**3GPP TSG-RAN WG4 Meeting #95-e *R4-2007798***

**Electronic meeting, 25 May– 5 June 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **0818** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | RRM Requiremet fo Introduction of band n259 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_n259 | | | | |  | ***Date:*** | | | 2020-05-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Band n259 is a new band. The RRM requirements should be introduced in technical specifications. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | All sections with band specific requirements are modified to include band n259 RRM rrequirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | RRM requirements for Band n259 cannot be referred. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Annex G | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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### 3.5.3 NR operating bands in FR2

NR frequency bands grouping for FR2 is specified in Table 3.5.3-1.

Table 3.5.3-1: NR frequency band groups for FR2

|  |  |  |
| --- | --- | --- |
| Group | Band group notation | Operating bands |
| A | NR\_TDD\_FR2\_A | n2571, n2581, n2611 |
| B | NR\_TDD\_FR2\_B | n2574, n2584, n2614 |
| C | NR\_TDD\_FR2\_C |  |
| D | NR\_TDD\_FR2\_D |  |
| E | NR\_TDD\_FR2\_E |  |
| F | NR\_TDD\_FR2\_F | n2604 |
| G | NR\_TDD\_FR2\_G | n2601 |
| H | NR\_TDD\_FR2\_H |  |
| I | NR\_TDD\_FR2\_I |  |
| J | NR\_TDD\_FR2\_J |  |
| K | NR\_TDD\_FR2\_K |  |
| L | NR\_TDD\_FR2\_L | n2572, n2582, n2612 |
| M | NR\_TDD\_FR2\_M |  |
| N | NR\_TDD\_FR2\_N |  |
| O | NR\_TDD\_FR2\_O |  |
| P | NR\_TDD\_FR2\_P |  |
| Q | NR\_TDD\_FR2\_Q |  |
| R | NR\_TDD\_FR2\_R |  |
| S | NR\_TDD\_FR2\_S |  |
| T | NR\_TDD\_FR2\_T | n2573, n2583, n2613 |
| U | NR\_TDD\_FR2\_U |  |
| V | NR\_TDD\_FR2\_V |  |
| W | NR\_TDD\_FR2\_W |  |
| X | NR\_TDD\_FR2\_X |  |
| Y | NR\_TDD\_FR2\_Y | n2603 |
| Z | NR\_TDD\_FR2\_Y |  |
| AA | NR\_TDD\_FR2\_AA | n2593 |
| NOTE 1: UE power class 1.  NOTE 2: UE power class 2.  NOTE 3: UE power class 3.  NOTE 4: UE power class 4. | | |

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B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

**Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **NR operating band groups Note1** | **Minimum SSB\_RP** | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | **dB** |
| **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -124 | -121 | ≥ -4 |
| NR\_FDD\_FR1\_B | -123.5 | -120.5 |
| NR\_TDD\_FR1\_C | -123 | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -119 |
| NR\_FDD\_FR1\_G | -121 | -118 |
| NR\_FDD\_FR1\_H | -120.5 | -117.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

**Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Angle of arrival** | **NR operating bands** | **Minimum SSB\_RP Note 2, Note 3** | | | | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | | | | **dB** |
| **SCSSSB = 120 kHz** | | | | **SCSSSB = 240 kHz** |
| **UE Power class** | | | | **UE Power class** |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| Conditions | Rx Beam Peak | n257 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| n259 |  |  | -105.5 |  |
| n260 | -122.3+Y1 |  | -106.5 | -122.8+Y4 |
| n261 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| Spherical coverage Note 1 | n257 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| n259 |  |  | -92.7 |  |
| n260 | -114.3+Z1 |  | -93.9 | -110.8+Z4 |
| n261 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.1.2-2:*

*- The value of Y for Power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively*

*- The value of Z for Power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively*

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### B.2.1.2 Derivation of Minimum SSB\_RP values for FR1

[FFS]

### B.2.1.3 Derivation of Minimum SSB\_RP values for FR2

#### B.2.1.3.1 Minimum SSB\_RP values for Rx Beam Peak angle of arrival

Minimum SSB\_RP values in Tables B.2.2-2 and B.2.3-2 are based on Reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE Power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB\_RP = Reference sensitivity PC3, n260, 50MHz +Y -10Log10(PRBRefsens x 12) – SNRRefsens + SSB Ês/Iot + ∆MBP,n

where:

