

TSG RAN Meeting #18
New Orleans, US, 3 - 6 December, 2002

RP-020794

Title CRs (Rel-4 and Rel-5 Category A) to TS 25.106 & TS 25.143 on "Out of band gain"
Source TSG RAN WG4
Agenda Item 7.4.4

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-021586	25.106	017		F	Rel-4	4.3.0	Out of band gain	RInImp-REP
R4-021587	25.106	018		A	Rel-5	5.2.0	Out of band gain	RInImp-REP
R4-021584	25.143	025		F	Rel-4	4.5.0	Out of band gain	RInImp-REP
R4-021585	25.143	026		A	Rel-5	5.2.0	Out of band gain	RInImp-REP

CR-Form-v7

CHANGE REQUEST

⌘ **25.106 CR 017** ⌘ rev ⌘ Current version: **4.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Out of band gain for Pout smaller than 31 dBm		
Source:	⌘ RAN WG4		
Work item code:	⌘ RInImp-REP	Date:	⌘ 26/11/2002
Category:	⌘ F	Release:	⌘ Rel-4
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction 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 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ The requirement for the out of band gain for Pout smaller than 31dBm was missing.
Summary of change:	⌘ The requirement for the out of band gain for Pout smaller than 31dBm is added. The smaller than or equal signs corrected.
Consequences if not approved:	⌘ The requirement for out of band gain is not complete.

Clauses affected:	⌘ 8.1								
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="width: 20px;">X</td> <td style="width: 20px;">X</td> </tr> <tr> <td style="width: 20px;">X</td> <td style="width: 20px;">X</td> </tr> </table> Other core specifications Test specifications O&M Specifications	Y	N	X	X	X	X	⌘	TS25.143
Y	N								
X	X								
X	X								
Other comments:	⌘ Equivalent CRs in other Releases: CR018 cat. A to 25.106 v5.2.0								

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/specs/CR.htm>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
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- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8 Out of band gain

Out of band gain refers to the gain of the repeater outside the operating band.

8.1 Minimum requirement

The intended use of a repeater in a system is to amplify the in band signals and not to amplify the out of band emission of the donor base station.

In the intended application of the repeater, the out of band gain is less than the donor coupling loss.

The repeater minimum donor coupling loss shall be declared by the manufacturer. This is this the minimum required attenuation between the donor BS and the repeater for proper repeater operation.

The gain outside the operating band shall not exceed the maximum level specified in table 8.1, where:

- f_{offset} is the distance from the centre frequency of the first or last 5 MHz channel within the operating band.

Table 8.1: Out of band gain limits 1

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35 dB

For $12,5 \text{ MHz} \leq f_{\text{offset}} < 4 \text{ MHz}$ the out of band gain shall not exceed the maximum gain of table 8.2 or the maximum gain stated in table 8.1 whichever is lower.

Table 8.2: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
$P < 31$ dBm	Out of band gain \leq minimum donor coupling loss t.b.d.
$31 \text{ dBm} \leq P \leq 43$ dBm	Out of band gain \leq minimum donor coupling loss
$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss – (P-43dBm)
Note:	The out of band gain is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$

CHANGE REQUEST

⌘ **25.106 CR 018** ⌘ rev ⌘ Current version: **5.2.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘	Out of band gain for Pout smaller than 31 dBm
Source:	⌘	RAN WG4
Work item code:	⌘	RInImp-REP
		Date: ⌘ 26/11/2002
Category:	⌘	A
		Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction 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 .
		Release: ⌘ Rel-5
		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘	The requirement for the out of band gain for Pout smaller than 31dBm was missing.
Summary of change:	⌘	The requirement for the out of band gain for Pout smaller than 31dBm is added. The smaller than or equal signs corrected.
Consequences if not approved:	⌘	The requirement for out of band gain is not complete.

Clauses affected:	⌘	8.1						
Other specs affected:	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications Test specifications O&M Specifications	Y	N	X	X	X	X
Y	N							
X	X							
X	X							
		⌘ TS25.143						
Other comments:	⌘	Equivalent CRs in other Releases: CR017 cat. F to 25.106 v4.3.0						

How to create CRs using this form:

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8 Out of band gain

Out of band gain refers to the gain of the repeater outside the operating band.

