**3GPP TSG- Meeting #113 *R4-2418641***

**Orlando, US, Nov.18th – 22nd 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | **5114** | **rev** |  | **Current version:** | **17.15.0** |  |
|  | | | | | | | | |
| *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 | **X** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | (NR\_redcap-Perf) Correction to RedCap 2-step RACH RRM test cases\_R17 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | , Starpoint | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_redcap-Perf | | | | |  | ***Date:*** | | | 2024-11-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To fix the issues in 2-step RACH RMCs and test cases mentioned in discussion paper R4-2418637:   1. DUT is required to transmit the first MsgA PUSCH with a unreasonably high power of 3\*(2+μ) +0.6 dBm. Which is actually a copy-and-paste mistake. According to WF R4-2017254 MsgA PUSCH shall be transmitted with a power 3\*(2+μ) dB higher than MsgA PRACH power, rather than at the absolute power of 3\*(2+μ) dBm. 2. Current power shift is derived based on msgA-DeltaPramble = 3dB (Detailed derivation can be found in R4-2014934). However, it’s impossible to set msgA-DeltaPramble = 3dB because msgA-DeltaPramble can only be an even value as specified in 38.331.  |  | | --- | | ***msgA-DeltaPreamble***  Power offset of msgA PUSCH relative to the preamble received target power. Actual value = field value \* 2 [dB] (see TS 38.213 [13], clause 7.1). |   To fix issues above. We suggest update msgA-DeltaPramble in RMC to 2dB.   1. The power offset between first MsgA PUSCH power and first MsgA PRACH power also needs to be updated accordingly. We suggest change the power offset to -3dB for FDD test configurations and 0dB for TDD test configurations. Detailed calculation is given in R4-2418637 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Test requirements are updated. | | | | | | | | |
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| ***Consequences if not approved:*** | | Conforamnt UE will fail the test. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.16.3.2.2.5, A.16.3.2.2.6, A.16.3.2.2.7, A.16.3.2.2.8, A.17.3.2.2.3, A.17.3.2.2.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | **1st revision:**  To correct Clause affected on coversheet  To fix typos on coversheet | | | | | | | | |

#### **<Start of Change 1>**

##### A.16.3.2.2.5 2-step RA type contention based random access test in FR1 for NR standalone for 1 Rx UE

A.16.3.2.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.5.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.5.1-2.

Table A.16.3.2.2.5.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.5.1-2: General test parameters for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2,4 |  | SSB pattern 1 in FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB.1 RedCap FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 2 | | Config 1 |  | FDD |  |
|  | | Config 2,3 |  | TDD |
| Config 4 | HD-FDD |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2 |  | SR.1.1 TDD |
|  | | Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD |  |
| Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB*+1dB |
|  |  | Config 1,2,4 | dBm/15kHz | -98 |
|  |  | Config 3 |  | -101 |
|  |  | | dB | 3 |
|  | SS-RSRP | | dBm/ SCS | -95 |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB*+1dB |
|  |  | Config 1,2,4 | dBm/15kHz | -98 |
|  |  | Config 3 |  | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1,2,4 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 3 | -65.38/18.36 MHz |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 1 | As defined in A.3.20.2.1. |
| *msgA-RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.16.3.2.2.5.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.16.3.2.2.5.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*+1dB.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble transmission shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.5.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB(s) contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.5.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

##### A.16.3.2.2.6 2-step RA type contention based random access test in FR1 for NR standalone for 2 Rx UE

A.16.3.2.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.6.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.6.1-2.

