spurious emissions for NR SL-U

The general spurious emission of NR-U is defined in clause 6.5.3.1 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC general spurious emission requirements in 38.101-1 clause 6.5.3.1 for NR SL-U.

The additional spurious emission of NR-U is defined in clause 6.5F.3.3 of TS 38.101-1 with different NS values for different bands.

It has been agreed to reuse the NR-U single CC minimum requirements in TS 38.101-1 clause 6.5F.3.3 for NR SL-U.

### 6.1.13 Spurious emission band UE co-existence for NR SL-U

UE coexistence requirements are not defined for NR-U.

It has been agreed not to define UE coexistence spurious emission requirements for NR SL-U when operating in bands n46, n96 and n102 in case of non-concurrent operation.

### 6.1.14 Transmit intermodulation for NR SL-U

The Transmit intermodulation of NR-U is defined in clause 6.5.4 of TS 38.101-1 and the normal NR requirement apply, which is the same for NR V2X.

It has been agreed to reuse the NR single CC Transmit intermodulation requirements in 38.101-1 clause 6.5.4 for NR SL-U.

## 6.2 Tx requirements for inter-band con-current operation

It has been agreed to consider the functionality and requirements of single carrier SL-U operation as a basis of SL-U and the functionality and requirements of single carrier Uu operation as a basis of Uu in con-current operation.

### 6.2.1 Maximum output power for inter-band con-current operation

It has been agreed to target the following power classes.

* + Power class 3 Uu@Licensed + Power class 5 SL@Un-licensed
  + Power class 3 Uu@Licensed + Power class 3 SL@Un-licensed can be considered as 2nd priority if Power class 3 SL is agreed in a single carrier at unlicensed band

For Power class 2 for Uu@Licensed for inter-band concurrent operation, it is not considered in Rel-18.

RAN4 agreed to define maximum output power for each operating band and there is no total power class for SL-U con-current band combination.

Table 6.2.1: NR UE Power Class for inter band SL-U con-current combination

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR SL con-current operating band Configuration | NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance  (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) | Class 5(dBm) | Tolerance (dB) |
| SL\_n78-n46 | n78 |  |  |  |  | 23 | +2/-3 |  |  |  |  |
| n46 |  |  |  |  |  |  |  |  | 20 | +2/-3 |
| NOTE 1: For the con-current band combinations, the simultaneous transmission and reception of sidelink and Uu interfaces can be supported while operation is agnostic of the service used on each interface.  NOTE 2: PPowerClass is the maximum output power specified without taking into account the tolerance for each operating band.  NOTE 3: For inter-band con-current operation, the aggregation power apply to the total transmitted power over all component carriers (per UE). | | | | | | | | | | | |

### 6.2.2 UE maximum output power reduction for inter-band con-current operation

It has been agreed to refer to the existing requirement for NR Uu and refer to the SL-U requirement if specified.

For the inter-band con-current operation, the allowed maximum power reduction (MPR) for the maximum output power shall be applied per each component carrier. The MPR requirements in TS 38.101-1 clause 6.2.2 apply for NR Uu operation in licensed band, and the MPR requirements in clause X apply for NR sidelink operation in unlicensed band.

### 6.2.3 UE additional maximum output power reduction for inter-band con-current operation

It has been agreed to refer to the existing requirement for NR Uu and refer to the SL-U requirement if specified.

For the inter-band con-current operation, the allowed additional maximum power reduction (A-MPR) for the maximum output power shall be applied per each component carrier. The A-MPR requirements in clause 6.2.3 apply for NR Uu operation in licensed band, and the A-MPR requirements in clause X apply for NR sidelink operation in unlicensed band.

### 6.2.4 Configured transmitted power for inter-band con-current operation

It has been agreed to

* + consider the existing requirement for NR V2X con-current operation (6.2E.4.2 in TS38.101-1) as starting point
  + reuse the existing delta Tib of CA\_n46-n78 for inter-band concurrent operation in Rel-18
* When a UE is configured for simultaneous NR sidelink and NR uplink transmissions for inter-band con-current operation, the UE is allowed to set its configured maximum output power PCMAX,*c*,*NR*and PCMAX,*c*,SL for the configured NR uplink carrier and the configured NR SL carrier, respectively, and its total configured maximum output power PCMAX,c.
* The configured maximum output power PCMAX *c*,*NR(p)* in slot *p* for the configured NR uplink carrier shall be set within the bounds:
* PCMAX\_L,*c,NR* (*p*) ≤ PCMAX,*c,NR* (*p*) ≤ PCMAX\_H,*c,NR* (*p*)
* where PCMAX\_L,*c,NR* andPCMAX\_H,*c,NR* are the limit as specified in TS 38.101-1 clause 6.2E.4.1.
* The configured maximum output power PCMAX *c*,SL*(q)* in slot *q* for the configured NR SL carrier shall be set within the bounds:
* PCMAX,*c,SL* (*q*) ≤ PCMAX\_H,*c,SL* (*q*)
* where PCMAX\_H,*c,SL* is the limit as specified in TS 38.101-1 clause 6.2E.4.
* The total UE configured maximum output power PCMAX (*p,q*) in a slot *p* of NR uplink carrier and a slot *q* of NR sidelink that overlap in time shall be set within the following bounds for synchronous and asynchronous operation unless stated otherwise:
* PCMAX\_L (*p,q*) ≤ PCMAX (*p,q*) ≤ PCMAX\_H (*p,q*)
* with
* PCMAX\_L (*p,q*) = PCMAX\_L,*c,NR* (*p*)
* PCMAX\_H (*p,q*) = 10 log10 [pCMAX\_H,*c,NR*(*p*) + pCMAX\_H,*c,SL*(*q*)]
* where pCMAX\_H*,c,SL* and pCMAX\_H,*c,NR*are the limits PCMAX\_H,*c,SL* (*q*) and PCMAX\_H,*c,NR* (*p*) expressed in linear scale.
* The measured total maximum output power PUMAX over both the NR uplink and NR SL carriers is
* PUMAX = 10 log10 [pUMAX,*c,NR* + pUMAX,*c,SL*],
* where pUMAX,*c,NR*  denotes the measured output power of serving cell *c* for the configured NR uplink carrier, and pUMAX,*c,SL* denotes the measured output power for the configured NR SL carrier expressed in linear scale.
* When a UE is configured for synchronous NR sidelink and uplink transmissions,
* PCMAX\_L(*p, q*)  – TLOW (PCMAX\_L(*p, q*)) ≤ PUMAX  ≤ PCMAX\_H(*p, q*) + THIGH (PCMAX\_H(*p, q*))
* where PCMAX\_L (*p,q*) and PCMAX\_H (*p,q*) are the limits for the pair (*p,q*) and with the tolerances TLOW(PCMAX) and THIGH(PCMAX) for applicable values of PCMAX specified in Table 6.2E.4.1-1.. PCMAX\_L may be modified for any overlapping portion of slots *(p, q)* and *(p +1, q+1).*

### 6.2.5 Minimum output power for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the requirements specified in TS 38.101-1 clause 6.3.1 shall apply for NR Uu operation in licensed band and the requirements specified in clause X shall apply for NR sidelink operation in unlicensed band.

### 6.2.6 Transmit OFF power for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the requirements specified in TS 38.101-1 clause 6.3.2 shall apply for NR Uu operation in licensed band and the requirements specified in clause X shall apply for NR sidelink operation in unlicensed band

### 6.2.7 ON/OFF time mask for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 6.2.8 Power control for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the requirements specified in TS 38.101-1 clause 6.3.4 shall apply for NR Uu operation in licensed band and the requirements specified in clause X shall apply for NR sidelink operation in unlicensed band

### 6.2.9 Transmit signal quality for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 6.2.10 Spectrum emission mask for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the general/additional SEM requirements specified in TS 38.101-1 clause 6.5.2 shall apply for NR Uu operation in licensed band and the general/additional SEM requirements specified in clause X shall apply for NR sidelink operation in unlicensed band.

### 6.2.11 ACLR requirements for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the ACLR requirement specified in clause TS 38.101-1 6.5.2.4 shall apply for NR Uu operation in licensed band and the ACLR requirement specified in clause X shall apply for NR sidelink operation in unlicensed band.

### 6.2.12 Spurious emissions for inter-band con-current operation

The general spurious emission is not needed for inter-band con-current operation as the NR SL only defines spurious emission for non-current case.

### 6.2.13 Spurious emission band UE co-existence for inter-band con-current operation

It has been agreed to reuse the inter band CA\_n46-n78 co-existence requirement for con-current operation with Uu@78 + SL@n46.

### 6.2.14 Transmit intermodulation for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

For the inter-band con-current operation, the requirements specified in TS 38.101-1 clause 6.5.4 shall apply for NR Uu operation in licensed band and the requirements specified in clause X shall apply for NR sidelink operation in unlicensed band.

## 6.3 Tx requirements for NR SL CA operation

### 6.3.1 Maximum output power for NR SL CA operation

For the intra-band SL CA operation, the following NR SL CA UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth. The period of measurement shall be at least one sub frame (1ms).

Table 6.3.1-1: NR SL CA UE Power Class

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR SL CA band Configuration | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) |
| SL\_n47B |  |  |  |  | 23 | +2/-33 |  |  |
| NOTE 1: PPowerClass is the maximum UE power specified without taking into account the tolerance  NOTE 2: For intra-band SL CA UE, the maximum power requirement apply to the total transmitted power over all component carriers (per UE).  NOTE 3: 3 refers to the transmission bandwidths (Figure 5.6-1 in TS38.101-1) confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB | | | | | | | | |

### 6.3.2 UE maximum output power reduction for NR SL CA operation

For basic parameters, reuse the simulation assumptions in TR38.785 (Rel-17 enhanced NR sidelink). Other constraints for PSCCH/PSSCH/PSFCH/S-SSB can be assumed based on current RAN1’s agreement.

|  |  |
| --- | --- |
| Center frequency | 5.9GHz |
| Bandwidth | per CC: 10/20/30/40MHz  Aggregated CBW: Table 5.2.3-1 (up to 70MHz CBW) |
| Maximum output power for aggregated CBW | 23dBm |
| Numerology | 15 kHz/30kHz/60kHz |
| Modulation per CC | QPSK/16QAM/64QAM/256QAM |
| Waveform | CP-OFDM |
| Carrier leakage | 34dBc |
| IQ image | 25dBc |
| CIM3 | 60dBc |
| PA calibration | PA calibrated to deliver 30dBc ACLR for a fully allocated RBs in 20MHz QPSK DFT- S-OFDM waveform at 1 dB MPR.  This is based to share PA between LTE V2X and NR V2X at 5.9GHz as worst case. |

6.3.2.1 MPR for NR SL CA operation

##### 6.3.2.1.1 MPR for simultaneous PSSCH/PSCCH transmission

For SL intra-band contiguous CA of PSCCH and PSSCH simultaneous transmission with contiguous RB allocation, specify MPR in Table 6.3.2.1.1-1.

Table 6.3.2.1.1-1: MPR for power class 3 SL CA [with contiguous RB allocation]

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | |
|  | | inner | outer |
| CP-OFDM | QPSK | ≤ 3.0 | ≤ 5.0 |
|  | 16QAM | ≤ 3.0 | ≤ 5.0 |
|  | 64QAM | ≤ 4.5 | ≤ 5.0 |
|  | 256QAM | ≤ 6.5 | 7.0 |

The contiguous allocation rule for SL intra-band contiguous CA refers to that for NR intra-band contiguous CA in 6.2A.2.1 in TS38.101-1.

[For SL intra-band contiguous CA of PSCCH and PSSCH simultaneous transmission with non-contiguous RB allocation, specify MPR in Table 6.3.2.1.1-2.

Table 6.3.2.1.1-2: MPR for power class 3 SL CA with non-contiguous RB allocation

[TBA]

The non-contiguous allocation rule for SL intra-band contiguous CA refers to that for NR intra-band contiguous CA in 6.2A.2.1 in TS38.101-1.]

6.3.2.1.1.1 Huawei’s simulation results (R4-2315227)

Referring to the updated MPR simulation assumption, we use the following simulation scenarios in Table 4.

Table 6.3.2.1.1.1-1 SLCA PSSCH/PSCCH MPR simulation scenarios

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Scenario** | **Aggregated CBW** | **Subcarrier spacing** | **Waveform** | **Modulation** |
| **1** | 10MHz + 10MHz | 15kHz+15kHz | CP-OFDM | QPSK/16QAM/64QAM/256QAM |
| **2** | 10MHz + 10MHz | 30kHz+30kHz | CP-OFDM | QPSK/16QAM/64QAM/256QAM |
| **3** | 30MHz + 40MHz | 30kHz+30kHz | CP-OFDM | QPSK/16QAM/64QAM/256QAM |
| 4 | 20MHz + 20MHz | 30kHz+30kHz | CP-OFDM | QPSK/16QAM/64QAM/256QAM |

The simulation results for the scenarios listed in are illustrated below, and the evaluation figures are shown in the Annex with Figure 1-Figure 4.