Reference sensitivity PC3, n260, 50MHz is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

|  |  |  |  |
| --- | --- | --- | --- |
| Value “Y” in dB, for each UE power class | | | |
| 1 | 2 | 3 | 4 |
| FFS | 9.0 | 7.0 | FFS |

PRBRefsens is NRB associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNRRefsens is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

∆MBP,n is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB\_RP value for the baseline of UE power class 3 in Band n260 is (-109.5+∆MBP,n) dBm/120kHz for intra-frequency measurements and (-107.5+∆MBP,n) dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB\_RP level for power class X (PC\_X) and operating band Y (Band\_Y) is used:

For Intra-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = -109.5 dBm/120kHz + Refsens PC\_X, Band\_Y, 50MHz – Refsens PC3, n260, 50MHz + Y PC\_X – Y PC3 +∆MBP,n,

For Inter-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = -107.5 dBm/120kHz + Refsens PC\_X, Band\_Y, 50MHz – Refsens PC3, n260, 50MHz + Y PC\_X – Y PC3 +∆MBP,n.

#### B.2.1.3.2 Minimum SSB\_RP values for angle of arrival within Spherical coverage

Minimum SSB\_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB\_RP = EIS spherical coverage PC3, n260, 50MHz +Z -10Log10(PRBRefsens x 12) – SNRRefsens + SSB Ês/Iot + ∆MBS,n

where:

EIS spherical coverage PC3, n260, 50MHz is the EIS spherical coverage value in dBm specified for power class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1;

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1;

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

|  |  |  |  |
| --- | --- | --- | --- |
| **Value “Z” in dB, for each UE power class** | | | |
| 1 | 2 | 3 | 4 |
| FFS | 9.0 | 7.0 | FFS |

PRBRefsens is NRB associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNRRefsens is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

∆MBS,n is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB\_RP value for the baseline of UE power class 3 in Band n260 is (-96.9+∆MBS,n) dBm/120kHz for intra-frequency measurements and is (-94.9+∆MBS,n) dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB\_RP level for power class X (PC\_X) and operating band Y (Band\_Y) is used:

For Intra-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = (-103.9+∆MBS,n +Z) dBm/120 kHz + Refsens PC\_X, Band\_Y, 50MHz – Refsens PC3, n260, 50MHz + Z PC\_X – Z PC3 +∆MBS,n,

For Inter-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = (-101.9+∆MBS,n +Z) dBm/120 kHz + Refsens PC\_X, Band\_Y, 50MHz – Refsens PC3, n260, 50MHz + Z PC\_X – Z PC3 +∆MBS,n

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## B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

**Table B.2.2-1: Conditions for intra-frequency measurements in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **NR operating band groups Note1** | **Minimum SSB\_RP** | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | **dB** |
| **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -127 | -124 | ≥ -6 |
| NR\_FDD\_FR1\_B | -126.5 | -123.5 |
| NR\_TDD\_FR1\_C | -126 | -123 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -125.5 | -122.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -125 | -122 |
| NR\_FDD\_FR1\_G | -124 | -121 |
| NR\_FDD\_FR1\_H | -123.5 | -120.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | NR operating bands | Minimum SSB\_RP Note 2, Note 3 | | | | | SSB Ês/Iot |
| dBm / SCSSSB | | | | | dB |
| SCSSSB = 120 kHz | | | | SCSSSB = 240 kHz |
| UE power class | | | | UE power class |
| 1 | 2 | 3 | 4 | 1, 2, 3, 4 |
| **Conditions** | Rx Beam Peak | n257 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-6 |
| n258 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| n259 |  |  | -108.5 |  |
| n260 | -125.3+Y1 |  | -109.5 | -125.8+Y4 |
| n261 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| Spherical coverage **Note 1** | n257 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-6 |
| n258 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| n259 |  |  | -95.7 |  |
| n260 | -117.3+Z1 |  | -96.9 | -113.8+Z4 |
| n261 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  Note 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.2-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

## B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

**Table B.2.3-1: Conditions for inter-frequency measurements in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **NR operating band groups Note1** | **Minimum SSB\_RP** | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | **dB** |
| **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -125 | -122 | ≥ -4 |
| NR\_FDD\_FR1\_B | -124.5 | -121.5 |
| NR\_TDD\_FR1\_C | -124 | -121 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -124.5 | -120.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -123 | -120 |
| NR\_FDD\_FR1\_G | -122 | -119 |
| NR\_FDD\_FR1\_H | -121.5 | -118.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

