RP-040192

Title CRs (Rel-4 and Rel-5/Rel-6 Category A) to TS 25.104 & TS 25.141 for the

introduction of new requirement: Adjacent Channel Rejection Ratio for

Repeaters

Source TSG RAN WG4

Agenda Item 7.5.4

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title Wor			
R4-040380	25.106	033	1	F	Rel-4	4.7.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-REP		
R4-040381	25.106	034	1	Α	Rel-5	5.7.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-REP		
R4-040382	25.106	035	1	Α	Rel-6	6.0.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-REP		
R4-040383	25.143	044	1	F	Rel-4	4.9.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-Rep		
R4-040384	25.143	045	1	Α	Rel-5	5.7.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-Rep		
R4-040385	25.143	046	1	Α	Rel-6	6.0.0	New Adjacent Channel Rejection Ratio for Repeaters	RInImp-Rep		

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Adjacent Channel Rejection Ratio (ACRR) is the ratio of the RRC filtered mean power amplification weighted gain per carrier of the repeater in the pass band to the RRC filtered mean power amplification weighted gain of the repeater on an adjacent channel.

The measurements requirement shall apply to the Uplink and Downlink of Repeater where the donor link is maintained via antennas (over the air Repeater).

xx.24 Minimum Requirements

In normal conditions the ACRR shall be higher than the value specified in the Table xx.1.

Table xx.1: Repeater ACRR

Repeater maximum output power as in 9.1.1	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band.	ACRR limit
<u>P ≥> 31 dBm</u>	<u>5 MHz</u>	<u>33dB</u>
<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	<u>33dB</u>
<u>P <≤ 31 dBm</u>	<u>5 MHz</u>	<u>20dB</u>
P <≦ 31 dBm	10 MHz	20dB

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Table xx.1: Repeater ACRR

Repeater maximum	Channel offset from the centre	ACRR limit
output power as in	frequency of the first or last 5 MHz	
<u>9.1.1</u>	channel within the pass band.	
<u>P ≥> 31 dBm</u>	<u>5 MHz</u>	<u>33dB</u>
<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	<u>33dB</u>
<u>P <≤ 31 dBm</u>	<u>5 MHz</u>	<u>20dB</u>
P < <u>≤</u> 31 dBm	<u>10 MHz</u>	<u>20dB</u>

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xx.2 Minimum Requirements

In normal conditions the ACRR shall be higher than the value specified in the Table xx.1.

Table xx.1: Repeater ACRR

Repeater maximum output power as in 9.1.1	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band.	ACRR limit
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<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	<u>33dB</u>
<u>P <≤ 31 dBm</u>	<u>5 MHz</u>	<u>20dB</u>
P <≦ 31 dBm	10 MHz	20dB

xx.3 Test purpose

To verify that the Repeater ACRR requirement shall be met as specified in subclause xx.1.

xx.4 Method of test

xx.4.1 Initial conditions

- 1) Set-up the equipment as shown in annex A.
- 2) Connect the signal generator equipment to the Repeater input port.
- 3) Connect the power measuring equipment to the Repeater output port.
- 4) The measurement device characteristics shall be:
 - measurement filter bandwidth: defined in subclause xx.1;
 - detection mode: true RMS voltage or true average power.

xx.4.2 Procedure

- 1) Set the signal generator to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 25.141 at the first or last 5 MHz channel within the pass band.
- 2) Adjust the input power to the Repeater to create the maximum nominal Repeater output power at maximum gain
- 3) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 4) Set the signal generator to transmit the same signal and the same input power at one of the channel offsets according to Table xx.1.

- 5) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 6) Calculate the ratio of the measured power in the pass band to the measured power at the channel offset.
- 7) Repeat step 4) to 6) until all channel offsets in Table xx.1 are measured.

xx.4.3 Test Requirements

In normal conditions as specified in section 5.4.1, the ACRR shall be higher than the value specified in the Table xx.2.