Table 6.3.2.1.1.1-2 SLCA PSSCH/PSCCH MPR simulation scenarios

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation | 10MHz + 10MHz/  30kHz+30kHz | | 10MHz + 10MHz/  15kHz+15kHz | | 30MHz + 40MHz /  30kHz+30kHz | | 20MHz + 20MHz /  30kHz+30kHz | |
| inner | outer | inner | outer | inner | outer | inner | outer |
| QPSK | 1.8 | 2.9 | 1.9 | 3.1 | 1.7 | 3.0 | 1.8 | 3.2 |
| 16QAM | 2.3 | 2.9 | 2.2 | 3.0 | 2.5 | 3.2 | 2.3 | 3.2 |
| 64QAM | 3.3 | 3.9 | 3.3 | 4.0 | 3.4 | 4.0 | 3.4 | 4.0 |
| 256QAM | 5.2 | 6.3 | 5.3 | 6.4 | 5.4 | 6.4 | 5.5 | 5.4 |

Figure 6.3.2.1.1.1-1 Scenario#1: 10MHz + 10MHz/ 30kHz+30kHz

Figure 6.3.2.1.1.1-2 Scenario#2: 10MHz + 10MHz/ 15kHz+15kHz

Figure 6.3.2.1.1.1-3 Scenario#3: 30MHz + 40MHz/ 30kHz+30kHz

Figure 6.3.2.1.1.1-4 Scenario#4: 20MHz + 20MHz/ 30kHz+30kHz

6.3.2.1.1.2 LGE’s simulation results (R4-2315532)

* For Contiguous RB allocation of SL contiguous CA

The following simulation scenarios are considered as Table 6.3.2.1.1.2-1 for Contiguous RB allocations.

Table 6.3.2.1.1.2-1: SLCA PSSCH/PSCCH MPR simulation scenarios (Contiguous RB allocation)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aggregated CBW | Scenario | CC1 | CC2 | Inner/Outer RB allocation | SCS |
| 10MHz + 10MHz | 1 | 10RB42 | 10RB0 | Inner | 15 |
| 2 | 10RB42 | 12RB0 | Inner | 15 |
| 3 | 10RB42 | 15RB0 | Inner | 15 |
| 4 | 10RB42 | 25RB0 | Inner | 15 |
| 5 | 10RB42 | 30RB0 | Inner | 15 |
| 6 | 10RB42 | 36RB0 | Outer | 15 |
| 7 | 10RB42 | 50RB0 | Outer | 15 |
| 8 | 12RB40 | 36RB0 | Outer | 15 |
| 9 | 25RB27 | 36RB0 | Outer | 15 |
| 10 | 40RB12 | 40RB0 | Outer | 15 |
| 11 | 50RB2 | 50RB0 | Outer | 15 |
| 20MHz + 30MHz | 12 | 10RB41 | 10RB0 | Inner | 30 |
| 13 | 10RB41 | 12RB0 | Inner | 30 |
| 14 | 10RB41 | 25RB0 | Inner | 30 |
| 15 | 10RB41 | 30RB0 | Inner | 30 |
| 16 | 10RB41 | 48RB0 | Inner | 30 |
| 17 | 10RB41 | 50RB0 | Outer | 30 |
| 18 | 25RB26 | 36RB0 | Outer | 30 |
| 19 | 36RB15 | 36RB0 | Outer | 30 |
| 20 | 40RB11 | 40RB0 | Outer | 30 |
| 21 | 50RB1 | 75RB0 | Outer | 30 |
| 20MHz + 40MHz | 22 | 10RB41 | 10RB0 | Inner | 30 |
| 23 | 10RB41 | 25RB0 | Inner | 30 |
| 24 | 10RB41 | 36RB0 | Inner | 30 |
| 25 | 10RB41 | 48RB0 | Inner | 30 |
| 26 | 10RB41 | 60RB0 | Inner | 30 |
| 27 | 10RB41 | 70RB0 | Outer | 30 |
| 28 | 25RB26 | 36RB0 | Outer | 30 |
| 29 | 36RB15 | 70RB0 | Outer | 30 |
| 30 | 40RB11 | 90RB0 | Outer | 30 |
| 31 | 50RB1 | 105RB0 | Outer | 30 |
| 30MHz + 40MHz | 32 | 10RB68 | 10RB0 | Inner | 30 |
| 33 | 10RB68 | 25RB0 | Inner | 30 |
| 34 | 10RB68 | 36RB0 | Inner | 30 |
| 35 | 10RB68 | 48RB0 | Inner | 30 |
| 36 | 10RB68 | 60RB0 | Inner | 30 |
| 37 | 10RB68 | 70RB0 | Outer | 30 |
| 38 | 10RB68 | 105RB0 | Outer | 30 |
| 39 | 25RB53 | 70RB0 | Outer | 30 |
| 40 | 36RB42 | 90RB0 | Outer | 30 |
| 41 | 40RB38 | 90RB0 | Outer | 30 |
| 42 | 75RB3 | 105RB0 | Outer | 30 |
| 20MHz + 20MHz | 43 | 10RB41 | 10RB0 | Inner | 30 |
| 44 | 10RB41 | 12RB0 | Inner | 30 |
| 45 | 10RB41 | 15RB0 | Inner | 30 |
| 45 | 10RB41 | 25RB0 | Inner | 30 |
| 46 | 10RB41 | 30RB0 | Inner | 30 |
| 47 | 10RB41 | 36RB0 | Outer | 30 |
| 48 | 10RB41 | 50RB0 | Outer | 30 |
| 49 | 12RB39 | 36RB0 | Outer | 30 |
| 50 | 25RB26 | 36RB0 | Outer | 30 |
| 51 | 40RB11 | 40RB0 | Outer | 30 |
| 52 | 50RB1 | 50RB0 | Outer | 30 |
| 10MHz + 30MHz | 53 | 10RB41 | 10RB0 | Inner | 30 |
| 54 | 10RB41 | 12RB0 | Inner | 30 |
| 55 | 10RB41 | 15RB0 | Inner | 30 |
| 56 | 10RB41 | 20RB0 | Inner | 30 |
| 57 | 10RB41 | 25RB0 | Outer | 30 |
| 58 | 10RB41 | 50RB0 | Outer | 30 |
| 59 | 10RB41 | 75RB0 | Outer | 30 |
| 60 | 12RB12 | 36RB0 | Outer | 30 |
| 61 | 15RB9 | 60RB0 | Outer | 30 |
| 62 | 20RB4 | 75RB0 | Outer |  |
| 63 | 24RB0 | 75RB0 | Outer | 30 |

Table 6.3.2.1.1.2-1-2 and Figure 6.3.2.1.1.2-1 show PSSCH/PSCCH MPR simulation results.

Table 6.3.2.1.1.2-2: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Contiguous RB allocations

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '10MHz+10MHz' | Scenario # | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 |  |  |  |  |  |  |  |
| 'QPSK' | 0.13 | 0.13 | 0.14 | 0.13 | 0.13 | 0.95 | 2.70 | 1.27 | 1.60 | 2.32 | 3.09 |  |  |  |  |  |  |  |
| '16QAM' | 1.27 | 0.96 | 1.27 | 0.95 | 0.95 | 0.96 | 2.69 | 1.27 | 1.60 | 2.32 | 3.09 |  |  |  |  |  |  |  |
| '64QAM' | 2.31 | 2.31 | 2.31 | 2.31 | 2.30 | 2.31 | 2.69 | 2.31 | 2.31 | 2.32 | 3.09 |  |  |  |  |  |  |  |
| '256QAM' | 4.36 | 3.92 | 3.93 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |  |  |  |  |  |  |  |
| '20MHz+30MHz' | Scenario # | #12 | #13 | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 |  |  |  |  |  |  |  |  |
| 'QPSK' | 0.37 | 0.65 | 1.26 | 0.96 | 0.67 | 0.95 | 0.96 | 1.95 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '16QAM' | 0.66 | 0.94 | 0.95 | 0.95 | 1.27 | 1.27 | 1.27 | 1.95 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '64QAM' | 1.93 | 1.93 | 2.31 | 2.31 | 2.31 | 2.31 | 2.31 | 2.31 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '256QAM' | 3.91 | 3.91 | 3.92 | 3.92 | 3.92 | 3.92 | 3.91 | 3.92 | 3.92 | 3.92 |  |  |  |  |  |  |  |  |
| '20MHz+40MHz' | Scenario # | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 |  |  |  |  |  |  |  |  |
| 'QPSK' | 0.00 | 0.00 | 0.00 | 0.13 | 0.13 | 0.39 | 0.66 | 1.95 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '16QAM' | 0.65 | 0.95 | 0.96 | 0.95 | 0.96 | 0.96 | 0.95 | 1.94 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '64QAM' | 1.93 | 1.94 | 2.30 | 2.31 | 2.31 | 2.31 | 2.30 | 2.31 | 2.31 | 3.09 |  |  |  |  |  |  |  |  |
| '256QAM' | 3.49 | 3.91 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |  |  |  |  |  |  |  |  |
| '30MHz+40MHz' | Scenario # | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 | #40 | #41 | #43 |  |  |  |  |  |  |  |
| 'QPSK' | 0.00 | 0.00 | 0.00 | 0.12 | 0.13 | 0.66 | 3.09 | 1.27 | 2.69 | 2.69 | 3.09 |  |  |  |  |  |  |  |
| '16QAM' | 0.64 | 0.95 | 0.95 | 0.95 | 1.27 | 1.27 | 3.09 | 1.27 | 2.69 | 2.69 | 3.09 |  |  |  |  |  |  |  |
| '64QAM' | 1.93 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 3.09 | 2.31 | 2.69 | 2.69 | 3.09 |  |  |  |  |  |  |  |
| '256QAM' | 3.49 | 3.91 | 3.91 | 3.91 | 4.35 | 3.92 | 4.36 | 3.92 | 4.36 | 3.92 | 4.35 |  |  |  |  |  |  |  |
| '20MHz+20MHz' | Scenario # | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 | #52 | #53 | #54 |
| 'QPSK' | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 1.26 | 3.09 | 1.59 | 1.94 | 2.31 | 3.09 |
| '16QAM' | 0.65 | 0.95 | 0.95 | 0.95 | 0.95 | 1.27 | 3.09 | 1.59 | 1.95 | 2.32 | 3.09 |
| '64QAM' | 1.93 | 1.93 | 1.94 | 2.30 | 2.31 | 2.31 | 3.08 | 2.31 | 2.31 | 2.31 | 3.09 |
| '256QAM' | 3.91 | 3.91 | 3.92 | 3.91 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |
| '10MHz+30MHz' | Scenario # | #55 | #56 | #57 | #58 | #59 | #60 | #61 | #62 | #63 | #64 | #65 |
| 'QPSK' | 0.00 | 0.00 | 0.00 | 0.38 | 0.66 | 1.60 | 2.69 | 1.60 | 2.31 | 2.70 | 3.09 |
| '16QAM' | 0.65 | 0.94 | 0.65 | 0.94 | 0.95 | 1.60 | 2.69 | 1.60 | 2.31 | 2.70 | 3.09 |
| '64QAM' | 1.93 | 1.94 | 1.95 | 1.94 | 2.31 | 2.30 | 2.69 | 2.31 | 2.31 | 2.70 | 3.09 |
| '256QAM' | 3.92 | 3.91 | 3.91 | 3.92 | 3.92 | 3.92 | 4.36 | 3.92 | 3.92 | 3.92 | 3.92 |

1. 10MHz + 10MHz
2. 20MHz + 30MHz
3. 20MHz + 40MHz
4. 30MHz + 40MHz
5. 20MHz + 20MHz
6. 10MHz + 30MHz

Figure 6.3.2.1.1.2-1: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Contiguous RB allocations

Table 6.3.2.1.1.2-3 shows the maximum value of simulation results for SL Contiguous CA with Contiguous RB allocations considering Inner RB allocation and Outer RB allocation as NR uplink Contiguous CA.

Table 6.3.2.1.1.2-3: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Contiguous RB allocations

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | |
|  | | inner | outer |
| CP-OFDM | QPSK | 0.38 | 3.09 |
|  | 16QAM | 1.27 | 3.09 |
|  | 64QAM | 2.31 | 3.09 |
|  | 256QAM | 4.36 | 4.36 |

The MPR can be proposed as Table 6.3.2.1.1.2-4 based on the simulation results when considering implementation margin.

Table 6.3.2.1.1.2-4: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Contiguous RB allocations

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | |
|  | | inner | outer |
| CP-OFDM | QPSK | ≤ 3.0 | ≤ 5.0 |
|  | 16QAM | ≤ 3.0 | ≤ 5.0 |
|  | 64QAM | ≤ 4.5 | ≤ 5.0 |
|  | 256QAM | ≤ 7.0 | ≤ 7.0 |

* For Non-contiguous RB allocation of SL contiguous CA

The following test scenarios are considered as Table 6.3.2.1.1.2-5 for Non-contiguous RB allocations.