8.1 Minimum requirement

The intended use of a repeater in a system is to amplify the in band signals and not to amplify the out of band emission of the donor base station.

In the intended application of the repeater, the out of band gain is less than the donor coupling loss.

The repeater minimum donor coupling loss shall be declared by the manufacturer. This is this the minimum required attenuation between the donor BS and the repeater for proper repeater operation.

The gain outside the operating band shall not exceed the maximum level specified in table 8.1, where:

- f_{offset} is the distance from the centre frequency of the first or last 5 MHz channel within the operating band.

Table 8.1: Out of band gain limits 1

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35 dB

For $12,5 \text{ MHz} \leq f_{\text{offset}} < 4 \text{ MHz}$ the out of band gain shall not exceed the maximum gain of table 8.2 or the maximum gain stated in table 8.1 whichever is lower.

Table 8.2: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
$P < 31$ dBm	Out of band gain \leq minimum donor coupling loss t.b.d.
$31 \text{ dBm} \leq P \leq 43$ dBm	Out of band gain \leq minimum donor coupling loss
$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss – (P-43dBm)
Note:	The out of band gain is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$

CHANGE REQUEST

⌘ **25.143 CR 025** ⌘ rev ⌘ Current version: **4.5.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Out of band gain for Pout smaller than 31 dBm		
Source:	⌘ RAN WG4		
Work item code:	⌘ RInImp-REP	Date:	⌘ 26/11/2002
Category:	⌘ F	Release:	⌘ Rel-4
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)	2	(GSM Phase 2)
	A (corresponds to a correction in an earlier release)	R96	(Release 1996)
	B (addition of feature),	R97	(Release 1997)
	C (functional modification of feature)	R98	(Release 1998)
	D (editorial modification)	R99	(Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .	Rel-4	(Release 4)
		Rel-5	(Release 5)
		Rel-6	(Release 6)

Reason for change:	⌘ The requirement for the out of band gain for Pout smaller than 31dBm was missing.
Summary of change:	⌘ The requirement for the out of band gain for Pout smaller than 31dBm is added. The smaller than or equal signs corrected.
Consequences if not approved:	⌘ The requirement for out of band gain is not complete.

Clauses affected:	⌘ 8.2, 8.5										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">X</td> </tr> </table>	Y	N	X	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	X	Other core specifications	⌘ TS25.106
Y	N										
X	<input type="checkbox"/>										
<input type="checkbox"/>	X										
<input type="checkbox"/>	X										
		Test specifications									
		O&M Specifications									
Other comments:	⌘ Equivalent CRs in other Releases: CR026 cat. A to 25.143 v5.2.0										

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8 Out of band gain

8.1 Definitions and applicability

Out of band gain refers to the gain of the Repeater immediately outside the operating band. The measurements shall apply to both paths Uplink and Downlink of the Repeater.

8.2 Minimum Requirements

The intended use of a repeater in a system is to amplify the in band signals and not to amplify the out of band emission of the donor base station.

In the intended application of the repeater, the out of band gain is less than the donor coupling loss.

The repeater minimum donor coupling loss shall be declared by the manufacturer. This is this the minimum required attenuation between the donor BS and the repeater for proper repeater operation.

In normal conditions as specified in section 5.4.1 the gain outside the operating band shall not exceed the maximum level specified in Table 8.1, where:

- f_{offset} is the distance from the centre frequency of the first or last 5 MHz channel within the operating band.

Table 8.1: Out of band gain limits 1

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35 dB

For $12,5 \text{ MHz} \leq f_{\text{offset}} < 20 \text{ MHz}$ the out of band gain shall not exceed the maximum gain of table 8.2 or the maximum gain stated in table 8.1 whichever is lower.

Table 8.2: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
$P < 31$ dBm	Out of band gain \leq minimum donor coupling loss t.b.d.
$31 \text{ dBm} \leq P \leq 43$ dBm	Out of band gain \leq minimum donor coupling loss
$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss – (P-43dBm)
Note:	The out of band gain is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$

8.3 Test purpose

The purpose of this test is to verify that the Repeater meets the out of band gain requirements as specified in TS 25.106.