Table xx.2: Repeater ACRR

Repeater maximum output power as in 9.1.1.1	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band.	ACRR limit
<u>P ≥> 31 dBm</u>	<u>5 MHz</u>	32,3dB
<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	32,3dB
<u>P ≤< 31 dBm</u>	<u>5 MHz</u>	<u>19,3dB</u>
P ≤< 31 dBm	<u>10 MHz</u>	19,3dB

Next changed section

5.1.2 Measurements of Repeater

Table 5.1: Maximum Test System Uncertainty

Subclause	Maximum Test System Uncertainty	Range over which Test System Uncertainty applies				
6.1 Maximum output power	±0,7 dB	,				
7 Frequency error	±12 Hz	Measurement results of ± 500 Hz				
8 Out of band gain	±0,5 dB Calibration of test set-up shall be made without D.U.T. in order to achieve the accuracy					
9.1 Spectrum emission mask	±1,5 dB					
	Due to carrier leakage for measurements specified in a 1MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy. The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base					
9.2 Spurious emissions	Station according toTS25.141 In UTRA and coexistence receive bands: for results > -60 dBm ±2,0 dB for results < -60 dBm ±3,0 dB Outside above range: emission power f ≤ 2,2 GHz ±1,5 dB; 2,2 GHz < f ≤ 4 GHz ±2,0 dB; f > 4 GHz ±4,0 dB.					
10.1 Error vector magnitude	The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according toTS25.141 ± 2,5 % (single code applied)	Measurement results from 12,5%				
To. 1 End vector magnitude	(±2,5 % (single code applied) (±2,5 % measurement error for single code). 5,0 % EVM in the stimulus signal (single code) will shift the EVM maximum value 0,7% to 18,2%. (RSS repeater EVM and Stimulus EVM.)	to 22,5% at signal power = P_max - 3dB to P_max - 18 dB				
10.2 Peak code domain error	±1,1dB Formula: RSS measurement error and impedance mismatch error (using ±1,0 dB measurement error and ±0,5 dB impedance mismatch error (stimulus side) assuming 14 dB return loss)	Measurement results from – 36 dB to – 30 dB, at signal power = P_max – 3 dB to P_max – 18 dB				
11 Input intermodulation Characteristics	±1,2 dB Formula: RSS CW1 level error, 2 x CW2 level error, and measurement error (using all errors = ±0,5 dB)					
12 Output Intermodulation	±2,1 dB Spectrum emission Formula: RSS 2x Interference signal level error and Spectrum emission measurement level error. (1 dB interference signal level error is assumed.) Due to carrier leakage for measurements specified in a 1MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy. The interference from the signal generator ACLR					

	shall be minimum 10 dB below that of a Base
	Station
	For spurious emission:
	In UTRA and coexistence receive bands:
	for results > -60 dBm ±2,0 dB
	for results < -60 dBm ±3,0 dB
	Outside above range:
	emission power
	f ≤ 2,2 GHz ±1,5 dB;
	2,2 GHz < f ≤ 4 GHz ±2,0 dB;
	f > 4 GHz ±4,0 dB.
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	The interference signal must have a spurious
	· · · · · · · · · · · · · · · · · · ·
	emission level at least 10 dB below the spurious
A 17 4 OL 1	levels required in 9.2.
xx Adjacent Channel	<u>±0,7 dB</u>
Rejection Ratio	

5.2 Repeater test tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

Table 5.2: Test Tolerance

Subclause	Test Tolerance	Notes
6.1 Maximum output power	0,7 dB	
9.1 Spectrum emission mask	1,5 dB	
9.2 Spurious emissions	0 dB	
7 Frequency error	12 Hz	
10.1 Error vector magnitude	0 %	Target value is shifted due to stimulus EVM
10.2 Peak code domain error	1,1 dB	
8 Out of band gain	0,5dB	
11 Input intermodulation Characteristics	1,2dB	
12 Output intermodulation	1,5 dB for spectrum emission 0 dB for spurious emission	
xx Adjacent Channel Rejection Ratio	<u>0,7 dB</u>	

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- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
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xx.1 Definitions and applicability

Adjacent Channel Rejection Ratio (ACRR) is the ratio of the RRC filtered mean power amplification weighted gain per carrier of the repeater in the pass band to the RRC filtered mean power amplification weighted gain of the repeater on an adjacent channel.