Table 6.3.2.1.1.2-5: SL contiguous CA MPR test scenarios (Non-contiguous RB allocation)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aggregated CBW | Scenario | CC1 | CC2 | Inner/Outer1/Outer2 RB allocation | SCS |
| 10MHz + 10MHz | 1 | 10RB0 | 10RB42 | Outer2 | 15 |
| 2 | 10RB18 | 10RB22 | Outer2 | 15 |
| 3 | 10RB19 | 10RB22 | Outer2 | 15 |
| 4 | 10RB27 | 10RB14 | Outer2 | 15 |
| 5 | 10RB33 | 10RB7 | Outer1 | 15 |
| 6 | 10RB34 | 10RB7 | Outer1 | 15 |
| 7 | 10RB42 | 10RB1 | Inner | 15 |
| 8 | 25RB0 | 25RB27 | Outer2 | 15 |
| 9 | 25RB19 | 25RB8 | Outer2 | 15 |
| 10 | 25RB20 | 25RB8 | Outer2 | 15 |
| 11 | 25RB27 | 25RB1 | Outer1 | 15 |
| 12 | 30RB0 | 30RB22 | Outer2 | 15 |
| 13 | 30RB19 | 30RB3 | Outer2 | 15 |
| 14 | 30RB19 | 30RB2 | Outer2 | 15 |
| 15 | 30RB22 | 30RB1 | Outer1 | 15 |
| 16 | 50RB1 | 50RB0 | Outer2 | 15 |
| 20MHz + 30MHz | 17 | 10RB0 | 10RB68 | Outer2 | 30 |
| 18 | 10RB15 | 10RB32 | Outer2 | 30 |
| 19 | 10RB15 | 10RB31 | Outer2 | 30 |
| 20 | 10RB32 | 10RB10 | Outer1 | 30 |
| 21 | 10RB34 | 10RB9 | Outer1 | 30 |
| 22 | 10RB34 | 10RB8 | Outer1 | 30 |
| 23 | 10RB41 | 10RB1 | Inner | 30 |
| 24 | 25RB0 | 25RB53 | Outer2 | 30 |
| 25 | 25RB20 | 25RB25 | Outer2 | 30 |
| 26 | 25RB21 | 25RB25 | Outer2 | 30 |
| 27 | 25RB26 | 25RB1 | Outer1 | 30 |
| 28 | 30RB0 | 30RB48 | Outer2 | 30 |
| 29 | 30RB15 | 30RB12 | Outer2 | 30 |
| 30 | 30RB15 | 30RB11 | Outer2 | 30 |
| 31 | 30RB21 | 30RB1 | Outer1 | 30 |
| 32 | 50RB0 | 50RB28 | Outer2 | 30 |
| 33 | 50RB0 | 50RB0 | Outer2 | 30 |
| 34 | 50RB0 | 78RB0 | Outer2 | 30 |
| 20MHz + 40MHz | 35 | 10RB0 | 10RB96 | Outer2 | 30 |
| 36 | 10RB4 | 10RB30 | Outer2 | 30 |
| 37 | 10RB5 | 10RB30 | Outer2 | 30 |
| 38 | 10RB37 | 10RB15 | Outer1 | 30 |
| 39 | 10RB38 | 10RB15 | Inner | 30 |
| 40 | 10RB41 | 10RB1 | Inner | 30 |
| 41 | 25RB0 | 25RB81 | Outer2 | 30 |
| 42 | 25RB20 | 25RB38 | Outer2 | 30 |
| 43 | 25RB20 | 25RB37 | Outer2 | 30 |
| 44 | 25RB26 | 25RB1 | Outer1 | 30 |
| 45 | 30RB0 | 30RB76 | Outer2 | 30 |
| 46 | 30RB15 | 30RB26 | Outer2 | 30 |
| 47 | 30RB15 | 30RB25 | Outer2 | 30 |
| 48 | 30RB21 | 30RB1 | Outer1 | 30 |
| 49 | 50RB0 | 50RB56 | Outer2 | 30 |
| 50 | 50RB0 | 50RB0 | Outer2 | 30 |
| 51 | 50RB0 | 105RB0 | Outer2 | 30 |
| 30MHz + 40MHz | 52 | 10RB0 | 10RB96 | Outer2 | 30 |
| 53 | 10RB13 | 10RB30 | Outer2 | 30 |
| 54 | 10RB14 | 10RB30 | Outer1 | 30 |
| 55 | 10RB50 | 10RB15 | Outer1 | 30 |
| 56 | 10RB51 | 10RB15 | Inner | 30 |
| 57 | 10RB68 | 10RB1 | Inner | 30 |
| 58 | 25RB0 | 25RB81 | Outer2 | 30 |
| 59 | 25RB28 | 25RB37 | Outer2 | 30 |
| 60 | 25RB28 | 25RB36 | Outer1 | 30 |
| 61 | 25RB51 | 25RB1 | Outer1 | 30 |
| 62 | 25RB52 | 25RB1 | Inner | 30 |
| 63 | 30RB0 | 30RB76 | Outer2 | 30 |
| 64 | 30RB24 | 30RB26 | Outer2 | 30 |
| 65 | 30RB24 | 30RB25 | Outer1 | 30 |
| 66 | 30RB48 | 30RB1 | Outer1 | 30 |
| 67 | 75RB0 | 50RB56 | Outer2 | 30 |
| 68 | 75RB0 | 50RB0 | Outer2 | 30 |
| 69 | 75RB0 | 105RB0 | Outer2 | 30 |
| 20MHz + 20MHz | 70 | 10RB0 | 10RB41 | Outer2 | 30 |
| 71 | 10RB17 | 10RB22 | Outer2 | 30 |
| 72 | 10RB18 | 10RB22 | Outer1 | 30 |
| 73 | 10RB27 | 10RB14 | Outer1 | 30 |
| 74 | 10RB33 | 10RB7 | Outer1 | 30 |
| 75 | 10RB34 | 10RB7 | Inner | 30 |
| 76 | 10RB41 | 10RB1 | Inner | 30 |
| 77 | 25RB0 | 25RB26 | Outer2 | 30 |
| 78 | 25RB18 | 25RB8 | Outer2 | 30 |
| 79 | 25RB19 | 25RB8 | Outer1 | 30 |
| 80 | 25RB26 | 25RB1 | Outer1 | 30 |
| 81 | 30RB0 | 30RB21 | Outer2 | 30 |
| 82 | 30RB18 | 30RB3 | Outer1 | 30 |
| 83 | 30RB18 | 30RB2 | Outer1 | 30 |
| 84 | 30RB21 | 30RB1 | Outer2 | 30 |
| 85 | 50RB0 | 50RB0 | Outer2 | 30 |
| 10MHz + 30MHz | 86 | 10RB0 | 10RB68 | Outer2 | 30 |
| 87 | 10RB6 | 10RB32 | Outer2 | 30 |
| 88 | 10RB6 | 10RB31 | Outer1 | 30 |
| 89 | 10RB14 | 10RB10 | Outer1 | 30 |
| 90 | 10RB14 | 10RB1 | Outer1 | 30 |
| 91 | 10RB0 | 12RB53 | Outer2 | 30 |
| 92 | 10RB3 | 12RB25 | Outer2 | 30 |
| 93 | 25RB4 | 12RB25 | Outer1 | 30 |
| 94 | 25RB12 | 12RB1 | Outer1 | 30 |
| 95 | 25RB0 | 30RB48 | Outer2 | 30 |
| 96 | 25RB3 | 30RB7 | Outer2 | 30 |
| 97 | 30RB3 | 30RB6 | Outer1 | 30 |
| 98 | 30RB12 | 30RB1 | Outer1 | 30 |
| 99 | 30RB0 | 50RB28 | Outer2 | 30 |
| 100 | 30RB0 | 50RB1 | Outer2 | 30 |
| 101 | 50RB0 | 75RB1 | Outer2 | 30 |

Table 6.3.2.1.1.2-6 and Figure 6.3.2.1.1.2-2 show PSSCH/PSCCH MPR simulation results.

Table 6.3.2.1.1.2-6: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Non-contiguous RB allocations

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '10MHz+10MHz' | Scenario # | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 | #12 | #13 | #14 | #15 | #16 |  |  |
| 'QPSK' | 6.67 | 3.09 | 2.69 | 2.33 | 0.00 | 0.00 | 0.14 | 4.81 | 2.32 | 2.32 | 0.14 | 4.81 | 1.95 | 1.95 | 1.28 | 3.09 |  |  |
| '16QAM' | 6.67 | 2.70 | 3.10 | 2.70 | 0.95 | 0.97 | 0.96 | 5.26 | 2.32 | 2.32 | 0.96 | 4.81 | 1.95 | 1.95 | 1.28 | 3.09 |  |  |
| '64QAM' | 6.67 | 2.69 | 3.09 | 2.32 | 1.94 | 2.31 | 2.31 | 5.26 | 2.31 | 2.32 | 2.31 | 4.81 | 1.95 | 1.95 | 2.32 | 3.09 |  |  |
| '256QAM' | 7.15 | 3.92 | 3.93 | 3.93 | 3.92 | 3.92 | 3.93 | 4.81 | 3.92 | 3.92 | 3.92 | 4.81 | 3.92 | 3.92 | 3.92 | 3.92 |  |  |
| '20MHz+30MHz' | Scenario # | #17 | #18 | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 | #30 | #31 | #32 | #33 | #34 |
| 'QPSK' | 5.27 | 2.69 | 2.69 | 0.00 | 0.00 | 0.00 | 0.00 | 3.50 | 2.69 | 2.69 | 0.38 | 3.10 | 2.69 | 2.69 | 1.27 | 3.10 | 3.09 | 3.09 |
| '16QAM' | 5.27 | 2.70 | 2.69 | 0.66 | 0.66 | 0.65 | 0.66 | 3.50 | 2.70 | 2.69 | 0.96 | 3.09 | 2.69 | 2.69 | 1.27 | 3.09 | 3.09 | 3.09 |
| '64QAM' | 5.27 | 2.69 | 2.70 | 1.93 | 1.94 | 1.93 | 1.93 | 3.51 | 2.69 | 2.69 | 2.31 | 3.09 | 2.69 | 2.69 | 2.31 | 3.09 | 3.09 | 3.09 |
| '256QAM' | 5.26 | 3.50 | 3.49 | 3.48 | 3.91 | 3.49 | 3.49 | 3.50 | 3.50 | 3.49 | 3.91 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |
| '20MHz+40MHz' | Scenario # | #35 | #36 | #37 | #38 | #39 | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 | #49 | #50 | #51 |  |
| 'QPSK' | 5.28 | 3.09 | 3.08 | 0.00 | 0.00 | 0.00 | 3.09 | 2.69 | 2.69 | 0.66 | 3.09 | 2.69 | 2.69 | 1.60 | 3.10 | 3.09 | 3.09 |  |
| '16QAM' | 5.26 | 3.08 | 3.08 | 0.65 | 0.65 | 0.65 | 3.09 | 2.69 | 2.69 | 0.95 | 3.10 | 2.69 | 2.69 | 1.60 | 3.09 | 3.09 | 3.09 |  |
| '64QAM' | 5.27 | 3.09 | 3.09 | 1.94 | 1.94 | 1.94 | 3.09 | 2.69 | 2.69 | 1.94 | 3.09 | 2.69 | 2.69 | 2.31 | 3.10 | 3.09 | 3.09 |  |
| '256QAM' | 5.27 | 3.49 | 3.49 | 3.49 | 3.48 | 3.49 | 3.50 | 3.49 | 3.49 | 3.91 | 3.92 | 3.50 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |  |
| '30MHz+40MHz' | Scenario # | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 |
| 'QPSK' | 5.27 | 2.69 | 2.69 | 0.00 | 0.00 | 0.00 | 3.09 | 2.69 | 2.69 | 0.00 | 0.00 | 3.09 | 2.69 | 2.69 | 0.00 | 3.09 | 3.09 | 3.09 |
| '16QAM' | 5.26 | 2.69 | 2.69 | 0.65 | 0.65 | 0.65 | 3.10 | 2.69 | 2.69 | 0.95 | 0.94 | 3.09 | 2.69 | 2.69 | 0.95 | 3.09 | 3.09 | 3.09 |
| '64QAM' | 5.26 | 2.69 | 2.68 | 1.93 | 1.93 | 1.93 | 3.09 | 2.69 | 2.69 | 1.94 | 1.94 | 3.09 | 2.69 | 2.69 | 2.30 | 3.09 | 3.09 | 3.09 |
| '256QAM' | 5.27 | 3.48 | 3.49 | 3.48 | 3.49 | 3.49 | 3.50 | 3.49 | 3.49 | 3.91 | 3.91 | 3.92 | 3.92 | 3.92 | 3.91 | 3.92 | 3.92 | 4.36 |
| '20MHz+20MHz' | Scenario # | #70 | #71 | #72 | #73 | #74 | #75 | #76 | #77 | #78 | #79 | #80 | #81 | #82 | #84 | #84 | #85 |
| 'QPSK' | 5.27 | 2.69 | 2.69 | 2.68 | 0.00 | 0.00 | 0.00 | 3.50 | 2.31 | 2.31 | 0.39 | 3.09 | 1.95 | 1.95 | 1.60 | 3.09 |
| '16QAM' | 5.27 | 2.69 | 2.69 | 2.69 | 0.65 | 0.65 | 0.65 | 3.50 | 2.31 | 2.31 | 0.95 | 3.09 | 1.95 | 1.95 | 1.60 | 3.10 |
| '64QAM' | 5.26 | 2.69 | 2.69 | 2.68 | 1.93 | 1.94 | 1.93 | 3.50 | 2.31 | 2.31 | 1.94 | 3.09 | 1.95 | 1.95 | 2.31 | 3.09 |
| '256QAM' | 5.27 | 3.49 | 3.49 | 3.49 | 3.49 | 3.49 | 3.49 | 3.50 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 | 3.92 |
| '10MHz+30MHz' | Scenario # | #86 | #87 | #88 | #89 | #90 | #91 | #92 | #93 | #94 | #95 | #96 | #97 | #98 | #99 | #100 | #101 |
| 'QPSK' | 5.27 | 2.69 | 2.69 | 1.94 | 0.00 | 4.81 | 3.08 | 3.09 | 0.66 | 3.50 | 2.69 | 2.69 | 1.59 | 3.09 | 3.09 | 3.09 |
| '16QAM' | 5.26 | 2.69 | 2.69 | 1.93 | 0.66 | 4.81 | 3.09 | 3.09 | 0.66 | 3.51 | 2.69 | 2.69 | 1.59 | 3.09 | 3.09 | 3.09 |
| '64QAM' | 5.27 | 3.09 | 2.68 | 1.94 | 1.93 | 4.81 | 3.08 | 3.08 | 1.94 | 3.51 | 2.69 | 2.69 | 2.30 | 3.09 | 3.09 | 3.09 |
| '256QAM' | 5.27 | 3.49 | 3.49 | 3.49 | 3.49 | 4.81 | 3.49 | 3.92 | 3.92 | 3.50 | 3.50 | 3.92 | 3.92 | 3.93 | 3.93 | 3.92 |

1. 10MHz + 10MHz
2. 20MHz + 30MHz
3. 20MHz + 40MHz
4. 30MHz + 40MHz
5. 20MHz + 20MHz
6. 10MHz + 30MHz

Figure 6.3.2.1.1.2-2: PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Non-contiguous RB allocations

Table 6.3.2.1.1.2-7 shows the maximum value of simulation results for SL Contiguous CA with Non-contiguous RB allocations considering Inner RB allocation and Outer RB allocation as NR uplink Contiguous CA.