Table A.16.3.2.2.6.1-1: Supported test configurations for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 4 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.6.1-2: General test parameters for 2-step RA type contention based random access with successRAR test in FR1 for NR standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1,2,4 |  | SSB.1 FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
|  | | Config 3 |  | SSB.1 RedCap FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 2 | | Config 1 |  | FDD |  |
|  | | Config 2,3 |  | TDD |
| Config 4 | HD-FDD |
| TDD Configuration | | Config 2 |  | TDDConf.1.1 |  |
|  | | Config 3 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1,4 |  | TRS.1.1 FDD |  |
| Config 2 |  | TRS.1.1 TDD |  |
|  | | Config 3 |  | TRS.1.2 TDD |  |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 3 | | Config 1,4 |  | SR.1.1 FDD | As defined in A.3.1.1. |
|  | | Config 2 |  | SR.1.1 TDD |
|  | | Config 3 |  | SR.2.1 TDD |  |
| RMSI CORESET Reference Channel | | Config 1,4 |  | CR.1.1 FDD |  |
| Config 2 |  | CR.1.1 TDD |  |
|  | | Config 3 |  | CR.2.1 TDD |  |
| Dedicated CORESET Reference Channel | | Config 1,4 |  | CCR.1.1 FDD |  |
| Config 2 |  | CCR.1.1 TDD |  |
|  | | Config 3 |  | CCR.2.1 TDD |  |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2,4 | dBm/15kHz | -98 |
|  |  | Config 3 |  | -101 |
|  |  | | dB | 3 |
|  | SS-RSRP | | dBm/ SCS | -95 |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  |  | Config 1,2,4 | dBm/15kHz | -98 |
|  |  | Config 3 |  | -101 |
|  |  | | dB | -17 |
|  | SS-RSRP | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1,2,4 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 3 | -65.38/18.36 MHz |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 1 | As defined in A.3.20.2.1. |
| *msgA-RSRP-ThresholdSSB* | | | dBm | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.16.3.2.2.6.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.16.3.2.2.6.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble transmission shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.6.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit an ACK if the MsgB with a successRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble and if the Contention Resolution is successful.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB(s) contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.6.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 1,3 and 4, and be -25 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18] for test configuration 2. The power of the first MsgA PUSCH transmission shall be 3dB lower than the first MsgA preamble for test configuration 1 & 4 and same as the first MsgA preamble for test configuration 2 & 3 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

##### A.16.3.2.2.7 2-step RA type non-contention based test in FR1 for NR standalone for 1 RX UE

A.16.3.2.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.7.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.7.1-2.

Table A.16.3.2.2.7.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.7.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1 |  | SSB.1 RedCap FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
| Config 2 | SSB.1 FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 1 | | Config 1 |  | TDD |  |
| Config 2 | HD-FDD |
| TDD Configuration | | Config 1 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1 |  | TRS.1.2 TDD |  |
| Config 2 | TRS.1.1 FDD |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1 |  | SR.2.1 TDD | As defined in A.3.1.1. |
| Config 2 | SR.1.1 FDD |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.2.1 TDD |  |
| Config 2 | CR.1.1 FDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.2.1 TDD |  |
| Config 2 | CCR.1.1 FDD |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| msgA-*RSRP-ThresholdSSB* | | |  | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB*+1dB |
|  |  | Config 1 | dBm/15kHz | -101 |
|  | Config 2 | -98 |
|  |  | | dB | 3 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -95 |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB*+1dB |
|  |  | Config 1 | dBm/15kHz | -101 |
|  | Config 2 | -98 |
|  |  | | dB | -17 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -65.38/18.36 MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.3/9.36MHz |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2.2. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.16.3.2.2.7.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.16.3.2.2.7.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA PRACH on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.7.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.7.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

##### A.16.3.2.2.8 2-step RA type non-contention based test in FR1 for NR standalone for 2 RX UE

A.16.3.2.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.16.3.2.2.8.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.16.3.2.2.8.1-2.

Table A.16.3.2.2.8.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR 30 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode |
| 2 | NR 15 kHz SSB SCS, 10 MHz bandwidth, HD-FDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability | |

Table A.16.3.2.2.8.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test-1 | Comments |
| SSB Configuration | | Config 1 |  | SSB.1 RedCap FR1 | As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below |
| Config 2 | SSB.1 FR1 |
| Number of SSBs per SS-burst | | |  | 2 | Different from the definition in A.3.10 |
| SS/PBCH block index | | |  | 0,1 | Different from the definition in A.3.10 |
| Duplex Mode for Cell 1 | | Config 1 |  | TDD |  |
| Config 2 | HD-FDD |
| TDD Configuration | | Config 1 |  | TDDConf.2.1 |  |
| CSI-RS for tracking | | Config 1 |  | TRS.1.2 TDD |  |
| Config 2 | TRS.1.1 FDD |
| OCNG Pattern Note 1 | | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH parameters Note 4 | | Config 1 |  | SR.2.1 TDD | As defined in A.3.1.1. |
| Config 2 | SR.1.1 FDD |
| RMSI CORESET Reference Channel | | Config 1 |  | CR.2.1 TDD |  |
| Config 2 | CR.1.1 FDD |
| Dedicated CORESET Reference Channel | | Config 1 |  | CCR.2.1 TDD |  |
| Config 2 | CCR.1.1 FDD |
| NR RF Channel Number | | |  | 1 |  |
| EPRE ratio of PSS to SSS | | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | | dB |  |  |
| msgA-*RSRP-ThresholdSSB* | | |  | RSRP\_51 | The actual value of the threshold is -105dBm, as defined in TS 38.331 [2]. |
| SSB with index 0 |  | | dB | 3 | Power of SSB with index 0 is set to be above configured msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -101 |
|  | Config 2 | -98 |
|  |  | | dB | 3 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -95 |
| SSB with index 1 |  | | dB | -17 | Power of SSB with index 1 is set to be below configured msgA-*RSRP-ThresholdSSB* |
|  |  | Config 1 | dBm/15kHz | -101 |
|  | Config 2 | -98 |
|  |  | | dB | -17 |
|  | SS-RSRP Note 3 | | dBm/ SCS | -115 |
| Io Note 2 | | Config 1 | dBm | -65.3/9.36MHz | For symbols without SSB index 1 |
|  | | Config 2 |  | -65.38/18.36 MHz |
| ss-PBCH-BlockPower | | | dBm/ SCS | -5 | As defined in clause 6.3.2 in TS 38.331 [2]. |
| Configured UE transmitted power () | | | dBm | 23 | As defined in clause 6.2.4 in TS 38.101-1. |
| MsgA Configuration | | |  | FR1 MsgA configuration 2 | As defined in A.3.20.2.2. |
| Propagation Condition | | | - | AWGN |  |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: SS-RSRP, Es/Iot and Io levels have been derived from other parameters for information purpose. They are not settable parameters.  Note 3: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required. | | | | | |