The measurements requirement shall apply to the Uplink and Downlink of Repeater where the donor link is maintained via antennas (over the air Repeater).

xx.2 Minimum Requirements

In normal conditions the ACRR shall be higher than the value specified in the Table xx.1.

Table xx.1: Repeater ACRR

Repeater maximum output power as in 9.1.1	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band.	ACRR limit
<u>P ≥> 31 dBm</u>	<u>5 MHz</u>	<u>33dB</u>
<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	<u>33dB</u>
<u>P <≤</u> 31 dBm	<u>5 MHz</u>	<u>20dB</u>
P <≦ 31 dBm	10 MHz	20dB

xx.3 Test purpose

To verify that the Repeater ACRR requirement shall be met as specified in subclause xx.1.

xx.4 Method of test

xx.4.1 Initial conditions

- 1) Set-up the equipment as shown in annex A.
- 2) Connect the signal generator equipment to the Repeater input port.
- 3) Connect the power measuring equipment to the Repeater output port.
- 4) The measurement device characteristics shall be:
 - measurement filter bandwidth: defined in subclause xx.1;
 - detection mode: true RMS voltage or true average power.

xx.4.2 Procedure

- 1) Set the signal generator to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model 1 in TS 25.141 at the first or last 5 MHz channel within the pass band.
- 2) Adjust the input power to the Repeater to create the maximum nominal Repeater output power at maximum gain
- 3) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 4) Set the signal generator to transmit the same signal and the same input power at one of the channel offsets according to Table xx.1.

- 5) Measure the RRC filtered mean power at the RF output port over a certain slot.
- 6) Calculate the ratio of the measured power in the pass band to the measured power at the channel offset.
- 7) Repeat step 4) to 6) until all channel offsets in Table xx.1 are measured.

xx.4.3 Test Requirements

In normal conditions as specified in section 5.4.1, the ACRR shall be higher than the value specified in the Table xx.2.

Table xx.2: Repeater ACRR

Repeater maximum output power as in 9.1.1.1	Channel offset from the centre frequency of the first or last 5 MHz channel within the pass band.	ACRR limit
P ≥> 31 dBm	<u>5 MHz</u>	<u>32,3dB</u>
<u>P ≥> 31 dBm</u>	<u>10 MHz</u>	<u>32,3dB</u>
<u>P ≤< 31 dBm</u>	<u>5 MHz</u>	<u>19,3dB</u>
<u>P <≦ 31 dBm</u>	<u>10 MHz</u>	<u>19,3dB</u>

