**3GPP TSG- Meeting # *revision of R4-2413257***

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
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| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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:*** | | It was observed that the NR repeater specification does not capture clarification on the source of the normal and extreme conditions specification.  Furthermore, only limited set of requirements is defined for extreme test conditions, while all the others are defined for normal test conditions. Therefore, we introduce clarifications in clauses 6.1 and 7.1 to avoid unnecessary clarifications on normal conditions.  Finally, this specification mentions “normal conditions” for the purpose of testing, as well as very similar “normal operating conditions” or “normal operation” which relate to typical product behavior. To distinguish those two cases properly, we clarify related test cases.  In this CR we introduce missing information, pointing to related test specification, where normal and extreme test conditions are specified. Additionally, clarification on normal conditions being default is added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * 6.1, 7.1: clarification saying that normal test conditions are default, * 6.2, 7.2: clarifying on test conditions, to distinguish from “normal operating conditions” or “normal operation”, * 6.9.2, 7.8.2: removal of unnecessary clarifications for normal test conditions, which were not used consistently for all the other requirement sections. * Addition of sentence to clarify where normal and extreme test conditions are specified.   Other minor editorial corrections. | | | | | | | | |
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| ***Consequences if not approved:*** | | Ambiguity would remain on the specification, with unclear definition of the test conditions. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.1, 6.2, 6.9.2, 7.1, 7.2, 7.8.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

*------------------------------ Modified section ------------------------------*

# 6 Conducted characteristics

## 6.1 General

Clause 6 includes the conducted characteristics for both transmitter and receiver.

For conducted transmitter characteristics:

Unless otherwise stated, the conducted transmitter characteristics are specified at:

- Antenna connector for repeater type 1-C and *NCR type 1-C* (including Fwd and MT interfaces) configuration,

- *TAB connector* for *NCR type 1-H* (including Fwd and MT interfaces) in normal operating conditions.

Requirements apply in both DL and UL unless otherwise stated or declared.

For the DL the *antenna connector* or the *TAB connector* on the BS side is the input and the *antenna connector* or the *TAB connector* on the UE side is the output.

For the UL the *antenna connector* or the *TAB connector* on the UE side is the input and the *antenna connector* or the *TAB connector* on the BS side is the output.

All requirements are defined for normal conditions, unless otherwise stated.

For conducted receiver characteristics:

Conducted receiver characteristics are specified at *antenna connector* for *NCR type 1-C* and *TAB connector* for *NCR type 1-H*, with full complement of transceivers for the configuration in normal operating condition.

Unless otherwise stated, the following arrangements apply for conducted receiver characteristics requirements in clause 9:

- Requirements apply during the receive period.

- Requirements shall be met for any transmitter setting.

- Throughput requirements defined for the conducted receiver characteristics do not assume HARQ retransmissions.

- For ACS, blocking and intermodulation characteristics, the negative offsets of the interfering signal apply relative to the lower *passband* edge or *inter-passband gap*, and the positive offsets of the interfering signal apply relative to the upper *passband* edge or *inter-passband gap*.

NOTE: In normal operating condition the NCR-MT in TDD operation is configured to TX OFF power during *receive period*.

*------------------------------ Next modified section -------------------------*

### 6.2.2 Minimum requirement for RF repeater

The requirements shall apply with NR signals in the *passband* of the repeater at:

The lowest input power (Pin,p,AC) that produces the *rated passband output power* (Prated,p,AC).

Up to:

The lowest input power (Pin,p,AC) that produces the *rated passband output power* (Prated,p,AC), plus 10 dB.

In normal conditions, the measured output power, Pmax,p,AC shall remain within +2 dB and -2 dB of the *rated passband output power* Prated,p,AC, declared by the manufacturer.

In extreme conditions, the measured output power, Pmax,p,AC shall remain within +2.5 dB and -2.5 dB of the *rated passband output power* Prated,p,AC, declared by the manufacturer.*------------------------------ Next modified section -------------------------*

### 6.2.3 Minimum requirement for NCR

#### 6.2.3.1 Minimum requirement for NCR-Fwd

##### 6.2.3.1.1 Minimum requirement for NCR-Fwd type 1-C

The requirements shall apply with NR signals in the *passband* of the NCR-Fwd at:

The lowest input power (Pin,p,AC) that produces the *rated passband output power* (Prated,p,AC).

Up to:

The lowest input power (Pin,p,AC) that produces the *rated passband output power* (Prated,p,AC), plus 10 dB.