A.16.3.2.2.8.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.16.3.2.2.8.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.2.1, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA PRACH on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.8.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a fallbackRAR containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 containing the payload of MsgA PUSCH if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble. The UE shall monitor contention resolution as described in clause 8.2A in TS 38.213 [3].

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA and msg3 transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.16.3.2.2.8.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB containing a successRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble for test configuration 1 and 3dB lower than the first MsgA preamble for test configuration 2 with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

#### **<End of Change 1>**

#### **<Start of Change 2>**

##### A.17.3.2.2.3 2-step RA type contention based random access test in FR2 for NR Standalone

###### A.17.3.2.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the 2-step RA type random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.3.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.3.1-2 and Table A.17.3.2.2.3.1-3.

Table A.17.3.2.2.3.1-1: Supported test configurations for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.17.3.2.2.3.1-2: General test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | SSB.3 FR2 | As defined in A.3.10 |
| Duplex Mode for Cell 1 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 | As defined in A.3.1.4 |
| BWchannel | Config 1 | MHz | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OCNG pattern 1 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR.3.1 TDD | As defined in A.3.1.1. |
| RMSI CORESET Reference Channel | Config 1 |  | CR.3.1 TDD | As defined in A.3.1.2 |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power () | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| MsgA Configuration | |  | FR2 MsgA configuration 1 | As defined in A.3.20.3, with exceptions as defined below |
| *msgA-RSRP-ThresholdSSB* | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| preambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PMsgA0 -1), where PMsgA0 is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

Table A.17.3.2.2.3.1-3: OTA-related test parameters for 2-step RA type contention based random access test in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 2b | As defined in A.3.15.2 |
| Assumption for UE beamsNote 2 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | No external noise (Note 3) |  |
| Note 1: No articial noise is applied in this test.  Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 3: The downlink connection between the System Simulator and the UE is without Additive White Gaussian Noise, and has no fading or multipath effects as specified in TS 38.521-2 B.0 [38]. | | | | |

###### A.17.3.2.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.17.3.2.2.3.2.1 MsgA Transmission

To test the UE behavior specified in Clause 6.2.2.3.1.1 the System Simulator shall receive the MsgA with a preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *msgA-RSRP-ThresholdSSB*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.3.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.1.2 the System Simulator shall transmit a MsgB containing a fallbackRAR message and a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB(s) and shall transmit the msg3 if the MsgB with a fallbackRAR contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit MsgA with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if all received MsgB’s contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.3.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.1.3 the System Simulator shall transmit a MsgB containing a fallbackRAR message and Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA PRACH and MsgA PUSCH transmission power when the backoff time expires if no MsgB is received within the MsgB Response window.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first MsgA PRACH shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

##### A.17.3.2.2.4 2-step RA type non-contention based random access test in FR2 for NR Standalone

###### A.17.3.2.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the MsgA PRACH, MsgA PUSCH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2B.2 and Clause 7.1A.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.17.3.2.2.4.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.17.3.2.2.4.1-2 and Table A.17.3.2.2.4.1-3.