Next changed section

5.1.2 Measurements of Repeater

Table 5.1: Maximum Test System Uncertainty

Subclause	Maximum Test System Uncertainty	Range over which Test System Uncertainty applies
6.1 Maximum output power	±0,7 dB	,
7 Frequency error	±12 Hz	Measurement results of ± 500 Hz
8 Out of band gain	±0,5 dB Calibration of test set-up shall be made without D.U.T. in order to achieve the accuracy	
9.1 Spectrum emission mask	±1,5 dB	
	Due to carrier leakage for measurements specified in a 1MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy. The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base	
9.2 Spurious emissions	Station according toTS25.141 In UTRA and coexistence receive bands: for results > -60 dBm ±2,0 dB for results < -60 dBm ±3,0 dB Outside above range: emission power f ≤ 2,2 GHz ±1,5 dB; 2,2 GHz < f ≤ 4 GHz ±2,0 dB; f > 4 GHz ±4,0 dB.	
10.1 Error vector magnitude	The interference from the signal generator ACLR shall be minimum 10 dB below that of a Base Station according toTS25.141 ± 2,5 % (single code applied)	Measurement results from 12,5%
To.1 End vector magnitude	(±2,5 % (single code applied) (±2,5 % measurement error for single code). 5,0 % EVM in the stimulus signal (single code) will shift the EVM maximum value 0,7% to 18,2%. (RSS repeater EVM and Stimulus EVM.)	to 22,5% at signal power = P_max - 3dB to P_max - 18 dB
10.2 Peak code domain error	±1,1dB Formula: RSS measurement error and impedance mismatch error (using ±1,0 dB measurement error and ±0,5 dB impedance mismatch error (stimulus side) assuming 14 dB return loss)	Measurement results from – 36 dB to – 30 dB, at signal power = P_max – 3 dB to P_max – 18 dB
11 Input intermodulation Characteristics	±1,2 dB Formula: RSS CW1 level error, 2 x CW2 level error, and measurement error (using all errors = ±0,5 dB)	
12 Output Intermodulation	±2,1 dB Spectrum emission Formula: RSS 2x Interference signal level error and Spectrum emission measurement level error. (1 dB interference signal level error is assumed.) Due to carrier leakage for measurements specified in a 1MHz bandwidth close to the carrier (4 MHz to 8 MHz), integration of the measurement using several narrower bandwidth measurements may be necessary in order to achieve the above accuracy. The interference from the signal generator ACLR	

	shall be minimum 10 dB below that of a Base Station	
	For spurious emission:	
	In UTRA and coexistence receive bands:	
	for results > -60 dBm±2,0 dB for results < -60 dBm±3,0 dB	
	Outside above range: emission power	
	$f \le 2,2 \text{ GHz} \pm 1,5 \text{ dB};$ 2,2 GHz < $f \le 4 \text{ GHz} \pm 2,0 \text{ dB};$	
	f > 4 GHz ±4,0 dB.	
	The interference signal must have a spurious emission level at least 10 dB below the spurious levels required in 9.2.	
13 Adjacent Channel	±0.7 dB	
Rejection Ratio		

5.2 Repeater test tolerances (informative)

The Test Tolerances defined in this subclause have been used to relax the Minimum Requirements in this specification to derive the Test Requirements.

The Test Tolerances are derived from Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the Test Tolerances may sometimes be set to zero.

The test tolerances should not be modified for any reason e.g. to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

Table 5.2: Test Tolerance

Subclause	Test Tolerance	Notes
6.1 Maximum output power	0,7 dB	
9.1 Spectrum emission mask	1,5 dB	
9.2 Spurious emissions	0 dB	
7 Frequency error	12 Hz	
10.1 Error vector magnitude	0 %	Target value is shifted due to stimulus EVM
10.2 Peak code domain error	1,1 dB	
8 Out of band gain	0,5dB	
11 Input intermodulation Characteristics	1,2dB	
12 Output intermodulation	1,5 dB for spectrum emission 0 dB for spurious emission	
13 Adjacent Channel Rejection Ratio	<u>0,7 dB</u>	

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<u>P <≤</u> 31 dBm	<u>5 MHz</u>	<u>20dB</u>
P <≦ 31 dBm	10 MHz	20dB

xx.3 Test purpose

To verify that the Repeater ACRR requirement shall be met as specified in subclause xx.1.

xx.4 Method of test

xx.4.1 Initial conditions

- 1) Set-up the equipment as shown in annex A.
- 2) Connect the signal generator equipment to the Repeater input port.
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xx.4.3 Test Requirements

In normal conditions as specified in section 5.4.1, the ACRR shall be higher than the value specified in the Table xx.2.

Table xx.2: Repeater ACRR

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Next changed section

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	f > 4 GHz ±4,0 dB.	
	The interference signal must have a spurious emission level at least 10 dB below the spurious levels required in 9.2.	
13 Adjacent Channel	±0.7 dB	
Rejection Ratio		

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13 Adjacent Channel Rejection Ratio	<u>0,7 dB</u>	