Table 6.3.2.1.1.2-7 : PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Non-contiguous RB allocations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | |
|  | | Inner | Outer1 | Outer2 |
| CP-OFDM | QPSK | 0.13 | 3.09 | 6.68 |
|  | 16QAM | 0.96 | 3.09 | 6.67 |
|  | 64QAM | 2.31 | 3.10 | 6.67 |
|  | 256QAM | 4.35 | 3.93 | 6.67 |

The MPR can be proposed as Table 6.3.2.1.1.2-8 based on the simulation results when considering implementation margin.

Table 6.3.2.1.1.2-8 PSSCH/PSCCH MPR simulation results for SL Contiguous CA with Non-contiguous RB allocations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | |
|  | | Inner | Outer1 | Outer2 |
| CP-OFDM | QPSK | ≤ 3.0 | ≤ 5.0 | ≤ 9.5 |
|  | 16QAM | ≤ 3.0 | ≤ 5.0 | ≤ 9.5 |
|  | 64QAM | ≤ 4.5 | ≤ 5.0 | ≤ 9.5 |
|  | 256QAM | ≤ 7.0 | ≤ 7.0 | ≤ 9.5 |

##### 6.3.2.1.2 MPR for PSFCH transmission

For SL intra-band CA of PSFCH with single RB transmission on each carrier, the required MPR are specified as follow.

|  |  |
| --- | --- |
| MPR\_PSFCH\_SLCA = 2.5; | 0< R ≤ 0.3 |
| = 7.5; | 0.3< R ≤ 0.5 |
| = 12; | 0.5< R ≤ 1 |

Where,

R is the ratio of the gap bandwidth between the two PSFCH transmitted on the two intra-band carrier by the total bandwidth of the two carrier.

6.3.2.1.2.1 Huawei’s simulation results (R4-2319504)

The evaluation scenarios and MPR results for SL CA PSFCH are illustrated in the following table.

Table 6.3.2.1.2.1-1: PSFCH MPR simulation results for SL Contiguous CA

|  |  |
| --- | --- |
| 0< R ≤ 0. 6 | 0.6 < R ≤ 1.0 |
| 6.0 | 11.0 |

**Table 6.3.2.1.2.1-1: Evaluation scenarios and MPR for SL CA PSFCH**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Case** | **Aggregated BW/**  **SCS/**  **RB number per BW** | **PSFCH RB on CC1+CC2/**  **RB index/** (NRB1+NRB2) | **Gap Ratio[2]**  ((NRB1+NRB2)\*SCS\*12+(GB1+ GB2))/ (BW1+BW2- (GB1+ GB2)) | **MPR** |
| 1 | 10MHz+10MHz /  30kHz/  24 | 23+0 (1+1) | 0.11 | **0** |
| 2 | 23+2 (1+3) | 0.15 | **0** |
| 3 | 23+4 | 0.19 | **0** |
| 4 | 23+6 | 0.23 | **0** |
| 5 | 23+8 | 0.26 | **0** |
| 6 | 23+10 | 0.30 | **0.5** |
| 7 | 23+12 | 0.34 | **0.6** |
| 8 | 23+14 | 0.38 | **3.5** |
| 9 | 23+16 | 0.42 | **3.5** |
| 10 | 23+18 | 0.46 | **3.5** |
| 11 | 23+20 | 0.5 | **3.6** |
| 12 | 23+22 | 0.53 | **3.9** |
| 13 | 0+0 | 0.55 | **5.5** |
| 14 | 0+2 | 0.59 | **5.6** |
| 15 | 0+4 | 0.63 | **5.4** |
| 16 | 0+6 | 0.67 | **5.2** |
| 17 | 0+8 | 0.7 | **5.7** |
| 18 | 0+10 | 0.75 | **5.6** |
| 19 | 0+12 | 0.78 | **9.1** |
| 20 | 0+14 | 0.82 | **10.2** |
| 21 | 0+16 | 0.86 | **10.2** |
| 22 | 0+18 | 0.9 | **10.2** |
| 23 | 0+20 | 0.93 | **10.2** |
| 24 | 0+22 | 0.98 | **10.2** |
| 25 | 0+23 | 1 | **10.3** |
| 26 | 20MHz+20MHz/  30kHz  51 | 50+0 (1+1) | 0.06 | **0** |
| 27 | 50+5 (1+6) | 0.11 | **0** |
| 28 | 50+10 (1+11) | 0.15 | **0** |
| 29 | 50+15 (1+16) | 0.2 | **0** |
| 30 | 50+20 (1+21) | 0.25 | **0.5** |
| 31 | 50+25 (1+26) | 0.3 | **0.8** |
| 32 | 50+30 (1+31) | 0.34 | **3.4** |
| 33 | 50+35 (1+36) | 0.39 | **3.4** |
| 34 | 50+40 (1+41) | 0.44 | **3.4** |
| 35 | 50+45 (1+46) | 0.48 | **4.1** |
| 36 | 0+0 (51+1) | 0.53 | **5.4** |
| 37 | 0+5 (51+6) | 0.58 | **5.7** |
| 38 | 0+10 (51+11) | 0.62 | **5.7** |
| 39 | 0+15 (51+16) | 0.67 | **9.8** |
| 40 | 0+20 (51+21) | 0.72 | **10** |
| 41 | 0+25 (51+26) | 0.76 | **10.2** |
| 42 | 0+30 (51+31) | 0.81 | **10.2** |
| 43 | 0+35 (51+36) | 0.86 | **10.2** |
| 44 | 0+40 (51+41) | 0.9 | **10.3** |
| 45 | 0+45 (51+46) | 0.95 | **10.3** |
| 46 | 0+50 (51+51) | 1.0 | **10.3** |

6.3.2.1.2.2 LGE’s simulation results (R4-2315532)

The following simulation scenarios are considered as Table 6.3.2.1.2.2-1 for SL contiguous CA.

Table 6.3.2.1.2.2-1: SL contiguous CA MPR test scenarios

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aggregated CBW | Scenario | CC1 | CC2 | R = NGap/(NRB1+NRB2+ NGBchannel\_CC1+ NGBchannel\_CC2) | SCS |
| 10MHz + 10MHz | 1 | 1RB0 | - |  | 15 |
| 2 | 1RB51 | - |  | 15 |
| 3 | 1RB0 | 1RB0 | 0.5255 | 15 |
| 4 | 1RB0 | 1RB10 | 0.6185 | 15 |
| 5 | 1RB0 | 1RB20 | 0.7116 | 15 |
| 6 | 1RB0 | 1RB30 | 0.8046 | 15 |
| 7 | 1RB0 | 1RB40 | 0.8976 | 15 |
| 8 | 1RB0 | 1RB51 | 1.0 | 15 |
| 9 | 1RB10 | 1RB0 | 0.4324 | 15 |
| 10 | 1RB20 | 1RB0 | 0.3394 | 15 |
| 11 | 1RB30 | 1RB0 | 0.2463 | 15 |
| 12 | 1RB40 | 1RB0 | 0.1533 |  |
| 13 | 1RB51 | 1RB0 | 0.0509 | 15 |
| 20MHz + 30MHz | 14 | 1RB0 | - |  | 30 |
| 15 | 1RB50 | - |  | 30 |
| 16 | 1RB0 | 1RB0 | 0.4248 | 30 |
| 17 | 1RB0 | 1RB10 | 0.4995 | 30 |
| 18 | 1RB0 | 1RB20 | 0.5742 | 30 |
| 19 | 1RB0 | 1RB30 | 0.6489 | 30 |
| 20 | 1RB0 | 1RB40 | 0.7236 | 30 |
| 21 | 1RB0 | 1RB50 | 0.7983 | 30 |
| 22 | 1RB0 | 1RB60 | 0.8730 | 30 |
| 23 | 1RB0 | 1RB70 | 0.9477 | 30 |
| 24 | 1RB0 | 1RB77 | 1.0 | 30 |
| 25 | 1RB10 | 1RB0 | 0.3501 | 30 |
| 26 | 1RB20 | 1RB0 | 0.2754 | 30 |
| 27 | 1RB30 | 1RB0 | 0.2007 | 30 |
| 28 | 1RB40 | 1RB0 | 0.1260 | 30 |
| 29 | 1RB50 | 1RB0 | 0.0513 | 30 |
| 20MHz + 40MHz | 30 | 1RB0 | - |  | 30 |
| 31 | 1RB50 | - |  | 30 |
| 32 | 1RB0 | 1RB0 | 0.3509 | 30 |
| 33 | 1RB0 | 1RB10 | 0.4127 | 30 |
| 34 | 1RB0 | 1RB20 | 0.4745 | 30 |
| 35 | 1RB0 | 1RB30 | 0.5363 | 30 |
| 36 | 1RB0 | 1RB40 | 0.5981 | 30 |
| 37 | 1RB0 | 1RB50 | 0.6600 | 30 |
| 38 | 1RB0 | 1RB60 | 0.7218 | 30 |
| 39 | 1RB0 | 1RB70 | 0.7836 | 30 |
| 40 | 1RB0 | 1RB80 | 0.8454 | 30 |
| 41 | 1RB0 | 1RB90 | 0.9073 | 30 |
| 42 | 1RB0 | 1RB100 | 0.9691 | 30 |
| 43 | 1RB0 | 1RB105 | 1.0 | 30 |
| 44 | 1RB10 | 1RB0 | 0.2890 | 30 |
| 45 | 1RB20 | 1RB0 | 0.2272 | 30 |
| 46 | 1RB30 | 1RB0 | 0.1654 | 30 |
| 47 | 1RB40 | 1RB0 | 0.1036 | 30 |
| 48 | 1RB50 | 1RB0 | 0.0417 | 30 |
| 30MHz + 40MHz | 49 | 1RB0 | - |  | 30 |
| 50 | 1RB77 | - |  | 30 |
| 51 | 1RB0 | 1RB0 | 0.4449 | 30 |
| 52 | 1RB0 | 1RB10 | 0.4977 | 30 |
| 53 | 1RB0 | 1RB20 | 0.5506 | 30 |
| 54 | 1RB0 | 1RB30 | 0.6035 | 30 |
| 55 | 1RB0 | 1RB40 | 0.6563 | 30 |
| 56 | 1RB0 | 1RB50 | 0.7092 | 30 |
| 57 | 1RB0 | 1RB60 | 0.7621 | 30 |
| 58 | 1RB0 | 1RB70 | 0.8150 | 30 |
| 59 | 1RB0 | 1RB80 | 0.8678 | 30 |
| 60 | 1RB0 | 1RB90 | 0.9207 | 30 |
| 61 | 1RB0 | 1RB100 | 0.9736 | 30 |
| 62 | 1RB0 | 1RB105 | 1.0000 | 30 |
| 63 | 1RB10 | 1RB0 | 0.3920 | 30 |
| 64 | 1RB20 | 1RB0 | 0.3391 | 30 |
| 65 | 1RB30 | 1RB0 | 0.2862 | 30 |
| 66 | 1RB40 | 1RB0 | 0.2334 | 30 |
| 67 | 1RB50 | 1RB0 | 0.1805 | 30 |
| 68 | 1RB60 | 1RB0 | 0.1276 | 30 |
| 69 | 1RB70 | 1RB0 | 0.0748 | 30 |
| 70 | 1RB77 | 1RB0 | 0.0377 | 30 |
| 20MHz + 20MHz | 71 | 1RB0 | - |  | 30 |
| 72 | 1RB51 | - |  | 30 |
| 73 | 1RB0 | 1RB0 | 0.5304 | 30 |
| 74 | 1RB0 | 1RB10 | 0.6243 | 30 |
| 75 | 1RB0 | 1RB20 | 0.7182 | 30 |
| 76 | 1RB0 | 1RB30 | 0.8122 | 30 |
| 77 | 1RB0 | 1RB40 | 0.9061 | 30 |
| 78 | 1RB0 | 1RB50 | 1.0 | 30 |
| 79 | 1RB10 | 1RB0 | 0.4365 | 30 |
| 80 | 1RB20 | 1RB0 | 0.3426 | 30 |
| 81 | 1RB30 | 1RB0 | 0.2486 | 30 |
| 82 | 1RB40 | 1RB0 | 0.1547 | 30 |
| 83 | 1RB50 | 1RB0 | 0.0608 | 30 |
| 10MHz + 30MHz | 84 | 1RB0 | - |  | 30 |
| 85 | 1RB23 | - |  | 30 |
| 86 | 1RB0 | 1RB0 | 0.2768 | 30 |
| 87 | 1RB0 | 1RB10 | 0.3707 | 30 |
| 88 | 1RB0 | 1RB20 | 0.4646 | 30 |
| 89 | 1RB0 | 1RB30 | 0.5586 | 30 |
| 90 | 1RB0 | 1RB40 | 0.6525 | 30 |
| 91 | 1RB0 | 1RB50 | 0.7464 | 30 |
| 92 | 1RB0 | 1RB60 | 0.8403 | 30 |
| 93 | 1RB0 | 1RB70 | 0.9343 | 30 |
| 94 | 1RB0 | 1RB77 | 1.0 | 30 |
| 95 | 1RB10 | 1RB0 | 0.1829 | 30 |
| 96 | 1RB20 | 1RB0 | 0.0890 | 30 |
| 97 | 1RB23 | 1RB0 | 0.0608 | 30 |

Here, the aggregated CA bandwidth is CA bandwidth class B which is composed of 2 CCs (CC1 + CC2). The ratio of NGap/(NRB1+NRB2+ NGBchannel\_CC1+ NGBchannel\_CC2) is considered.

