**3GPP TSG-RAN4 Meeting #112 *rev R4-2411131***

**Maastricht, Netherlands, 19th Aug 2024 - 23rd Aug 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.115-1** | **CR** | **0037** | **rev** | **1** | **Current version:** | **18.5.0** |  |
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| *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:***  | (NR\_netcon\_repeater-Perf)CR for TS 38.115-1, Correction on requirement for 5MHz channel bandwidth for NCR MT |
|  |  |
| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_netcon\_repeater-Perf |  | ***Date:*** | 2024-08-05 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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:*** | Since the PREFSENS for wanted signal mean power for ACS, in-band blocking, and receiver intermodulation for NCR-MT should be refer to Table 6.16.1.2-1 of TS 38.106 instead of that in TS 38.104 or TS 38.174. For WA NCR-MT type 1-H, ACS, in-band blocking, and receiver intermodulation requirement should be refer to TS38.104 instead of TS 38.174, since 5MHz CBW are not supported in TS38.174. |
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| ***Summary of change:*** | 1. Add reference sensitivity level for NCR-MT for 15kHz SCS.
2. For the test requirement for Wide Area NCR-MT type 1-C and NCR-MT type 1-H for ACS, in-band blocking and receiver intermodulation requirement, the test requirement for WA BS type 1-C and BS type 1-H for ACS, in-band blocking and receiver intermodulation requirement in TS 38.1141-1 apply, and the PREFSENS used for wanted signal mean power should use PREFSENS in table 6.16.1.2-1 of TS 38.106.
3. For the test requirement for Local Area NCR-MT type 1-C and NCR-MT type 1-H for ACS, in-band blocking and receiver intermodulation requirement, the test requirement for that in TS 38.521-1 apply.
4. Add FRC for reference sensitivity level, ACS, in-band blocking, out-of-band blocking and receiver intermodulation.
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| ***Consequences if not approved:*** | The ACS, blocking, and receiver intermodulation test requirement would be incorrect. |
|  |  |
| ***Clauses affected:*** | 6.14.2, 6.14.5, 6.16.2, 6.16.5, 6.16.6, 6.17.2, 6.17.5, 6.19.2, 6.19.5, new Annex F.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Revised from R4-2411131 |

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

## 6.14 Conducted reference sensitivity for NCR-MT

### 6.14.1 Definition and applicability

The reference sensitivity power level PREFSENS is the minimum mean power received at the antenna connector for *NCR-MT type 1-C* or *TAB connector* for *NCR-MT type 1-H* at which a throughput requirement shall be met for a specified reference measurement channel.

### 6.14.2 Minimum requirements for NCR-MT type 1-C and 1-H

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The minimum requirement for MT connectors of *NCR type 1-C* is defined in TS 38.106 [2] clause 6.16.1.2.

The minimum requirement for MT connectors of *NCR type 1-H* is defined in TS 38.106 [2] clause 6.16.1.2.

### 6.14.3 Test purpose

To verify that for each *NCR TAB connector or antenna connector* at the reference sensitivity level the throughput requirement shall be met for a specified reference measurement channel.

### 6.14.4 Method of test

#### 6.14.4.1 Initial conditions

Test environment:

- Normal; see annex B.2.

- Extreme, see annexes B.3 and B.5.

RF channels to be tested for single carrier: B, M and T; see clause 4.9.1.

Under extreme test environment, the test shall be performed on each of B, M and T under extreme power supply conditions as defined in annex B.5.

NOTE: Tests under extreme power supply conditions also test extreme temperatures.

#### 6.14.4.2 Procedure

The minimum requirement is applied to all connectors under test.

The procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested; see clause 7.1.

1) Connect the connector under test to measurement equipment as shown in annex D.2.1.

2) Start the signal generator for the wanted signal to transmit the Fixed Reference Channels for reference sensitivity in clause 6.14.5 and according to annex A.1.

3) Set the signal generator for the wanted signal power as specified in clause 6.14.5.

4) Measure the throughput according to annex A.1.