8.4 Method of test

8.4.1 Initial conditions

Set-up the equipment as shown in annex A.

The test shall be performed with an offset between CW-signal and the first or last 5 MHz channel within the operating band of 2,7 MHz, 3 MHz, 3,5 MHz, 5 MHz, 7,5 MHz, 10 MHz, 12,5 MHz, 15 MHz and 20 MHz, excluding other

operating bands. In addition the test shall also be performed for all harmonic frequencies of the repeaters operating band up to 12,75 GHz.

8.4.2 Procedure

- 1) Set the Repeater to maximum gain.
- 2) Set the signal generator to generate a CW-signal, applied to the input port of the Repeater. The power level of the RF input signal shall be at least 5 dB below the power level which, when applied within the operating band, would produce the maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is operating in the linear output range.
- 3) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded compared to table 8.3 or table 8.4 whichever is lower.
- 4) With the same input power as in step 1) set the repeater gain to the minimum specified by the manufacturer.
- 5) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded and compared to table 8.3 or table 8.4 whichever is lower.

8.5 Test requirements

Table 8.3: Out of band gain limits

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60,5 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45,5 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45,5 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35,5 dB

Table 8.4: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
$P < 31$ dBm	Out of band gain \leq minimum donor coupling loss + 0,5 dB b.d.
$31 \text{ dBm} \leq P \leq 43$ dBm	Out of band gain \leq minimum donor coupling loss + 0,5 dB
$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss - (P-43dBm) + 0,5 dB
Note: The donor coupling loss is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$	

CHANGE REQUEST

⌘ **25.143 CR 026** ⌘ rev ⌘ Current version: **5.2.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: UICC apps ME Radio Access Network Core Network

Title:	⌘ Out of band gain for Pout smaller than 31 dBm		
Source:	⌘ RAN WG4		
Work item code:	⌘ RInImp-REP	Date:	⌘ 26/11/2002
Category:	⌘ A	Release:	⌘ Rel-5
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction 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 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

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Clauses affected:	⌘ 8.2, 8.5										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications	Y	N	X	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>	X	⌘ TS25.106	
Y	N										
X	<input type="checkbox"/>										
<input type="checkbox"/>	X										
<input type="checkbox"/>	X										
Other comments:	⌘ Equivalent CRs in other Releases: CR025 cat. F to 25.143 v4.5.0										

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Table 8.2: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
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$P \geq 43$ dBm	Out of band gain \leq minimum donor coupling loss – (P-43dBm)
Note:	The out of band gain is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$

8.3 Test purpose

The purpose of this test is to verify that the Repeater meets the out of band gain requirements as specified in TS 25.106.

8.4 Method of test

8.4.1 Initial conditions

Set-up the equipment as shown in annex A.

The test shall be performed with an offset between CW-signal and the first or last 5 MHz channel within the operating band of 2,7 MHz, 3 MHz, 3,5 MHz, 5 MHz, 7,5 MHz, 10 MHz, 12,5 MHz, 15 MHz and 20 MHz, excluding other

operating bands. In addition the test shall also be performed for all harmonic frequencies of the repeaters operating band up to 12,75 GHz.

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- 3) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded compared to table 8.3 or table 8.4 whichever is lower.
- 4) With the same input power as in step 1) set the repeater gain to the minimum specified by the manufacturer.
- 5) The average output power in each case shall be measured using a spectrum analyser connected to the output port of the Repeater and the net gain shall be recorded and compared to table 8.3 or table 8.4 whichever is lower.

8.5 Test requirements

Table 8.3: Out of band gain limits

Frequency offset from the carrier frequency, f_{offset}	Maximum gain
$2,7 \leq f_{\text{offset}} < 3,5$ MHz	60,5 dB
$3,5 \leq f_{\text{offset}} < 7,5$ MHz	45,5 dB
$7,5 \leq f_{\text{offset}} < 12,5$ MHz	45,5 dB
$12,5 \text{ MHz} \leq f_{\text{offset}}$	35,5 dB

Table 8.4: Out of band gain limits 2

Repeater maximum output power as in 9.1.1.1	Maximum gain
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Note: The donor coupling loss is considered with $12,5 \text{ MHz} \leq f_{\text{offset}}$	