In normal conditions, the measured output power, Pmax,p,AC shall remain within +2 dB and -2 dB of the *rated passband output power* Prated,p,AC, declared by the manufacturer.

In extreme conditions, the measured output power, Pmax,p,AC shall remain within +2.5 dB and -2.5 dB of the *rated passband output power* Prated,p,AC, declared by the manufacturer.

##### 6.2.3.1.2 Minimum requirement for NCR-Fwd type 1-H

The requirements shall apply with NR signals in the *passband* of the NCR-Fwd at:

The lowest input power (Pin,p,TABC) that produces the *rated passband output power* (Prated,p,TABC).

Up to:

The lowest input power (Pin,p,TABC) that produces the *rated passband output power* (Prated,p,TABC), plus 10dB

In normal conditions, the measured output power, Pmax,p,TABC shall remain within +2 dB and -2 dB of the *rated passband output power* Prated,p,TABC, declared by the manufacturer.

In extreme conditions, the measured output power, Pmax,p,TABC shall remain within +2.5 dB and -2.5 dB of the *rated passband output power* Prated,p,TABC, declared by the manufacturer.

*------------------------------ Next modified section -------------------------*

##### 6.2.3.2.2 Minimum requirement for NCR-MT type 1-C and NCR-MT type 1-H

In normal conditions, Pmax,c,AC shall remain within +2 dB and -2 dB of the *rated carrier output power* Prated,c,AC, declared by the manufacturer.

In extreme conditions, Pmax,c,AC of *NCR type 1-C* and *NCR type 1-H* shall remain within +2.5 dB and -2.5 dB of the *rated carrier output power* Prated,c,AC, declared by the manufacturer.

*------------------------------ Next modified section -------------------------*

### 6.9.2 Minimum Requirements for *RF repeater*

For a repeater operating at *passband* below 2496 MHz, the ACRR requirements in table 6.9.2-1 shall apply in downlink. ACRR for downlink shall be higher than the value specified in the Table 6.9.2-1.

Table 6.9.2-1: Repeater Downlink ACRR below 2496MHz

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit |
| UTRA, E-UTRA, NR | Wide Area repeater | BWNominal/2 | 45 |
| Medium Range repeater | BWNominal/2 | 45 |
| Local Area repeater | BWNominal/2 | 33  (Note 1) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*. | | | |

For a repeater operating at *passband* above 2496 MHz, the ACRR requirements in table 6.9.2-1a shall apply in downlink. ACRR for downlink shall be higher than the value specified in the Table 6.9.2-1a.

Table 6.9.2-1a: Repeater Downlink ACRR above 2496 MHz

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit |
| UTRA, E-UTRA, NR | Wide Area repeater | BWNominal/2 | 33dB |
| Medium Range repeater | BWNominal/2 | 33dB |
| Local Area repeater | BWNominal/2 | 33dB  (Note 1) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*. | | | |

For a repeater operating at *passband* below 2496 MHz, the ACRR requirements in table 6.9.2-2 shall apply in uplink. ACRR for uplink shall be higher than the value specified in the Table 6.9.2-2.

Table 6.9.2-2: Repeater Uplink ACRR below 2496 MHz

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit |
| UTRA, E-UTRA, NR | Wide Area repeater | BWNominal/2 | 33dB |
| Local Area repeater | BWNominal/2 | 33dB  (Note 1) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*. | | | |

For a repeater operating at *passband* above 2496 MHz, the ACRR requirements in table 6.9.2-2a shall apply in uplink. ACRR for uplink shall be higher than the value specified in the Table 6.9.2-2a.

Table 6.9.2-2a: Repeater Uplink ACRR above 2496 MHz

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit |
| UTRA, E-UTRA, NR | Wide Area repeater | BWNominal/2 | 33dB |
| Local Area repeater | 5MHz | 20dBc (Note 1, Note 2) |
| BWNominal/2 | 33dBc (Note 1) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*.  NOTE 2: In this case, the channel within the *passband* and the adjacent channel are assumed to have a bandwidth of 10 MHz. | | | |

*------------------------------ Next modified section -------------------------*

# 7 Radiated characteristics

## 7.1 General

Radiated characteristics are specified at RIB for *repeater type 2-O, NCR- type 1-H* (including Fwd and MT interfaces)*, NCR type 2-O* (including Fwd and MT interfaces)*,*. Requirements apply in both DL and UL unless otherwise stated or declared.

All requirements are defined for normal conditions, unless otherwise stated.

*------------------------------ Next modified section -------------------------*

### 7.2.2 Minimum requirement for NR repeater

The AoA of the input signal shall be the same as the reference direction for the *OTA peak directions set* when operating in the opposite DL/UL direction.