Table A.17.3.2.2.4.1-1: Supported test configurations for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |
| --- | --- |
| Config | Description |
| 1 | NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode |

Table A.17.3.2.2.4.1-2: General test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| SSB Configuration | Config 1 |  | SSB.3 FR2 | As defined in A.3.10 |
| Duplex Mode for Cell 2 | Config 1 |  | TDD |  |
| TDD Configuration | Config 1 |  | TDDConf.3.1 |  |
| BWchannel | Config 1 | MHz | 100: NRB,c = 24 |  |
| OCNG Pattern Note 1 | |  | OP.3 | As defined in A.3.2.1. |
| PDSCH Reference Channel Note 2 | Config 1 |  | SR3.1 TDD | As defined in A.3.1.1. |
| NR RF Channel Number | |  | 1 |  |
| EPRE ratio of PSS to SSS | | dB | 0 |  |
| EPRE ratio of PBCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PBCH to PBCH\_DMRS | | dB |  |  |
| EPRE ratio of PDCCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDCCH to PDCCH\_DMRS | | dB |  |  |
| EPRE ratio of PDSCH\_DMRS to SSS | | dB |  |  |
| EPRE ratio of PDSCH to PDSCH\_DMRS | | dB |  |  |
| ss-PBCH-BlockPower | | dBm/ SCS | +20 +ΔUL | As defined in TS 38.331 [2].  ΔUL is derived from the uplink calibration process Note 3 |
| Configured UE transmitted power (PCMAX,f,c) | | dBm | maximum value configurable for certain power class | As defined in clause 6.2.4 in TS 38.101-2 [19] |
| MsgA Configuration | |  | FR2 MsgA configuration 2 | As defined in A.3.20.3, with exceptions as defined below. |
| msgA-RSRP-ThresholdSSB | | dBm | RSRP\_69 +ΔDL | RSRP\_69 corresponds to -88dBm. ΔDL is derived from the downlink calibration process Note 4 |
| msgA-PreambleReceivedTargetPower | | dBm | -100 | As defined in TS 38.331 [2] |
| Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: The ΔUL value is calculated as -ROUND(PMsgA0 -1), where PMsgA0 is the measured first MsgA PRACH power with -80.6dBm/SCS applied, *msgA-PreambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send MsgA.  Note 4: The ΔDL value is calculated as (RSRP\_REP – RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value. | | | | |

Table A.17.3.2.2.4.1-3: OTA-related test parameters for non-contention based random access test for 2-step RA type in FR2 for NR Standalone

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | | Unit | Test-1 | Comments |
| AoA setup | |  | Setup 1 | As defined in A.3.15.1 |
| Assumption for UE beams Note 2 | |  | Rough |  |
| SSB with index 0 | Es Note1 | dBm/SCS | -80.6 | Power of SSB with index 0 is set to be above configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -80.6 |
|  | Es/IotBB | dB | 21.09 |  |
|  | Io | dBm/95.04 MHz | -56.01 | Io in symbols containing SSB index 0 |
| SSB with index 1 | Es Note1 | dBm/SCS | -95.0 | Power of SSB with index 1 is set to be below configured *msgA-RSRP-ThresholdSSB* |
|  | SSB\_RP | dBm/SCS | -95.0 |
|  | Es/IotBB | dB | 6.69 |  |
|  | Io | dBm/95.04 MHz | -70.41 | Io in symbols containing SSB index 1 |
| Propagation Condition | | - | No external noise (Note 3) |  |
| Note 1: No artificial noise is applied in this test.  Note 2: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation  Note 3: The downlink connection between the System Simulator and the UE is without Additive White Gaussian Noise, and has no fading or multipath effects as specified in TS 38.521-2 B.0 [38]. | | | | |

###### A.17.3.2.2.4.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.17.3.2.2.4.2.1 MsgA Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.3.2.1 for MsgA transmission, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the MsgA which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the MsgA on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given first by the *msgA-SSB-SharedRO-MaskIndex* if configured, or next by the *ra-ssb-OccasionMaskIndex* if configured.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.4.2.2 MsgB Reception

To test the UE behavior specified in Clause 6.2.2.3.2.2 the System Simulator shall transmit a MsgB containing a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble after 3 MsgA transmissions have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a MsgB *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for MsgB if the MsgB contains a successRAR MAC subPDU corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power if all received Random Access Response Reception has not been considered as successful.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

A.17.3.2.2.4.2.3 No MsgB Reception

To test the UE behavior specified in clause 6.2.2.3.2.3 the System Simulator shall transmit a MsgB corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2a in TS 38.321 [7], and transmit with the calculated MsgA transmission power when the backoff time expires if no MsgB is received within the MsgB Response window configured in *RACH-ConfigGenericTwoStepRA*.

In addition, the power applied to all MsgA transmissions shall be in accordance with what is specified in Clause 6.2.2.3. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The power of the first MsgA PUSCH transmission shall be same as the first MsgA preamble with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional MsgA transmissions shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all MsgA transmissions shall be within the accuracy specified in Clause 7.1A.2.

#### **<End of Change 2>**