In addition, for a *multi-band connector*, the following steps shall apply:

5) For *multi-band connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

### 6.14.5 Test requirements for NCR-MT

The throughput shall be ≥ 95% of the maximum throughput of the reference measurement channel as specified in annex F.2 with parameters specified in table 6.14.5-1 for Wide Area NCR-MT.

Table 6.14.5-1: Wide Area NCR-MT reference sensitivity levels

|  |  |  |  |
| --- | --- | --- | --- |
| **NCR-MT channel bandwidth (MHz)** | **Sub-carrier spacing (kHz)** | **Reference measurement channel** | **Reference sensitivity power level, PREFSENS****(dBm)** |
| **f ≤ 3.0 GHz** | **3.0 GHz < f ≤ 4.2 GHz** | **4.2 GHz < f ≤ 6.0 GHz** |
| 5,10,15 | 15 | G-FR1-A1-27 (Note 1) | -100.8 | -100.5 | -100.3 |
| 10, 15 | 30 | G-FR1-A1-22 (Note 1) | -101.3 | -101 | -100.8 |
| 10, 15 | 60 | G-FR1-A1-23 (Note 1) | -98.3 | -98 | -97.8 |
| 20, 25, 30, 35, 40, 45, 50 | 15 | G-FR1-A1-24 (Note 1) | -94.5 | -94.2 | -94 |
| 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 | 30 | G-FR1-A1-25 (Note 1) | -94.7 | -94.4 | -94.2 |
| 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 | 60 | G-FR1-A1-26 (Note 1) | -94.9 | -94.6 | -94.4 |
| NOTE 1: PREFSENS is the power level of a single instance of the reference measurement channel. This requirement shall be met for each consecutive application of a single instance of the reference measurement channel mapped to disjoint frequency ranges with a width corresponding to the number of resource blocks of the reference measurement channel each, except for one instance that might overlap one other instance to cover the full *passband.*. |

For Local Area NCR-MT reference sensitivity levels are defined in TS 38.101-1 [x] in clause 7.3.2 plus measurement uncertainty.

Table 6.14.5-2: measurement uncertainty for reference sensitivity levels

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| --- | --- |
|  | **The applicable frequency range** |
| f ≤ 3 GHz | 3 GHz < f ≤ 4.2 GHz | 4.2 GHz < f ≤ 6 GHz |
| REFSENS | ±0.7 dB  | ±1.0 dB | ±1.2 dB |

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

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

## 6.16 Conducted adjacent channel selectivity

### 6.16.1 Definition and applicability

Adjacent channel selectivity (ACS) is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency at the antenna connector for NCR-MT type 1-C or TAB connector for NCR-MT type 1-H in the presence of an adjacent channel signal with a specified centre frequency offset of the interfering signal to the band edge of a victim system.

This requirement applies to NCR-MT.

### 6.16.2 Minimum requirement

The minimum requirement for NCR-MT type 1-C is defined in TS 38.106 [2] clause 6.18.1.2.

The minimum requirement for NCR-MT type 1-H is defined in TS 38.106 [2] clause 6.18.1.2.

### 6.16.3 Test purpose

The test purpose is to verify the ability of the NCR receiver filter to suppress interfering signals in the channels adjacent to the wanted channel.

### 6.16.4 Method of test

#### 6.16.4.1 Initial conditions

Test environment: Normal; see annex B.2.

RF channels to be tested for single carrier (SC): M; see clause 4.9.1.

*Repeater RF Bandwidth p*ositions to be tested for multi-carrier (MC):

- MRFBW for *single-band connector(s)*, see clause 4.9.1,

- BRFBW\_T'RFBW and B'RFBW\_TRFBW for *multi-band connector(s),* see clause 4.9.1.

#### 6.16.4.2 Procedure

The minimum requirement is applied to all connectors under test.

For *NCR type 1-H* the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested; see clause 6.1.

1) Connect the connector under test to measurement equipment as shown in annex D.13.

2) For FDD operation, set the NCR to transmit:

- For single carrier operation set the connector under test to transmit at manufacturers declared r*ated output power per passband* (D.9).