* R = NGap/(NRB1+NRB2+ NGBchannel\_CC1+ NGBchannel\_CC2)
  + NGap is the gap RB amount from CC1 RBstart  to CC2 RBend for SL contiguous CA when a single PSFCH or contiguous and non-contiguous allocation simultaneous PSFCHs is transmitted in each CC.
  + NGBchannel\_CC1 and NGBchannel\_CC2 is the number of RB which corresponds to the minimum guardbands for CC1 and CC2, respectively, which have been calculated using the following equation:

NGBchannel = GBchannel / (SCS x 12)

GBchannel = (BWChannel - NRB x SCS x 12) / 2 - SCS/2,

where NRB are from Table 5.3.2-1 in TS38.101-1, and BWChannel is the channel bandwidth for each CC.

Figure 6.3.2.1.2.2-1 shows NGap, NRB1, NRB2, NGBchannel\_CC1, and NGBchannel\_CC2.



Figure 6.3.2.1.2.2-1: Parameters related to Ratio of R

Table 6.3.2.1.2.2-2 and Figure 6.3.2.1.2.2-2 show the PSFCH MPR simulation results.

Table 6.3.2.1.2.2-2: PSFCH MPR simulation results for SL Contiguous CA

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| '10MHz+10MHz' | Scenario # | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | #10 | #11 | #12 | #13 |  |  |  |  |  |
| R | - | - | 0.53 | 0.62 | 0.71 | 0.80 | 0.90 | 1.00 | 0.43 | 0.34 | 0.25 | 0.15 | 0.05 |  |  |  |  |  |
|  | 2.66 | 0.00 | 6.91 | 6.91 | 11.14 | 11.14 | 10.68 | 10.70 | 2.04 | 0.84 | 0.00 | 0.00 | 0.00 |  |  |  |  |  |
| '20MHz+30MHz' | Scenario # | #14 | #15 | #16 | #17 | #18 | #19 | #20 | #21 | #22 | #23 | #24 | #25 | #26 | #27 | #28 | #29 |  |  |
| R | - | - | 0.42 | 0.50 | 0.57 | 0.65 | 0.72 | 0.80 | 0.87 | 0.95 | 1.00 | 0.35 | 0.28 | 0.20 | 0.13 | 0.05 |  |  |
|  | 1.59 | 0.00 | 6.37 | 5.88 | 5.40 | 10.63 | 11.08 | 10.63 | 10.63 | 10.17 | 10.18 | 2.04 | 0.84 | 0.00 | 0.00 | 0.00 |  |  |
| '20MHz+40MHz' | Scenario # | #30 | #31 | #32 | #33 | #34 | #35 | #36 | #37 | #38 | #39 |  |  |  |  |  |  |  |  |
| R | - | - | 0.35 | 0.41 | 0.47 | 0.54 | 0.60 | 0.66 | 0.72 | 0.78 |  |  |  |  |  |  |  |  |
|  | 2.58 | 0.00 | 1.68 | 6.39 | 5.90 | 5.90 | 11.10 | 10.64 | 10.18 | 9.71 |  |  |  |  |  |  |  |  |
| Scenario # | #40 | #41 | #42 | #43 | #44 | #45 | #46 | #47 | #48 |  |  |  |  |  |  |  |  |  |
| R | 0.85 | 0.91 | 0.97 | 1.00 | 0.29 | 0.23 | 0.17 | 0.10 | 0.04 |  |  |  |  |  |  |  |  |  |
|  | 10.64 | 11.10 | 10.64 | 10.65 | 1.22 | 0.84 | 0.00 | 0.00 | 0.00 |  |  |  |  |  |  |  |  |  |
| '30MHz+40MHz' | Scenario # | #49 | #50 | #51 | #52 | #53 | #54 | #55 | #56 | #57 | #58 | #59 |  |  |  |  |  |
| R | - | - | 0.44 | 0.50 | 0.55 | 0.60 | 0.66 | 0.71 | 0.76 | 0.82 | 0.87 |  |  |  |  |  |
|  | 3.15 | 0.00 | 5.45 | 6.42 | 5.94 | 11.14 | 10.68 | 9.75 | 10.68 | 10.68 | 11.14 |  |  |  |  |  |
| Scenario # | #60 | #61 | #62 | #63 | #64 | #65 | #66 | #67 | #68 | #69 | #70 |  |  |  |  |  |
| R | 0.92 | 0.97 | 1.00 | 0.39 | 0.34 | 0.29 | 0.23 | 0.18 | 0.13 | 0.07 | 0.04 |  |  |  |  |  |
|  | 10.68 | 10.22 | 11.16 | 2.04 | 2.04 | 1.21 | 1.21 | 0.00 | 0.00 | 0.00 | 0.00 |  |  |  |  |  |
| '20MHz+20MHz' | Scenario # | #71 | #72 | #73 | #74 | #75 | #76 | #77 | #78 | #79 | #80 | #81 | #82 | #83 |  |  |  |  |  |
| R | - | - | 0.53 | 0.62 | 0.72 | 0.81 | 0.91 | 1.00 | 0.44 | 0.34 | 0.25 | 0.15 | 0.06 |  |  |  |  |  |
|  | 2.66 | 0.00 | 6.43 | 10.68 | 10.68 | 11.14 | 10.68 | 10.70 | 2.48 | 0.84 | 0.00 | 0.00 | 0.00 |  |  |  |  |  |
| '10MHz+30MHz' | Scenario # | #84 | #85 | #86 | #87 | #88 | #89 | #90 | #91 | #92 | #93 | #94 | #95 | #96 | #97 |  |  |  |  |
| R | - | - | 0.28 | 0.37 | 0.46 | 0.56 | 0.65 | 0.75 | 0.84 | 0.93 | 1.00 | 0.18 | 0.09 | 0.06 |  |  |  |  |
|  | 2.66 | 0.00 | 1.31 | 2.14 | 5.45 | 5.45 | 10.22 | 11.14 | 10.68 | 10.22 | 10.70 | 0.84 | 0.00 | 0.00 |  |  |  |  |

Table 6.3.2.1.2.2-3 shows the maximum value of simulation results for SL Contiguous CA considering the ratio of R.

R = NGap/(NRB1+NRB2+ NGBchannel\_CC1+ NGBchannel\_CC2)

Table 6.3.2.1.2.2-3 : PSFCH MPR simulation results for SL Contiguous CA

|  |  |  |
| --- | --- | --- |
| MPR for ratio (R) in bandwidth class B(dB) | | |
| R ≤ 0. 33 | 0.33 < R ≤ 0. 55 | 0.55 < R ≤ 1.0 |
| 1.31 | 6.91 | 11.16 |

The MPR can be proposed as Table 6.3.2.1.2.2-4 based on the simulation results when considering implementation margin.

Table 6.3.2.1.2.2-4 PSFCH MPR simulation results for SL Contiguous CA

|  |  |  |
| --- | --- | --- |
| MPR for ratio (R) in bandwidth class B(dB) | | |
| R ≤ 0. 33 | 0.33 < R ≤ 0. 55 | 0.55 < R ≤ 1.0 |
| 3.5 | 9.0 | 13.0 |
| Here, R = NGap/(NRB1+NRB2+ NGBchannel\_CC1+ NGBchannel\_CC2) | | |

##### 6.3.2.1.3 MPR for S-SSB transmission

When single S-SSB is transmitted on intra-band contiguous carriers, required MPR for single cell V2X in Table 6.2E.2.2-2 is reused. For two S-SSB transmissions on intra-band contiguous carriers, the required MPR are specified as follow.

**Table 6.3.2.1.3-1: MPR for two S-SSB transmissions on intra-band contiguous carriers for power class 3**

|  |  |  |
| --- | --- | --- |
| MPR for bandwidth class B(dB) | | |
| Inner | Outer1 | Outer2 |
| 3.5 | 9.0 | 13.0 |

6.3.2.1.3.1 LGE’s simulation results (R4-2315532)

The following simulation scenarios are considered as Table 6.3.2.1.3.1-1 for SL contiguous CA.

Table 6.3.2.1.3.1-1: SL contiguous CA MPR test scenarios

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Aggregated CBW | Scenario | CC1 | CC2 | Inner/Outer1/Outer2 RB allocation | SCS |
| 10MHz + 10MHz | 1 | 11RB0 | 11RB41 | Outer2 | 15 |
| 2 | 11RB18 | 11RB22 | Outer2 | 15 |
| 3 | 11RB20 | 11RB22 | Outer1 | 15 |
| 4 | 11RB33 | 11RB17 | Outer1 | 15 |
| 5 | 11RB35 | 11RB7 | Inner | 15 |
| 6 | 11RB41 | 11RB0 | Inner | 15 |
| 20MHz + 30MHz | 7 | 11RB0 | 11RB67 | Outer2 | 30 |
| 8 | 11RB15 | 11RB32 | Outer2 | 30 |
| 9 | 11RB15 | 11RB30 | Outer1 | 30 |
| 10 | 11RB33 | 11RB7 | Outer1 | 30 |
| 11 | 11RB34 | 11RB7 | Inner | 30 |
| 12 | 11RB40 | 11RB0 | Inner | 30 |
| 20MHz + 40MHz | 13 | 11RB0 | 11RB95 | Outer2 | 30 |
| 14 | 11RB4 | 11RB30 | Outer2 | 30 |
| 15 | 11RB15 | 11RB30 | Outer1 | 30 |
| 16 | 11RB33 | 11RB7 | Outer1 | 30 |
| 17 | 11RB34 | 11RB7 | Inner | 30 |
| 18 | 11RB40 | 11RB0 | Inner | 30 |
| 30MHz + 40MHz | 19 | 11RB0 | 11RB95 | Outer2 | 30 |
| 20 | 11RB4 | 11RB30 | Outer2 | 30 |
| 21 | 11RB15 | 11RB30 | Outer1 | 30 |
| 22 | 11RB47 | 11RB7 | Outer1 | 30 |
| 23 | 11RB48 | 11RB7 | Inner | 30 |
| 24 | 11RB67 | 11RB0 | Inner | 30 |
| 20MHz + 20MHz | 25 | 11RB0 | 11RB40 | Outer2 | 30 |
| 26 | 11RB4 | 11RB30 | Outer2 | 30 |
| 27 | 11RB28 | 11RB7 | Outer1 | 30 |
| 28 | 11RB33 | 11RB7 | Outer1 | 30 |
| 29 | 11RB34 | 11RB0 | Inner | 30 |
| 30 | 11RB40 | 11RB0 | Inner | 30 |
| 10MHz + 30MHz | 31 | 11RB0 | 11RB67 | Outer2 | 30 |
| 32 | 11RB7 | 11RB32 | Outer2 | 30 |
| 33 | 11RB7 | 11RB31 | Outer1 | 30 |
| 34 | 11RB13 | 11RB1 | Outer1 | 30 |
| 35 | 11RB13 | 11RB0 | Inner | 30 |

Table 6.3.2.1.3.1-2 and Figure 6.3.2.1.3.1-1 show the S-SSB MPR simulation results.

Table 6.3.2.1.3.1-2: S-SSB MPR simulation results for SL Contiguous CA

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| '10MHz+10MHz' | Scenario # | #1 | #2 | #3 | #4 | #5 | #6 |
|  | 10.21 | 6.30 | 6.20 | 1.25 | 1.08 | 1.50 |
| '20MHz+30MHz' | Scenario # | #7 | #8 | #9 | #10 | #11 | #12 |
|  | 8.20 | 4.52 | 4.38 | 1.14 | 1.09 | 1.46 |
| '20MHz+40MHz' | Scenario # | #13 | #14 | #15 | #16 | #17 | #18 |
|  | 8.08 | 4.50 | 4.62 | 1.23 | 1.06 | 1.25 |
| '30MHz+40MHz' | Scenario # | #19 | #20 | #21 | #22 | #23 | #24 |
|  | 8.06 | 7.84 | 4.19 | 1.07 | 1.10 | 1.70 |
| '20MHz+20MHz' | Scenario # | #25 | #26 | #27 | #28 | #29 | #30 |
|  | 8.20 | 8.04 | 4.40 | 1.25 | 1.15 | 1.51 |
| '10MHz+30MHz' | Scenario # | #31 | #32 | #33 | #34 | #35 |  |
|  | 8.20 | 4.24 | 4.50 | 1.55 | 1.52 |  |

Figure 6.3.2.1.3.1-1: S-SSB MPR simulation results for SL Contiguous CA

Table 6.3.2.1.3.1-3 shows the maximum value of simulation results for SL Contiguous CA considering Inner, Outer1, and Outer 2 RB allocation ranges.

Table 6.3.2.1.3.1-3: S-SSB MPR simulation results for SL Contiguous CA

|  |  |  |
| --- | --- | --- |
| MPR for bandwidth class B(dB) | | |
| Inner | Outer1 | Outer2 |
| 1.70 | 6.20 | 10.21 |

The MPR can be proposed as Table 6.3.2.1.3.1-4 based on the simulation results when considering implementation margin.