The requirements shall apply with NR signals in the *passband* of the repeater at:

The lowest input power (Pp,in,EIRP) that produces the *rated passband TRP output power* (Prated,p,TRP)

Up to:

The lowest input power (Pp,in,EIRP) that produces the *rated passband TRP output power* (Prated,p,TRP), plus 10dB

In normal conditions, the measured output power, Pmax,p,EIRP shall remain within +3.4 dB and -3.4 dB of the *rated beam EIRP output power* Prated,p,EIRP, declared by the manufacturer.

In extreme conditions, the measured output power, Pmax,p,,EIRP shall remain within +4.5 dB and -4.5 dB of the *rated beam EIRP output power* Prated,p,EIRP, declared by the manufacturer.

In normal conditions, the *repeater type 2-O* *maximum passband TRP output power*, Pmax,p,TRP measured at the RIB shall remain within ±3 dB of the *rated passband TRP output power* Prated,p,TRP, as declared by the manufacturer.

*------------------------------ Next modified section -------------------------*

#### 7.2.3.2 Minimum requirement for NCR-Fwd

##### 7.2.3.2.1 Minimum requirement for NCR-Fwd type 2-O

The AoA of the input signal shall be within the *Gain REFSENS RoAoA*.

The requirements shall apply with NR signals in the *passband* of the NCR-Fwd at:

- The lowest input power (Pp,in,EIRP) that produces the *rated passband TRP output power* (Prated,p,TRP)

Up to:

- The lowest input power (Pp,in,EIRP) that produces the *rated passband TRP output power* (Prated,p,TRP), plus 10dB

In normal conditions, the measured output power, Pmax,p,EIRP shall remain within +3.4 dB and -3.4 dB of the *rated beam EIRP output power* Prated,p,EIRP, declared by the manufacturer.

In extreme conditions, the measured output power, Pmax,p,,EIRP shall remain within +4.5 dB and -4.5 dB of the *rated beam EIRP output power* Prated,p,EIRP, declared by the manufacturer.

In normal conditions, the *repeater type 2-O* *maximum passband TRP output power*, Pmax,p,TRP measured at the RIB shall remain within ±3 dB of the *rated passband TRP output power* Prated,p,TRP, as declared by the manufacturer.

*------------------------------ Next modified section -------------------------*

### 7.8.2 Minimum Requirements for NR repeater

The requirement shall apply at the RIB when the AoA of the incident wave of a received signal in the *passband* and a received signal on an adjacent channel outside repeater *passband* is from the same direction and are the same as the TX reference direction for the opposite DL/UL setting*.*

For a repeater operating at *passband* operating in FR2, the ACRR requirements in table 7.8.2-1 shall apply in downlink. ACRR for downlink shall be higher than the value specified in the Table 7.8.2-1.

**Table 7.8.2-1: Repeater Downlink ACRR**

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit (dB) |
| NR | Wide Area repeater | BWNominal/2 | 28 (Note 2)  26 (Note 3) |
| Medium Range repeater | BWNominal/2 | 28 (Note 2)  26 (Note 3) |
| Local Area repeater | BWNominal/2 | 28 (Notes 1, 2)  26 (Note 1, 3) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*.  NOTE 2: Applicable to bands defined within the frequency spectrum range of 24.25 – 33.4 GHz.  NOTE 3: Applicable to bands defined within the frequency spectrum range of 37 – 52.6 GHz | | | |

For a repeater operating at *passband* operating in FR2, the ACRR requirements in table 7.8.2-2 shall apply in uplink. ACRR for uplink shall be higher than the value specified in the Table 7.8.2-2.

**Table 7.8.2-2: Repeater Uplink ACRR**

|  |  |  |  |
| --- | --- | --- | --- |
| Co-existence with other systems | Repeater Class | Channel offset from frequency edge of *passband* (MHz) | ACRR limit (dB) |
| NR | Wide Area repeater | BWNominal/2 | 28 (Note 2)  26 (Note 3) |
| Local Area repeater | BWNominal/2 | 17 (Note 1, 2)  16 (Note 1, 3) |
| NOTE 1: This requirement does not applicable if the *passband* occupies the entire *operating band*.  NOTE 2: Applicable to bands defined within the frequency spectrum range of 24.25 – 33.4 GHz.  NOTE 3: Applicable to bands defined within the frequency spectrum range of 37 – 52.6 GHz | | | |

*------------------------------ End of modified section -------------------------*