- For a connector under test declared to be capable of multi-carrier operation (D.x) set the connector under test to transmit on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7 and 4.8 using the corresponding test models or set of physical channels in clause 4.9.2.

3) Set the signal generator for the wanted signal to transmit as specified in:

- table 6.16.5-1 for WA NCR-MT type 1-C and for WA NCR-MT type 1-H.

- xx for LA NCR-MT type 1-C or for LA NCR-MT type 1-H.

4) Set the signal generator for the interfering signal to transmit at the frequency offset and as specified in

- table 6.16.5-1 and 6.16.5-2, for WA NCR-MT type 1-C or for WA NCR-MT type 1-H.

- xx for LA NCR-MT type 1-C or for LA NCR-MT type 1-H.

5) Measure the throughput according to TS 38.106 [2] annex B.1.5.

In addition, for a *multi-band* *connector*, the following steps shall apply:

6) For *multi-band* *connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

### 6.16.5 Test requirements for NCR-MT

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For wide area *NCR-MT type 1-C* and *NCR-MT type 1-H*, the test requirement for Wide Area BS type 1-C and BS type 1-H in clause 7.4.1.5 the requirement formulation and interferer levels for the conducted adjacent channel selectivity of TS 38.141-1 apply. However the PREFSENS used for wanted signal mean power shall not be the same as in 38.141-1, but instead shall be the same as use PREFSENS in table 6.16.1.2-1 of TS 38.106.

For local area *NCR-MT type 1-C* and *NCR-MT type 1-H*, the test requirements in clause 7.5.5 for adjacent channel selectivity of TS 38.521-1 [x] apply.

### 6.16.6 Void

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

## **<Start of Change 3>**

## 6.17 Conducted blocking characteristics

### 6.17.1 Definition and applicability

The in-band blocking characteristics is a measure of the receiver's ability to receive a wanted signal at its assigned channel at the *TAB connector* for *NCR type 1-C* and *NCR 1-H* in the presence of an unwanted interferer, which is an NR signal for general blocking or an NR signal with one resource block for narrowband blocking.

Conducted blocking characteristics requirement applies only to NCR-MT connectors.

### 6.17.2 Minimum requirement

The minimum requirement for MT connectors of *NCR type 1-C* is defined in TS 38.106 [2] clause 6.19.2.

The minimum requirement for MT connectors of *NCR type 1-H* is defined in TS 38.106 [2] clause 6.19.2.

### 6.17.3 Test purpose

The test purpose is to verify the ability of the NCR receiver (at MT connectors) to withstand high-levels of in-band interference from unwanted signals at specified frequency offsets without undue degradation of its sensitivity.

### 6.17.4 Method of test

#### 6.17.4.1 Initial conditions

Test environment: Normal; see annex B.2.

RF channels to be tested for single carrier (SC): M; see clause 4.9A.1.

*NCR RF Bandwidth p*ositions to be tested for multi-carrier (MC):

- MRFBW for *single-band connector(s)*, see clause 4.9A.1,

- BRFBW\_T'RFBW and B'RFBW\_TRFBW for *multi-band connector(s),* see clause 4.9A.1.

#### 6.17.4.2 Procedure for general blocking

The minimum requirement is applied to all connectors under test.

For *NCR type 1-H* the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested;

1) Connect the connector under test to measurement equipment

2) For FDD operation, set the NCR to transmit:

- For single carrier operation set the connector under test to transmit at manufacturers declared *rated output power per passband* (D.9).

- For a connector under test declared to be capable of multi-carrier operation (D.7) set the connector under test to transmit on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7 and 4.8 using the corresponding test models or set of physical channels in clause 4.9A.2.

3) Set the signal generator for the wanted signal to transmit as specified in clause 6.17.5.

4) Set the signal generator for the interfering signal to transmit at the frequency offset and as specified in clause 6.17.5. The interfering signal shall be swept with a step size of 1 MHz starting from the minimum offset to the channel edges of the wanted signals as specified in clause 6.17.5.

5) Measure the throughput.