Table 6.3.2.1.3.1-4 S-SSB MPR simulation results for SL Contiguous CA

|  |  |  |
| --- | --- | --- |
| MPR for bandwidth class B(dB) | | |
| Inner | Outer1 | Outer2 |
| 3.5 | 9.0 | 13.0 |

### 6.3.3 UE additional maximum output power reduction for NR SL CA operation

For the additional emission limits in Europe in ITS spectrum, RAN4 already defined the regulatory requirements in TS38.101-1. The ETSI regulation shall be considered to derive the A-MPR requirements for NR SL CA UE. For the US related regulatory requirements will be studied after final FCC announcement for the additional emission limits in US.

To derive A-MPR requirements for SL CA operation in ITS spectrum, RAN4 will assume the basic simulation parameters and assumptions in section 6.3.2 and the additional spectrum emission mask in Table 6.5E.2.3.1-1 and additional spurious emission requirements in Table 6.5E.3.4.2-1 and Table 6.5E.3.4.2-2 in TS38.101-1 will be considered when NS\_33 is configured from the pre-configured radio parameters in the geometrical region or indicated in the cell.

6.3.3.1 A-MPR for NR SL CA operation

##### 6.3.3.1.1 A-MPR for Intra-band contiguous SL CA operation

##### 6.3.3.1.2 LGE’s A-MPR simulation results for SLCA\_NS\_52

**Table 6.3.3.1.2-0: SLCA\_NS\_52’ for SL intra-band C-CA A-MPR**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sidelink CA operating band | Value of additionalSpectrumEmission | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| SL\_n47 | SLCA\_NS\_01 |  | SLCA\_NS\_52 |  |  |  |  |  |
| NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 | | | | | | | | |

For SL intra-band contiguous CA of PSCCH and PSSCH simultaneous transmission with contiguous RB allocation, the allowed A-MPR for the maximum output power are specified in Table 6.3.3.1.2-1.

**Table 6.3.3.1.2-1: A-MPR for power class 3 SL CA with contiguous RB allocation**

|  |  |  |  |
| --- | --- | --- | --- |
| Modulation | | A-MPR for bandwidth class B(dB) | |
|  | | inner | outer |
| CP-OFDM | QPSK | ≤ 7.0 | ≤ 8.5 |
|  | 16QAM | ≤ 7.0 | ≤ 8.5 |
|  | 64QAM | ≤ 7.0 | ≤ 8.5 |
|  | 256QAM | ≤ 7.0 | ≤ 8.5 |

The contiguous allocation rule of inner and outer for SL intra-band contiguous CA refers to that for NR intra-band contiguous CA in 6.2A.2.1 in TS38.101-1.

For SL intra-band contiguous CA of PSCCH and PSSCH simultaneous transmission with non-contiguous RB allocation, the allowed A-MPR for the maximum output power are specified in Table 6.3.3.1.2-2.

**Table 6.3.3.1.2-2: A-MPR for power class 3 SL CA with non-contiguous RB allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Modulation | | MPR for bandwidth class B(dB) | | |
|  | | Inner | Outer1 | Outer2 |
| CP-OFDM | QPSK | ≤ 3.0 | ≤ 8.0 | ≤ 13.5 |
|  | 16QAM | ≤ 3.0 | ≤ 8.0 | ≤ 13.5 |
|  | 64QAM | ≤ 4.5 | ≤ 8.0 | ≤ 13.5 |
|  | 256QAM | ≤ 7.0 | ≤ 8.0 | ≤ 13.5 |

The non-contiguous allocation rule of inner, outer1, and outer2 for SL intra-band contiguous CA refers to that for NR intra-band contiguous CA in 6.2A.2.1 in TS38.101-1.

For SL intra-band contiguous CA of PSFCH transmission, the allowed A-MPR for the maximum output power are specified in Table 6.3.3.1.2-3.

**Table 6.3.3.1.2-3: A-MPR for PSFCH transmission for power class 3 SL CA**

|  |  |  |
| --- | --- | --- |
| MPR for ratio (R) in bandwidth class B(dB) | | |
| R ≤0. 1 | 0.1 < R ≤ 0. 55 | 0.55 < R ≤ 1.0 |
| ≤4.0 | ≤17.0 | ≤19.0 |

In Table 6.3.3.1.2-3, R is defined in 6.3.2.1.2.

For SL intra-band contiguous CA of S-SSB transmission, the allowed A-MPR for the maximum output power are specified in Table 6.3.3.1.2-4.

**Table 6.3.3.1.2-4: A-MPR for S-SSB transmission for power class 3 SL CA**

|  |  |  |
| --- | --- | --- |
| MPR for bandwidth class B(dB) | | |
| Inner | Outer1 | Outer2 |
| ≤ 9.0 | ≤ 13.0 | ≤ 16.5 |

The non-contiguous allocation rule of inner, outer1, and outer2 for SL intra-band contiguous CA refers to that for NR intra-band contiguous CA in 6.2A.2.1 in TS38.101-1.

### 6.3.4 Configured transmitted power for NR SL CA operation

For intra-band contiguous SL CA operation, MPR*c* = MPR and A-MPR*c* = A-MPR with MPR and A-MPR specified in subclause 6.3.2 and subclause 6.3.4 respectively. There is one power management term for the UE, denoted P-MPR, and P-MPR*c* = P-MPR. PCMAX,*c* is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

The total configured maximum output power PCMAX shall be set within the following bounds:

PCMAX\_L ≤ PCMAX,  ≤ PCMAX\_H

For SL transmission of intra-band contiguous CA when same slot pattern is used in all aggregated component carriers.

PCMAX\_L = MIN{10 log10 ∑ pEMAX,C - TC, PPowerClass, SL\_CA – MAX(MAX(MPR, A-MPR) + ΔTIB,c+TC, P-MPR), PRegulatory, PEMAX, CA}

PCMAX\_H = MIN{10 log10 ∑ pEMAX,C , PPowerClass, SL\_CA, PRegulatory, PEMAX, CA }

where

- For the total transmitted power PCMAX,PSSCH/PSCCH, PEMAX,CA is the value given by [the sum of IE *sl-maxTransPower* from each CC or new IE for maximum transmitted power of SL CA], defined by TS 38.331;

- PPowerClass, SL\_CA is the maximum UE power specified in Table 6.3.1-1 without taking into account the tolerance;

- MPR and A-MPR are specified in subclause 6.3.2 and subclause 6.3.3 respectively;

- TIB,c and P-MPR are specified in clause 6.2.4 in TS38.101-1;

- TC is the highest value TC,c among all component carriers *c* in the subframe over both timeslots. TC,c = 1.5 dB when NOTE 3 in Table 6.2.1-1 in TS38.101-1 applies, otherwise TC,c = 0 dB;

- PRegulatory= 10 - Gpost connector dBm when V2X UE is within the protected zone in ETSI TS 102 792 of CEN DSRC tolling system and operating in Band n47; PRegulatory= 33 - Gpost connector dBm otherwise.

The maximum output power P*CMAX,PSSCH* and P*CMAX,PSCCH* are derived from PCMAX,c based on 0dB PSD offset between PSSCH and PSCCH.

For intra-band SL CA operation, when at least one different numerology/slot pattern is used in aggregated cells, the same requirement as specified in clause 6.2E.4.3 in TS38.101-1 shall be applied.

The measured configured maximum output power PUMAX,*c* for sidelink CA operation, when at least one slot has a different transmission numerology or slot pattern, the same requirement as specified in clause 6.2E.4.3 in TS38.101-1 shall be applied.

### 6.3.5 Minimum output power for NR SL CA operation

For SL intra-band contiguous CA, the minimum output power requirement as specified in table 6.3.5-1 shall be applied per component carrier.

Table 6.3.5-1: Minimum output power

|  |  |  |
| --- | --- | --- |
| Channel bandwidth  (MHz) | Minimum output power  (dBm) | Measurement bandwidth  (MHz) |
| 10 | -30 | MBW=REF\_SCS\*(12\*NRB+1)/1000 |
| 20 | -30 |
| 30 | -28.2 |
| 40 | -27 |

### 6.3.6 Transmit OFF power for NR SL CA operation

For SL intra-band contiguous CA, the transmit OFF power requirement as specified in Table 6.3.6-1 shall be applied per component carrier.

Table 6.3.6-1: Transmit OFF power

|  |  |  |
| --- | --- | --- |
| Channel bandwidth  (MHz) | Transmit OFF power  (dBm) | Measurement bandwidth  (MHz) |
| 10 | -50 | MBW=REF\_SCS\*(12\*NRB+1)/1000 |
| 20 | -50 |
| 30 | -50 |
| 40 | -50 |

### 6.3.7 ON/OFF time mask for NR SL CA operation

For SL intra-band contiguous CA, the SL ON/OFF time masks specified in clause 6.3E.3.2, 6.3E.3.3 and 6.3E.3.4 in TS38.101-1 are applicable for each component carrier during the ON power period and the transient periods. The OFF period shall only be applicable for each component carrier when all the component carriers are OFF.

Additionally, RAN4 can define the switching ON/OFF time mask between NR SL CA and NR SL single carrier operation as like fallback mode. In the case, the ON/OFF time mask in figure 6.3E.3.4-2 in TS38.101-1 for different carriers can be reused.

### 6.3.8 Power control for NR SL CA operation

For SL intra-band contiguous CA, the power control requirement as specified in clause 6.3E.4.2 in TS38.101-1 shall be applied per component carrier.

### 6.3.9 Transmit signal quality for NR SL CA operation

#### 6.3.9.1 Frequency Error

For SL intra-band contiguous CA, ±0.1 PPM observed over a period of 1 ms will be applied per CC compared to the absolute frequency in case of using GNSS synchronization source. The same requirements will be applied to all SL synchronous reference sources (the gNB or V2X synchronization reference UE).

#### 6.3.9.2 EVM

For SL intra-band contiguous CA, the EVM requirement as specified in clause 6.4E.2.2 in TS38.101-1 shall be applied per component carrier.

#### 6.3.9.3 Carrier Leakage

For SL intra-band contiguous CA, the carrier leakage requirement as specified in clause 6.4E.2.3 in TS38.101-1 shall be applied per component carrier when only one SL transimssion carrier is activated in a time.

#### 6.3.9.4 In-band Emission

For SL intra-band contiguous CA, the In-band emission requirement as specified in clause 6.4E.2.4 in TS38.101-1 shall be applied to the SL aggregated transmission bandwidth. This is same as NR intra-band CA UE.

### 6.3.10 Spectrum emission mask for NR SL CA operation

#### 6.3.10.1 Occupied Bandwidth

For SL intra-band contiguous CA, the occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated power of the aggregated CBW. The occupied bandwidth shall be less than the aggregated channel bandwidth.

#### 6.3.10.2 SEM

For SL intra-band contiguous CA, the SEM requirement for NR intra-band contiguous CA as specified in clause 6.5A.2.2.1 in TS38.101-1 shall be applied to the aggregated channel bandwidth with SL CA bandwidth class B.

#### 6.3.10.3 A-SEM

For SL intra-band contiguous CA, RAN4 does not need to consider the A-SEM in Europe since the A-SEM in Table 6.5E.2.3.1-1 in TS38.101-1 is only applied for the 10MHz CBW in Europe.

For the US region, RAN4 can reuse NS\_52, the details can be further discussed with the final A-SEM or A-SE requirements from FCC.

### 6.3.11 ACLR requirements for NR SL CA operation

For SL intra-band contiguous CA, the general NR CA ACLR requirements for CA Bandwidth Class B specified in subclause 6.5A.2.4.1.1 in TS38.101-1shall be applied to the aggregated channel bandwidth with SL CA bandwidth class B.

### 6.3.12 Spurious emissions for NR SL CA operation

For SL intra-band contiguous CA, the general NR CA general SE for CA Bandwidth specified in subclause 6.5A.3.1 in TS38.101-1 shall be applied to the aggregated channel bandwidth with SL CA bandwidth class B.

### 6.3.13 Spurious emission band UE co-existence for NR SL CA operation

For SL intra-band contiguous CA, the protection operating band lists for n47 transmission was defined in Table 6.5.3.2-1 in TS38.101-1which shall be applied to NR SL intra-band contiguous CA UE.

Table 6.3.13-1: Requirements for spurious emissions for UE co-existence

| NR Band | Spurious emission for UE co-existence | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n47B | E-UTRA Band 1, 3, 5, 7, 8, 22, 26, 28, 34, 39, 40, 41, 42, 44, 45, 65, 68, 72, 73 | FDL\_low | - | FDL\_high | -50 | 1 |  |
|  | NR Band n71, n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |

Also, RAN4 already defined the additional SE requirements as specified in clause 6.5E.3.4 in TS38.101-1 by the European Regulation which shall be considered to derive the A-MPR requirements with NS\_33 as follows.

Table 6.3.13-2: Additional requirements for "NS\_33"

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Protected band | | Frequency range (MHz) | | | Maximum Level (EIRP2) | MBW (MHz) | NOTE |
| Frequency range | 5925 | | - | 5950 | -30 | 1 | 1 |
| Frequency range | 5815 | | - | 5855 | -30 | 1 | 3 |
| NOTE 1: In the frequency range x-5950MHz, SE requirement of -30dBm/MHz should be applied; where x = max (5925, fc + 15), where fc is the channel centre frequency.  NOTE 2: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain Gpost connector declared by the UE following the principle described in annex I in [11].  NOTE 3: Resolution BW is 10% of the measurement BW and the result should be integrated to achieve the measurement bandwidth. The sweep time shall be set larger than (symbol length)\*(number of points in sweep) to improve the measurement accuracy. | | | | | | | |

Furthermore, when "NS\_33" is configured from pre-configured radio parameters or the cell, and the indication from upper layers has indicated that the UE is within the protection zone of CEN DSRC devices or HDR DSRC devices, the power of any NR V2X UE emission shall fulfil either one of the two sets of conditions.