**Table** B.2.3-2**: Conditions for inter-frequency measurements in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Angle of arrival | NR operating bands | Minimum SSB\_RP Note 2, Note 3 | | | | | SSB Ês/Iot |
| dBm / SCSSSB | | | | | dB |
| SCSSSB = 120 kHz | | | | SCSSSB = 240 kHz |
| UE power class | | | | UE power class |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| **Conditions** | Rx Beam Peak | n257 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| n259 |  |  | -106.5 |  |
| n260 | -123.3+Y1 |  | -107.5 | -123.8+Y4 |
| n261 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| Spherical coverage **Note 1** | n257 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 |
| n259 |  |  | -93.7 |  |
| n260 | -115.3+Z1 |  | -94.9 | -111.8+Z4 |
| n261 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.3-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1, and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

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### B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

**Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **NR operating band groups Note1** | **Minimum SSB\_RP** | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | **dB** |
| **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -121 | ≥ -3 |
| NR\_FDD\_FR1\_B | -123.5 | -120.5 |
| NR\_TDD\_FR1\_C | -123 | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -119 |
| NR\_FDD\_FR1\_G | -121 | -118 |
| NR\_FDD\_FR1\_H | -120.5 | -117.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

**Table** **B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Angle of arrival** | **NR operating bands** | **Minimum SSB\_RP Note 2, Note 3** | | | | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | | | | **dB** |
| **SCSSSB = 120 kHz** | | | | **SCSSSB = 240 kHz** |
| **UE power class** | | | | **UE power class** |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| **Conditions** | Rx Beam Peak | n257 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-3 |
| n258 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| n259 |  |  | -105.5 |  |
| n260 | -122.3+Y1 |  | -106.5 | -122.8+Y4 |
| n261 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| Spherical coverage **Note 1** | n257 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-3 |
| n258 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| n259 |  |  | -92.7 |  |
| n260 | -114.3+Z1 |  | -93.9 | -110.8+Z4 |
| n261 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.4.1-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

### B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS\_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

**Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum CSI-RS\_RP | | | CSI-RS Ês/Iot |
| dBm / SCSCSI-RS | | | dB |
| SCSCSI-RS = 15 kHz | SCSCSI-RS = 30 kHz | SCSCSI-RS = 60 kHz |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -121 | -118 | ≥ -3 |
| NR\_FDD\_FR1\_B | -123.5 | -120.5 | -117.5 |
| NR\_TDD\_FR1\_C | -123 | -120 | -117 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -119.5 | -116.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -119 | -116 |
| NR\_FDD\_FR1\_G | -121 | -118 | -115 |
| NR\_FDD\_FR1\_H | -120.5 | -117.5 | -114.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | | |

**Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Angle of arrival** | **NR operating bands** | **Minimum CSI-RS\_RP Note 2, Note 3** | | | | | **CSI-RS Ês/Iot** |
| **dBm / SCSCSI-RS** | | | | | **dB** |
| **SCSCSI-RS = 60 kHz** | | | | **SCSCSI-RS = 120 kHz** |
| **UE power class** | | | | **UE power class** |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| **Conditions** | Rx Beam Peak | n257 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 | (Value for SCSCSI-RS = 60 kHz) +3dB | ≥-3 |
| n258 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| n259 |  |  | -108.5 |  |
| n260 | -125.3+Y1 |  | -109.5 | -125.8+Y4 |
| n261 | -128.3+Y1 | -113.8 | -112.1 | -127.8+Y4 |
| Spherical coverage **Note 1** | n257 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 | (Value for SCSCSI-RS = 60 kHz) +3dB | ≥-3 |
| n258 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| n259 |  |  | -95.7 |  |
| n260 | -117.3+Z1 |  | -96.9 | -113.8+Z4 |
| n261 | -120.3+Z1 | -102.8 | -101.2 | -118.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.4.2-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