In addition, for a *multi-band* *connector*, the following steps shall apply:

6) For *multi-band* *connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band.

#### 6.17.4.3 Procedure for narrowband blocking

The minimum requirement is applied to all connectors under test.

For *NCR type 1-H* the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested;

1) Connect the connector under test to measurement equipment;.

2) For FDD operation, set the NCR-MT to transmit:

- For single carrier operation set the connector under test to transmit at manufacturers declared *rated carrier output power* (D.9).

- For a connector under test declared to be capable of multi-carrier operation (D.7) set the connector under test to transmit on all carriers configured using the applicable test configuration and corresponding power setting specified in clauses 4.7 and 4.8 using the corresponding test models or set of physical channels in clause 4.9A.2.

3) Set the signal generator for the wanted signal to transmit as specified in clause 6.17.5.

4) Set the signal generator for the interfering signal to transmit at the frequency offset and as specified in clause 6.17.5 Set-up and sweep the interfering RB centre frequency offset to the channel edge of the wanted signal as specified in clause 6.17.5.

5) Measure the throughput.

In addition, for a *multi-band* *connector*, the following steps shall apply:

6) For *multi-band* *connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band

#### 6.17.4.4 Procedure for out of band blocking

The minimum requirement is applied to all connectors under test.

For NCR *type 1-H* the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested;

1) Connect the connector under test to measurement equipment

2) For NCR-MT, set the signal generator for the wanted signal as defined in clause 6.17.5 to transmit.

3) For NCR-MT, set the Signal generator for the interfering signal to transmit at the frequency offset and as specified in clause 6.17.5. The CW interfering signal shall be swept with a step size of 1 MHz over than range 1 MHz to (FUL\_low - ΔfOOB) MHz and (FUL\_high + ΔfOOB) MHz to 12750 MHz.

4) Measure the throughput.

### 6.17.5 Test requirements for NCR-MT

For wide area *NCR-MT type 1-C* and *NCR-MT type 1-H*, the test requirement for Wide Area BS type 1-C and BS type 1-H in clause 7.4.2.5 the requirement formulation and interferer levels for the in-band blocking and 7.5.5 for out-of-band blocking of TS 38.141-1 apply. However the PREFSENS used for wanted signal mean power shall not be the same as in 38.141-1, but instead shall be the same as use PREFSENS in table 6.16.1.2-1 of TS 38.106.

For local area *NCR-MT type 1-C* and *NCR-MT type 1-H*, the test requirements in clause 7.6.2.5 for in-band blocking, 7.6.3.5 for out-of-band blocking and 7.6.4.5 for Narrow band blocking of TS 38.521-1 [x] apply.

## **<End of Change 3>**

## **<Start of Change 4>**

## 6.19 Conducted intermodulation characteristics

### 6.19.1 Definition and applicability

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency at the antenna connector for *NCR-MT type 1-C* or *TAB connector* for *NCR-MT type 1-H* in the presence of two interfering signals which have a specific frequency relationship to the wanted signal.

This requirement applies at MT connectors only.

### 6.19.2 Minimum requirement

The minimum requirement for MT connectors of *NCR type 1-C* is defined in TS 38.106 [2] clause 6.21.2.

The minimum requirement for MT connectors of *NCR type 1-H* is defined in TS 38.106 [2] clause 6.21.2.

### 6.19.3 Test purpose

The test purpose is to verify the ability of the receiver to inhibit the generation of intermodulation products in its non-linear elements caused by the presence of two high-level interfering signals at frequencies with a specific relationship to the frequency of the wanted signal.

### 6.19.4 Method of test

#### 6.19.4.1 Initial conditions

Test environment: Normal; see annex B.2.

RF channels to be tested for single carrier (SC): M; see clause 4.9A.1

*NCR RF Bandwidth p*ositions to be tested for multi-carrier (MC) and/or CA:

- MRFBW for *single-band connector(s)*, see clause 4.9A.1,

- BRFBW\_T'RFBW and B'RFBW\_TRFBW for *multi-band connector(s),* see clause 4.9A.1.