Table 6.3.13-3: Requirements for spurious emissions to protect CEN DSRC for V2X UE

|  |  |  |
| --- | --- | --- |
|  | Maximum Transmission Power (dBm EIRP1) | Emission Limit in Frequency Range 5795-5815 (dBm/MHz EIRP1) |
| Condition 1 | 10 | -65 |
| Condition 2 | 10 | -45 |
| NOTE 1: The EIRP requirement is converted to conducted requirement depend on the supported post antenna connector gain Gpost connector declared by the UE following the principle described in annex I in [11]. | | |

### 6.3.14 Transmit intermodulation for NR SL CA operation

For SL intra-band contiguous CA, the general NR CA Transmit Intermodulation requirements for CA Bandwidth Class B specified in clause 6.5A.4.2.1 in TS38.101-1 shall be applied to the aggregated channel bandwidth with SL CA bandwidth class B.

# 7 Receiver characteristics for NR SL evolution

## 7.1 Rx requirements for NR SL single carrier operation in unlicensed bands

### 7.1.1 Reference sensitivity power level for NR SL-U

Background information for NR V2X reference sensitivity requirement has been captured in the TR 38.886 as captured below and can be reused for NR SL-U

The reference sensitivity power level REFSENS is the minimum mean power applied to the UE antenna connector at which the throughput shall meet or exceed 95% of the maximum throughput of the reference measurement channels.

The V2X UE REFSENS is defined by the following equation:

REFSENSV2X=*kTB* + SNRV2X +10log10(LCRB\*SCS\*12/RX\_BW) +( NFV2X+ IM) – Diversity gain

Where

*- kTB:* Thermal noise level is [-174dBm(kT) + 10\*log10(RX BW)]dBm.

*-* NF: Noise figure. 13 dB is used for LAA and can be reused for NR V2X requirements. Assumed NF is 9dB < 3GHz, NF is 10dB>= 3GHz (e.g B42, n77, n78, n79…) at licensed bands at FR1.

*-* IM: 2.5 dB is assumed. When the number of RB size equal to or less than 24RBs, 0.5dB additional relaxation is allowed.

- Target SNR: -0.5 dB

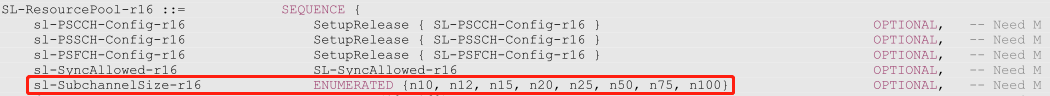
- Diversity gain: 3dB

For NR-U, the following equations in table below are used to calculate the REFSENS requirement and it can be further re-used in NR SL-U in bands n46, n96 and n102, while taking account that for NR-U target SNR of -1dB was used and therefore the REFSENS values in table below are 0.5dB higher than with NR SL-U target SNR of 0.5dB.

Table 7.1.1-1 REFSENS for NR-U

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS | | | | |
| Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm) | Duplex Mode |
| n46 | 15 | 20, 40 | -89.7 + 10log10(NRB/106) | HD |
| 30 | 20, 40, 60, 80, 100 | -89.9 + 10log10(NRB/51) |
| 60 | 20, 40, 60, 80, 100 | -90.1 + 10log10(NRB/24) |
| n96, n102 | 15 | 20, 40 | -89.2 + 10log10(NRB/106) | HD |
| 30 | 20, 40, 60, 80, 100 | -89.4 + 10log10(NRB/51) |
| 60 | 20, 40, 60, 80, 100 | -89.6 + 10log10(NRB/24) |
| NOTE 1: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the RB configuration for SL-U REFSENS as shown in table 7.1.1-1. | | | | |

For the NR-U REFESENS requirement, the RB configuration for larger than 20MHz is considered as wideband operation and hence all intra-cell guard bands between sub-bands should be filled. In this case, the full RB allocation of NR is used to define the reference sensitivity requirement. However, for V2X, specific RB allocation using the sub-channels based on the RAN2 specification TS 38.331 is used as captured below:



Following the TS 38.331 definitions Table 7.1.1-2 shows the RB configuration for NR SL-U reference sensitivity requirement.

Table 7.1.1-2 NR SL-U RB configurations for REFSENS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | NR band / SCS / Channel bandwidth / Duplex mode | | | | | |
| NR SL-U Band | SCS kHz | 20MHz | 40MHz | 60MHz | 80MHz | 100MHz | Duplex Mode |
| n46 | 15 | 105 | 216 |  |  |  | HD |
| 30 | 50 | 105 | 160 | 216 | 270 |
| 60 | 24 | 50 | 75 | 105 | 135 |
| n96 | 15 | 105 | 216 |  |  |  | HD |
| 30 | 50 | 105 | 160 | 216 | 270 |
| 60 | 24 | 50 | 75 | 105 | 135 |
| n102 | 15 | 105 | 216 |  |  |  | HD |
| 30 | 50 | 105 | 160 | 216 | 270 |
| 60 | 24 | 50 | 75 | 105 | 135 |

With the agreed SNR and RB configuration as above, the REFNSENS requirement for NR SL-U is shown in Table 7.1.1-3.

Table 7.1.1-3 REFSENS for SL-U

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Operating band / SCS / Channel bandwidth / REFSENS | | | | |
| Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm) | Duplex Mode |
| n46 | 15 | 20, 40 | -89.2 + 10log10(NRB/105) | HD |
| 30 | 20, 40, 60, 80, 100 | -89.4 + 10log10(NRB/50) |
| 60 | 20, 40, 60, 80, 100 | -89.6 + 10log10(NRB/24) |
| n96, n102 | 15 | 20, 40 | -88.7 + 10log10(NRB/105) | HD |
| 30 | 20, 40, 60, 80, 100 | -88.9 + 10log10(NRB/50) |
| 60 | 20, 40, 60, 80, 100 | -89.1 + 10log10(NRB/24) |
| NOTE 1: The REFSENS value is rounded to the nearest number down to one decimal point. “NRB” in REFSENS formula is the RB configuration for NR SL-U REFSENS as shown in table 7.1.1-2 | | | | |

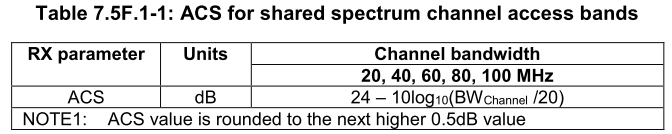
### 7.1.2 Maximum input level for NR SL-U

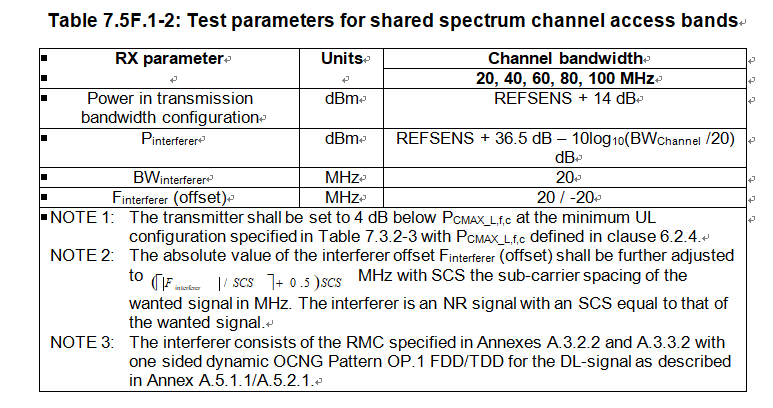
The Maximum input level for NR-U is defined in clause 7.4 of TS 38.101-1. For NR V2X, Maximum input level is defined in clause 7.4E.1. The NRV2X Sidelink requirement only covers up to 40MHz and the minimum requirement is the same as NR-U.

It has been agreed to reuse the NRU Maximum input level requirements in TS 38.101-1 clause 7.4 for NR SL-U.

### 7.1.3 Adjacent Channel Selectivity for NR SL-U

For the ACS requirement, the ACS for NR-U was defined for bands above 3.3GHz considering the unlicensed bands of n46, n96, n102 are all high bands. However, the requirement format is different from NR single CC which can be found below, i.e. the ACS is adjusted according to the CBW while the NR single CC is fixed as 33dB for bands above 3.3GHz. The ACS requirement has been extensively discussed in NR-U WI with various views considering the difference of ACLR, ACIR impacts, and comparison with WIFI system, and coexistence with LAA, and the final value is a compromised outcome.





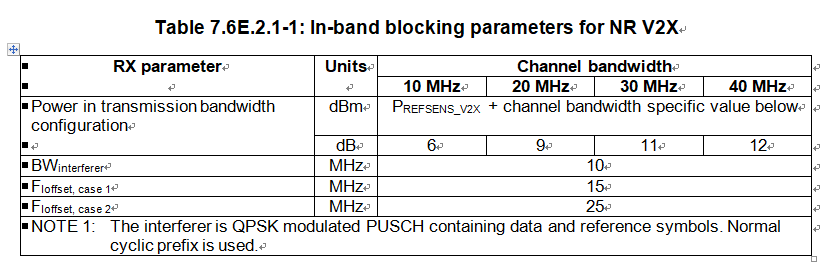
ACS Requirement for NR-U

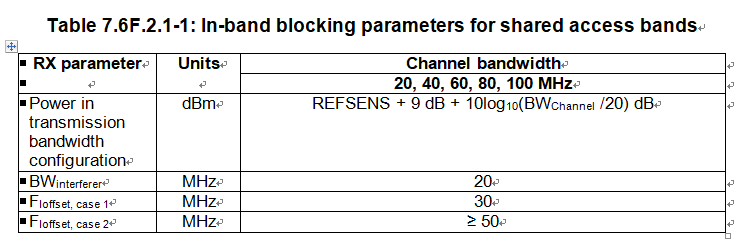
Furthermore, for NR normal requirement, there are two test cases for ACS as case 1 and case 2. During the NR-U discussion, the case 2 was considered not necessary for operation in unlicensed bands. It has been agreed to reuse NR-U ACS requirement for NR SL-U using the NR SL-U RMC, as discussed in general part.

### 7.1.4 Blocking characteristics for NR SL-U

7.1.4.1 In Band Blocking

The in band blocking requirement for NR V2X is captured in clause 7.6E.2.1 and for NR-U it is captured in clause 7.F.2.1. The transmission power is the same for 20 and 40MHz and the difference is the bandwidth of interferer. The 10MHz as smallest CBW for NR V2X is used as BWinterferer and corresponding offset frequency is decided. In NR SL-U, 10MHz is not supported and 20MHz is supported as the smallest CBW for single CC.

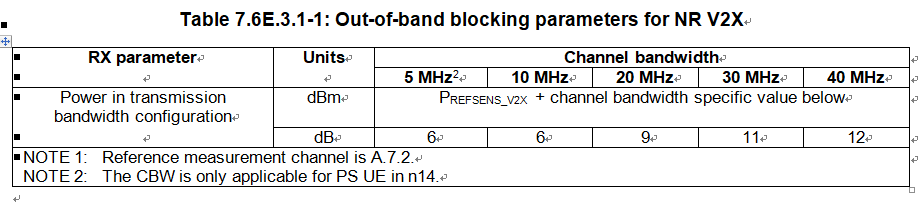


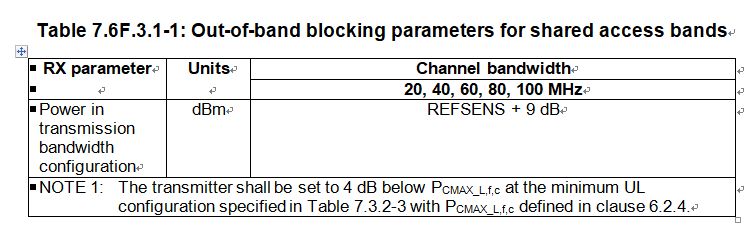


In this case, the NR-U IBB can be reused for NR SL-U.

7.1.4.2 Out of Band Blocking

The NR sidelink OBB requirement is reused from LTE sidelink and hence different power level for the transmission power based on different bandwidth. For NR-U OBB requirement, it is based on the NR normal requirement since there is no Wi-Fi corresponding requirement. Further modification has applied for range 3 considering the shallower frequency response of the band filter at high frequencies. In this case, the NR-U requirement can be reused for NR SL-U.





7.1.4.3 Narrow Band Blocking

Narrow band blocking was introduced in NR single CC to mimic the potential interference coming from narrow band systems, but such system is not existing in the targeting unlicensed spectrum and therefore the Narrow Band Blocking requirements are not defined for NR-U.

It has been agreed not to define Narrow Band Blocking requirements for NR SL-U.

### 7.1.5 Spurious response for NR SL-U

The NR sidelink spurious response requirement is reused from LTE sidelink and hence different power level for the transmission power based on different bandwidth is used.For NR SL-U operation in unlicensed bands, the NR-U requirement can be reused.

### 7.1.6 Intermodulation characteristics for NR SL-U

The NR sidelink Intermodulation requirement is reused from LTE sidelink and hence different power level for the transmission power based on different bandwidth is used.For NR SL-U operation in unlicensed bands, the NR-U requirement can be reused.

## 7.2 Rx requirements for inter-band con-current operation

### 7.2.1 Reference sensitivity power level for inter-band con-current operation

It has been agreed to

* + reuse the existing CA\_n46-n78 MSD requirements of the power class 5 in the aggressor band n46 for MSD of the inter-band concurrent operation.
  + reuse the existing delta Rib of CA\_n46-n78 for inter-band concurrent operation in Rel-18

### 7.2.2 Maximum input level for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 7.2.3 Adjacent Channel Selectivity for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 7.2.4 Blocking characteristics for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 7.2.5 Spurious response for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

### 7.2.6 Intermodulation characteristics for inter-band con-current operation

It has been agreed to reuse NR uu and SL-U requirements for each band if an issue is not identified.