## B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

**Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **NR operating band groups Note1** | **Minimum SSB\_RP** | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | **dB** |
| **SCSSSB = 15 kHz** | **SCSSSB = 30 kHz** |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A | -125 | -122 | ≥ -4 |
| NR\_FDD\_FR1\_B | -124.5 | -121.5 |
| NR\_TDD\_FR1\_C | -124 | -121 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -124.5 | -120.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -123 | -120 |
| NR\_FDD\_FR1\_G | -122 | -119 |
| NR\_FDD\_FR1\_H | -121.5 | -118.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Angle of arrival** | **NR operating bands** | **Minimum SSB\_RP Note 2, Note 3** | | | | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | | | | **dB** |
| **SCSSSB = 120 kHz** | | | | **SCSSSB = 240 kHz** |
| **UE power class** | | | | **UE power class** |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| **Conditions** | Rx Beam Peak | n257 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| n259 |  |  | -106.5 |  |
| n260 | -123.3+Y1 |  | -107.5 | -123.8+Y4 |
| n261 | -126.3+Y1 | -111.8 | -110.1 | -125.8+Y4 |
| Spherical coverage **Note 1** | n257 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-4 |
| n258 | -118.3+Z1 | -100.8 | -99.2 | -116.8+Z4 |
| n259 |  |  | -93.7 |  |
| n260 | -115.3+Z1 |  | -94.9 | -111.8+Z4 |
| n261 | -114.3 | -100.8 | -99.2 | -116.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.5.2-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine*

## B.2.6 Conditions for UE transmit timing

### B.2.6.1 Conditions for SSB based UE transmit timing

This clause defines the following conditions for UE transmit timing adjustment performed based on SSBs: SSB\_RP and SSB Ês/Iot and applicable for a corresponding operating band.

The conditions are defined in Table B.2.6.1-1 for FR1 SSB.

**Table B.2.6.1-1: Conditions for SSB based UE transmit timing in FR1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | NR operating band groups Note1 | Minimum SSB\_RP | | SSB Ês/Iot |
| dBm / SCSSSB | | dB |
| SCSSSB=15 kHz | SCSSSB=30 kHz |
| **Conditions** | NR\_FDD\_FR1\_A, NR\_TDD\_FR1\_A, NR\_SDL\_FR1\_A | -124 | -121 | ≥ -3 |
| NR\_FDD\_FR1\_B | -123.5 | -120.5 |
| NR\_TDD\_FR1\_C | -123 | -120 |
| NR\_FDD\_FR1\_D, NR\_TDD\_FR1\_D | -122.5 | -119.5 |
| NR\_FDD\_FR1\_E, NR\_TDD\_FR1\_E | -122 | -119 |
| NR\_FDD\_FR1\_G | -121 | -118 |
| NR\_FDD\_FR1\_H | -120.5 | -117.5 |
| NOTE 1: NR operating band groups are defined in clause 3.5.2. | | | | |

The conditions are defined in Table B.2.6.1-2 for FR2 SSB.

Table B.2.6.1-2: Conditions for SSB based UE transmit timing in FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Angle of arrival** | **NR operating bands** | **Minimum SSB\_RP Note 2, Note 3** | | | | | **SSB Ês/Iot** |
| **dBm / SCSSSB** | | | | | **dB** |
| **SCSSSB = 120 kHz** | | | | **SCSSSB = 240 kHz** |
| **UE power class** | | | | **UE power class** |
| **1** | **2** | **3** | **4** | **1, 2, 3, 4** |
| **Conditions** | Rx Beam Peak | n257 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-3 |
| n258 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| n259 |  |  | -105.5 |  |
| n260 | -122.3+Y1 |  | -106.5 | -122.8+Y4 |
| n261 | -125.3+Y1 | -110.8 | -109.1 | -124.8+Y4 |
| Spherical coverage **Note 1** | n257 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 | (Value for SCSSSB = 120 kHz) +3dB | ≥-3 |
| n258 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| n259 |  |  | -92.7 |  |
| n260 | -114.3+Z1 |  | -93.9 | -110.8+Z4 |
| n261 | -117.3+Z1 | -99.8 | -98.2 | -115.8+Z4 |
| NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.  NOTE 2: Values specified at the Reference point to give minimum SSB Ês/Iot, with no applied noise.  NOET 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ∆MBP,n and Spherical coverage values are increased by ∆MBS,n, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19]. | | | | | | | | |

*Editor’s notes for Table B.2.6.1-2:*

*- The value of Y for power classes 1 and 4 is FFS, where Y1 and Y4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively*

*- The value of Z for power classes 1 and 4 is FFS, where Z1 and Z4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively*

*--------------------------------------------------------< end of changes >-----------------------------------------------------------------*