#### 6.19.4.2 Procedure

The minimum requirement is applied to all connectors under test.

For NCR-MT *type 1-H* the procedure is repeated until all *TAB connectors* necessary to demonstrate conformance have been tested;

1) Connect the connector under test to measurement equipment . All connectors not under test shall be terminated.

2) Set the signal generator for the wanted signal to transmit as specified in clause 6.19.5 for NCR-MT.

3) Set the signal generator for the interfering signal to transmit at the frequency offset and as specified in clause 6.19.5 for NCR-MT.

4) Measure the throughput.

In addition, for a *multi-band* *connector*, the following steps shall apply:

5) For *multi-band* *connector* and single band tests, repeat the steps above per involved band where single band test configurations and test models shall apply with no carrier activated in the other band

### 6.19.5 Test requirements for NCR-MT

For wide area *NCR-MT type 1-C* and *NCR-MT type 1-H* , the test requirement for Wide Area BS type 1-C and BS type 1-H conducted intermodulation characteristics in TS 38.141-1 [x], clause 7.7.5 the requirement formulation and interferer levels apply. However the PREFSENS used for wanted signal mean power shall not be the same as in 38.141-1, but instead shall be the same as use PREFSENS in table 6.16.1.2-1 of TS 38.106.

For local area *NCR-MT type 1-C* and *NCR-MT type 1-H*, the test requirement for conducted intermodulation characteristics in clause 7.8.2.5 of TS 38.521-1 [x] apply.

## **<End of Change 4>**

## **<Start of Change 5>**

Annex F (normative):
NCR-MT Reference measurement channels

# F.1 NCR-MT Demodulation Performance Fixed Reference Channels

## F.1.1 Fixed Reference Channels for PDSCH performance requirements

The parameters for the reference measurement channels are specified in table F.7.1.1-1 for FR1 PDSCH performance requirements.

**Table F.7.1.1-1: FRC parameters for FR1 PDSCH performance requirements, 1 transmission layers**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Reference channel |  | M-FR1-NCR..1.1-1 | M-FR1-NCR.1.1-2 | M-FR1-NCR.1.1-3 | M-FR1-NCR.1.1-4 |
| Channel bandwidth | MHz | 10 | 40 | 10 | 40 |
| Subcarrier spacing | kHz | 15 | 30 | 15 | 30 |
| Allocated resource blocks | PRBs | 52 | 106 | 52 | 106 |
| Number of consecutive PDSCH symbols |  | 12 | 12 | 12 | 12 |
| MCS table |  | 64QAM | 64QAM | 64QAM | 64QAM |
| MCS index |  | 4 | 4 | 13 | 13 |
| Modulation |  | QPSK | QPSK | 16QAM | 16QAM |
| Target Coding Rate |  | 0.3 | 0.30 | 0.48 | 0.48 |
| Number of MIMO layers |  | 1 | 1 | 1 | 1 |
| Number of DMRS REs |  | 12 | 12 | 12 | 12 |
| Overhead for TBS determination |  | 0 | 0 | 0 | 0 |
| Information Bit Payload per Slot  |  | 4096 | 8456 | 13064 | 26632 |
| Transport block CRC per Slot |  | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Slot |  | 1 | 2 | 2 | 4 |
| Binary Channel Bits Per Slot |  | 13728 | 27984 | 27456 | 55968 |

## F.1.2 Fixed Reference Channels for PDCCH performance requirements

The parameters for the reference measurement channels are specified in table F.1.2-1 for FR1 PDCCH performance requirements.

**Table F.1.2-1 . FR1 PDCCH Reference Channels**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** |  |  |  |
| Reference channel |  | M-FR1-NCR.1.2-1 | M-FR1-NCR.1.2-2 | M-FR1-NCR.1.2-3 | M-FR1-NCR.1.2-4 | M-FR1-NCR.1.2-5 | M-FR1-NCR.1.2-6 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 30 | 30 | 30 |
| CORESET frequency domain allocation |  | 24 | 48 | 48 | 102 | 102 | 102 |
| CORESET time domain allocation |  | 2 | 2 | 1 | 1 | 1 | 1 |
| Aggregation level |  | 2 | 4 | 8 | 2 | 4 | 8 |
| DCI Format |  | 1\_0 | 1\_1 | 1\_1 | 1\_0 | 1\_1 | 1\_1 |
| Payload (without CRC) | Bits | 39 | 52 | 52 | 41 | 53 | 53 |

## F.1.3 Fixed Reference Channels for CSI reporting performance

This clause defines the DL signal applicable to the reporting of channel status information.