## 7.3 Rx requirements for NR SL CA operation

### 7.3.1 Reference sensitivity power level for NR SL CA operation

For intra-band contiguous CA operation, the reference sensitivity requirement specified in Table 7.3E.2-1 in TS38.101-1shall apply for each component carrier with all carriers active. The requirement is applied for each carrier reception when 2 carrier transmissions are activated at the same time.

### 7.3.2 Maximum input level for NR SL CA operation

For the RX RF requirements of NR SL CA UE, the following maximum input level requirements shall be applied to the SL CA bandwidth class B.

**Table 7.3.2-1 Maximum input levels for NR SL CA UE**

|  |  |  |  |
| --- | --- | --- | --- |
| Rx Parameter | Units | SL CA Bandwidth Class | |
| A | B |
| Power in largest Transmission Bandwidth Configuration CC | dBm |  | -25 + 10log10(BWChannel /20)Note 1 |
|  | -27 + 10log10(BWChannel /20)Note 2 |
| NOTE 1: Reference measurement channel is A.7.2.x for 64 QAM.  NOTE 2: Reference measurement channel is A.7.2.x for 256 QAM.  NOTE 3: 10log10(x) is rounded to the nearest 0.5dB | | | |

### 7.3.3 Adjacent Channel Selectivity for NR SL CA operation

In NR V2X UE, RAN4 follows the NR ACS requirements < 2700MHz for single carrier in n47 since to align with LTE V2X UE requirements. So RAN4 can reuse the principle as follows.

For intra-band contiguous SL CA operation, the UE shall fulfil the minimum requirement specified in Table 7.3.3-1 to Table 7.3.3-3 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 in TS38.101-1.

**Table 7.3.3-1 ACS for NR SL CA UE**

|  |  |  |
| --- | --- | --- |
|  |  | SL CA bandwidth class |
| Rx Parameter | Units | B |
| ACS | dB | 20.0 |

**Table 7.3.3-2 Test parameters for intra-band contiguous SL CA UE, case 1**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | SL CA bandwidth class |
|  |  | B |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | PREFSENS\_SL + 14 dB |
| PInterferer | dBm | Aggregated power + 18.5 dB |
| BWInterferer | MHz | 10 |
| FInterferer (offset) | MHz | 5+Aggreagted BWChannel/2  /  -(5+Aggregated BWChannel/2) |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.  NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS. | | |

**Table 7.3.3-3 Test parameters for intra-band contiguous SL CA UE, case 2**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | SL CA Bandwidth Class |
|  |  | B |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | -43.5 + 10log(NRB,c/NRB\_agg) |
| PInterferer | dBm | -25 |
| BWInterferer | MHz | 10 |
| FInterferer (offset) | MHz | 5+Aggreagted BWChannel/2  /  -(5+Aggregated BWChannel/2) |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used.  NOTE 2: The absolute value of the interferer offset Finterferer (offset) shall be further adjusted to MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interferer is an NR signal with 15 kHz SCS. | | |

### 7.3.4 Blocking characteristics for NR SL CA operation

#### 7.3.4.1 In-band blocking

For intra-band contiguous SL CA operation, the UE shall fulfil the minimum requirement specified in Table 7.3.4.1-1 to Table 7.3.4.1-2 where the throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 in TS38.101-1.

**Table 7.3.4.1-1 In-band blocking parameters for intra-band contiguous SL CA UE**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | SL CA bandwidth class |
|  |  | B |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | PREFSENS\_SL + NR SL CA bandwidth class specific value below |
|  | dB | 16.0 |
| BWInterferer | MHz | 10 |
| FIoffset, case 1 | MHz | 15 |
| FIoffset, case 2 | MHz | 25 |
| NOTE 1: The interferer is QPSK modulated PUSCH containing data and reference symbols. Normal cyclic prefix is used. | | |

**Table 7.3.4.1-2 In-band blocking for intra-band contiguous SL CA UE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NR SL CA band | Parameter | Unit | Case 1 | Case 2 |
| PInterferer | dBm | -44 | -44 |
| SL\_n47B | FInterferer  (offset) | MHz | - BWchannel CA/2 – FIoffset,case 1  &  + BWchannel CA/2 + FIoffset,case 1 | ≤- BWchannel CA/2 – FIoffset,case 2  &  ≥+ BWchannel CA/2 + FIoffset,case 2 |
| FInterferer (Range) | MHz | NOTE 2 | FDL\_low – 30  to  FDL\_high + 30 |
| NOTE 1: For certain bands, the unwanted modulated interfering signal may not fall inside the UE receive band, but within the first 30 MHz below or above the UE receive band  NOTE 2: For each carrier frequency the requirement is valid for two frequencies:  a. the carrier frequency - BWchannel CA/2 - FIoffset, case 1 and  b. the carrier frequency + BWchannel CA/2 + FIoffset, case 1  NOTE 3: BWchannel CA denotes the aggregated channel bandwidth of the wanted signal | | | | |

#### 7.3.4.2 Out-of-band blocking

For intra-band contiguous SL CA operation, the UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 with parameters specified in Tables 7.3.4.2-1 and 7.3.4.2-2.

For Table 7.3.4.2-2 in frequency range 1, 2 and 3, up to exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.3.5 spurious response are applicable.

Table 7.3.4.2-1: Out-of-band blocking parameters for intra-band contiguous SL CA UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rx Parameter | Units | SL CA Bandwidth Class | | | | |
| B |  |  |  |  |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | PREFSENS\_SL + SL CA Bandwidth Class specific value below | | | | |
| 9 |  |  |  |  |

Table 7.3.4.2-2: Out of band blocking for intra-band contiguous SL CA UE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR SL  CA band | Parameter | Units | Frequency | | |
| Range 1 | Range 2 | Range 3 |
| PInterferer | dBm | -44 | -30 | -15 |
| V2X\_47B | FInterferer (CW) | MHz | -60 < f – FDL\_low < -30  or  30 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: The requirement is applied for multi-carrier intra-band con-current receptions when 2 carrier transmissions are activated at the same time. | | | | | |

### 7.3.5 Spurious response for NR SL CA operation

For intra-band contiguous SL CA operation, the UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 with parameters specified in Table 7.3.5-1and Table 7.3.5-2.

Table 7.3.5-1: Spurious response parameters for intra-band contiguous SL CA UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rx Parameter | Units | SL CA Bandwidth Class | | | | |
| B |  |  |  |  |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | PREFSENS\_SL + SL CA Bandwidth Class specific value below | | | | |
| 9 |  |  |  |  |
| NOTE 1: The requirement is applied for multi-carrier intra-band con-current receptions when 2 carrier transmissions are activated at the same time.  NOTE 2: Reference measurement channel is A.7.2 | | | | | | |

Tables 7.3.5-2: Spurious response for intra-band contiguous SL CA UE

|  |  |  |
| --- | --- | --- |
| Parameter | Unit | Level |
| PInterferer  (CW) | dBm | -44 |
| FInterferer | MHz | Spurious response frequencies |
| NOTE 1: The requirement is applied for multi-carrier intra-band con-current receptions when 2 carrier transmissions are activated at the same time. | | |

### 7.3.6 Intermodulation characteristics for NR SL CA operation

For intra-band contiguous SL CA operation, the UE throughput shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annex A.7.2 with parameters specified in Table 7.3.6-1for the specified wanted signal mean power in the presence of two interfering signals.

Table 7.3.6-1: Wide band intermodulation for intra-band contiguous SL CA UE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rx parameter | Units | SL CA Bandwidth Class | | | | |
| B |  |  |  |  |
| Pw in Transmission Bandwidth Configuration, per CC | dBm | PREFSENS\_SL + SL CA Bandwidth Class specific value below | | | | |
| 9 |  |  |  |  |
| PInterferer 1  (CW) | dBm | -46 | | | | |
| PInterferer 2  (Modulated) | dBm | -46 | | | | |
| BWInterferer 2 | MHz | 10 |  |  |  |  |
| FInterferer 1  (Offset) | MHz | –Foffset-15  /  + Foffset+15 |  |  |  |  |
| FInterferer 2  (Offset) | MHz | 2\*FInterferer 1 | | | | |
| NOTE 1: The requirement is applied for multi-carrier intra-band con-current receptions when 2 carrier transmissions are activated at the same time.  NOTE 2: The Finterferer 1 (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the CW interferer and Finterferer 2 (offset) is the frequency separation of the center frequency of the carrier closest to the interferer and the center frequency of the modulated interferer. | | | | | | |

# 8 Co-channel coexistence between LTE Sidelink and NR Sidelink

### 8.1. Configured transmitted power for V2X UE supporting co-channel coexistence with LTE SL

For the measured configured maximum output power PUMAX,*c* for NR V2X sidelink transmissions non-concurrent with NR uplink transmissions, the same requirement as in clause 6.2.4 shall be applied. When NR V2X UE is configured to co-channel coexistence operation with LTE V2X and NR SCS is configured to 30kHz, the evaluation period for PUMAX,c for NR V2X sidelink is the first slot of NR SL slots overlapping with an LTE SL subframe.

When NR V2X UE is configured to co-channel coexistence operation with LTE V2X and NR SCS is configured to 30kHz, the PCMAX,f,c tolerances in Table 6.2.4-1 are relaxed by 1dB i.e. T(PCMAX,f,c) = T(PCMAX,f,c) +1 (dB).

### 8.2. Relative slot power tolerance for V2X UE supporting co-channel coexistence with LTE SL

Relative slot power tolerance is defined for NR V2X supporting co-channel coexistence to ensure the RX performance of the LTE V2X UE operating within the same channel. This requirement applies only to transmissions with 30kHz SCS.

The relative slot power tolerance for V2X UE supporting co-channel coexistence with LTE SL is the ability of the NR V2X UE operating with 30kHz SCS to control the output power of transmitted slots during PSCCH/PSSCH transmission consisting of two slots overlapping with an LTE SL subframe (500us). The reference slot is the 1st slot overlapping with LTE SL subframe and target slot is the subsequent NR SL slot overlapping with the LTE SL subframe. The measurement period is one NR SL slot with guard symbol omitted.

The power of the target slot must not exceed the power of the reference slot by more than relative slot power tolerance of +1 dB.

# Annex A: Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2023-02 | RAN4#106 |  |  |  |  | Initial Skeleton | 0.0.1 |
| 2023-04 | RAN4#106bis-e | R4-2306634 |  |  |  | TP to TR on the SL-e TX requirement | 0.1.0 |
| 2023-04 | RAN4#106bis-e | R4-2306635 |  |  |  | TP to TR on on the SL-e RX requirement | 0.1.0 |
| 2023-05 | RAN4#107 | R4-2310378 |  |  |  | TP for TR 38.786 on the MPR/A-MPR simulation assumptions | 0.2.0 |
| 2023-05 | RAN4#107 | R4-2310307 |  |  |  | TP on system parameters for SL unlicensed operation for single CC | 0.2.0 |
| 2023-05 | RAN4#107 | R4-2310308 |  |  |  | on the SL-e TX requirement | 0.2.0 |
| 2023-05 | RAN4#107 | R4-2310309 |  |  |  | on the SL-e RX requirement | 0.2.0 |
| 2023-05 | RAN4#107 | R4-2310311 |  |  |  | TP to TR on con-current operation on Uu and sidelink | 0.2.0 |
| 2023-05 | RAN4#107 | R4-2310312 |  |  |  | TP for TR 38.786 on the updated TR structure for NR SL CA operation | 0.2.0 |
| 2023-08 | RAN4#108 | R4-2314733 |  |  |  | TP on system parameters for SL unlicensed operation for single CC | 0.3.0 |
| 2023-08 | RAN4#108 | R4-2311532 |  |  |  | TP for TR 38.786 on the remaining UE RF requirements for SL-U UE | 0.3.0 |
| 2023-08 | RAN4#108 | R4-2314734 |  |  |  | TP for TR 38.786 on the SL-U MPR and A-MPR | 0.3.0 |
| 2023-08 | RAN4#108 | R4-2312262 |  |  |  | TP to TR on con-current operation on Uu and sidelink | 0.3.0 |
| 2023-08 | RAN4#108 | R4-2314736 |  |  |  | TP for TR 38.786 on the updated RF requirements for NR SL CA operation | 0.3.0 |
| 2023-08 | RAN4#108 | R4-2314882 |  |  |  | TP for TR 38.786 on the SLCA channel bandwidth and MPR | 0.3.0 |
| 2023-09 | RAN#101 | RP-231721 |  |  |  | TR 38.786 v1.0.0 UE radio transmission and reception for NR sidelink evolution | 1.0.0 |
| 2023-10 | RAN4#108-bis | R4-2315825 |  |  |  | TP for TR 38.786: Addition of definitions and symbols to Chapter 3 | 1.1.0 |
| 2023-10 | RAN4#108-bis | R4-2317722 |  |  |  | TP for TR 38.786 on the SL-U MPR and A-MPR | 1.1.0 |
| 2023-10 | RAN4#108-bis | R4-2317723 |  |  |  | TP to TR 38.786 on concurrent operation | 1.1.0 |
| 2023-10 | RAN4#108-bis | R4-2317726 |  |  |  | TP for TR 38.786 On Co-channel coexistence for LTE SL and NR SL | 1.1.0 |
| 2023-10 | RAN4#108-bis | R4-2317728 |  |  |  | TP for TR 38.786 on the Remaining RF requirements for NR SL CA operation | 1.1.0 |
| 2023-10 | RAN4#108-bis | R4-2317729 |  |  |  | TP to TR38.786 sidelink CA | 1.1.0 |
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