Tables in this clause specifies the mapping of CQI index to Information Bit payload, which complies with the CQI definition specified in clause 5.2.2.1 of TS 38.214 [23] and with MCS definition specified in clause 5.1.3 of TS 38.214 [23].

Table F.1.3-1: Fixed Reference Channels for FR1 CSI reporting with CQI table 2 and MCS table 2

|  |  |  |
| --- | --- | --- |
| **Reference channel** | **M-FR1-NCR.1.3-1** | **M-FR1-NCR.1.3-2** |
| Number of allocated PDSCH resource blocks | 52 | 106 |
| Number of consecutive PDSCH symbols | 12 | 12 |
| Number of PDSCH MIMO layers | 1 | 2 |
| Number of DMRS REs (Note 1) | 24 | 24 |
| Overhead for TBS determination | 0 | 0 |
| Available RE-s for PDSCH | 6240 | 12720 |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A |
| 1 | 0.1523  | 0 | QPSK | 1480 | 2976 |
| 2 | 0.3770  | 1 | 2408 | 4744 |
| 3 | 0.8770  | 3 | 5504 | 11016 |
| 4 | 1.4766  | 5 | 16QAM | 9224 | 18960 |
| 5 | 1.9141  | 7 | 12040 | 24576 |
| 6 | 2.4063  | 9 | 15112 | 30728 |
| 7 | 2.7305  | 11 | 64QAM | 16896 | 34816 |
| 8 | 3.3223  | 13 | 20496 | 42016 |
| 9 | 3.9023  | 15 | 24576 | 49176 |
| 10 | 4.5234  | 17 | 28168 | 57376 |
| 11 | 5.1152  | 19 | 31752 | 65576 |
| 12 | 5.5547  | 21 | 256QAM | 34816 | 69672 |
| 13 | 6.2266 | 23 | 38936 | 79896 |
| 14 | 6.9141 | 25 | 43032 | 88064 |
| 15 | 7.4063  | 27 | 46104 | 94248 |
| NOTE 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNOTE 2: PDSCH is only scheduled on slots which are full DL |

# F.2 Fixed Reference Channels for reference sensitivity level, ACS, in-band blocking, out-of-band blocking and receiver intermodulation (QPSK, R=1/3)

The parameters for the FR1 WA NCR-MT reference measurement channels are specified in tables F.2-1 for FR1 reference sensitivity level, ACS, in-band blocking, out-of-band blocking, receiver intermodulation.

Table F.2-1: FRC parameters for FR1 reference sensitivity level for FR1 WA NCR-MT

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A1-22 | G-FR1-A1-23 | G-FR1-A1-24 | G-FR1-A1-25 | G-FR1-A1-26 | G-FR1-A1-27 |
| Subcarrier spacing (kHz) | 30 | 60 | 15 | 30 | 60 | 15 |
| Allocated resource blocks | 11 | 11 | 106 | 51 | 24 | 25 |
| CP-OFDM Symbols per slot (Note 1) | 9 | 9 | 9 | 9 | 9 | 9 |
| Modulation | QPSK | QPSK | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 | 1/3 |
| NOTE 1: *DL-DMRS-config-type* = 1 with *DL-DMRS-max-len* = 1, *DL-DMRS-add-pos* = pos2 with *l0* = 2, *l* = 6 and 9 as per Table 7.4.1.1.2-3 of TS 38.211 [3].NOTE 2: MCS index 4 and target coding rate = 308/1024 are adopted to calculate payload size for receiver sensitivity |

## **<End of Change 5>**