TSG RAN Meeting #21 **RP-030419**
Frankfurt, Germany, 16 - 19 September 2003

Title **CRs (Rel-5) to TS 25.106 & TS 25.143 (Repeaters specifications) on "Correction of naming of frequency bands and operating band. Introduction of pass band"**
Source **TSG RAN WG4**
Agenda Item **7.5.5**

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-020761	25.106	024		F	Rel-5	5.5.0	Correction of naming of frequency bands and operating band. Introduction of pass band	RInImp-REP
R4-020762	25.143	035		F	Rel-5	5.5.0	Correction of naming of frequency bands and operating band. Introduction of pass band	RInImp-REP

3GPP TSG RAN WG4 (Radio) Meeting #28 **R4-030761**

Sophia Antipolis, France 18 - 22 August 2003

CR-Form-v7

CHANGE REQUEST

⌘ **25.106** **CR** **024** ⌘ **rev** ⌘ Current version: **5.5.0** ⌘

*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:	⌘	Correction of naming of frequency bands and operating band. Introduction of pass band
Source:	⌘	RAN WG4
Work item code:	⌘	RInImp-REP
Date:	⌘	08/09/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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 naming of the frequency bands was the old version.
Summary of change:	⌘	Renaming of the frequency bands according to the other specification (e.g. 25.101 and 25.104). This caused a collison of the expression "operating band". The new expression for the repeater operating band is "pass band".
Consequences if not approved:	⌘	Naming of frequency bands in Repeater specification would differ from the other specifications.

Clauses affected:	⌘	3.1, 5, 6.1.1, 8, 9, 10, 11			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘ TS25.143
		X		Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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.

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.

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.

5 Frequency bands and channel arrangement

5.1 Frequency bands

a) A UTRA/FDD Repeater is designed to operate in one or several ~~operating~~ pass bands within either of the following paired frequency bands;

~~a) 1920 – 1980 MHz: Up-link (Mobile transmit, base receive)~~
~~2110 – 2170 MHz: Down-link (Base transmit, mobile receive)~~

~~b) 1850 – 1910 MHz: Up-link (Mobile transmit, base receive)~~
~~1930 – 1990 MHz: Down-link (Base transmit, mobile receive)~~
~~(Note 1)~~

Table 5.1: Frequency bands

Operating Band	UL Frequencies UE transmit, Node B receive	DL frequencies UE receive, Node B transmit
I	1920 – 1980 MHz	2110 –2170 MHz
II	1850 –1910 MHz	1930 –1990 MHz

~~NOTE 1: Used in Region 2. Additional allocations in ITU region 2 are FFS.~~

~~NOTE 2:~~ b) Deployment in other frequency bands is not precluded.

5.2 ~~Up-link to down-link~~ TX–RX frequency separation

a) A UTRA/FDD repeaters is designed to operate with the following TX to RX frequency separation

Table 5.2: TX–RX frequency separation

Operating Band	TX-RX frequency separation
I	190 MHz
II	80 MHz.

~~a) The minimum up-link to down-link frequency separation is 134.8 MHz and the maximum value is 245.2 MHz and all UTRA/FDD repeaters shall support an up-link to down-link frequency separation of 190 MHz when operating in the paired frequency band defined in sub-clause 5.1(a).~~

b) A UTRA/FDD repeater can support both fixed and variable up-link to down-link frequency separation.

~~c) When operating in the paired frequency band defined in sub-clause 5.1(b), all UTRA/FDD repeaters shall support an up-link to down-link frequency separation of 80 MHz.~~

~~d~~c) The use of other up-link to down-link frequency separations in existing or other frequency bands shall not be precluded.

5.3 Channel arrangement

5.3.1 Channel spacing

The nominal channel spacing is 5 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

5.3.2 Channel raster

The channel raster is 200 kHz, which for all bands except Band II means that the centre frequency must be an integer multiple of 200 kHz. In Band II, 12 additional centre frequencies are specified according to the table 5.3 and the centre frequencies for these channels are shifted 100 kHz relative to the normal raster.

5.3.3 Channel number

The carrier frequency is designated by the UTRA Absolute Radio Frequency Channel Number (UARFCN). The UARFCN values ~~of the UARFCN in the IMT2000 band is~~ are defined as follows:

Table 5.~~1~~3: UTRA Absolute Radio Frequency Channel Number

Up-link	$N_u = 5 * F_{uplink}$	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where F_{uplink} is the up-link frequency in MHz
Down-link	$N_d = 5 * F_{downlink}$	0.0 MHz ≤ $F_{downlink}$ ≤ 3276.6 MHz where $F_{downlink}$ is the down-link frequency in MHz

Table 5.4: UARFCN definition (Band II additional channels)

	UARFCN	Carrier Frequency [MHz]
Uplink	$N_u = 5 * (F_{uplink} - 1850.1\ MHz)$	F_{uplink} = 1852.5, 1857.5, 1862.5, 1867.5, 1872.5, 1877.5, 1882.5, 1887.5, 1892.5, 1897.5, 1902.5, 1907.5
Downlink	$N_d = 5 * (F_{downlink} - 1850.1\ MHz)$	$F_{downlink}$ = 1932.5, 1937.5, 1942.5, 1947.5, 1952.5, 1957.5, 1962.5, 1967.5, 1972.5, 1977.5, 1982.5, 1987.5

========== NEXT CHANGED SECTION ==========

9.2.2 Co-existence with UTRA-FDD BS

9.2.2.1 Operation in the same geographic area

This requirement shall be applied for the protection of UTRA-FDD BS receivers in geographic areas in which UTRA-FDD Repeater and UTRA-FDD BS are deployed. The requirement applies only to the down-link direction of the Repeater.

9.2.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 9.7A: UTRA Repeater Spurious emissions limits in geographic coverage area of UTRA FDD BS receiver

Operating Band	Band	Maximum Level	Measurement Bandwidth	Note
I	1920 - 1980MHz ~~For operation in Frequency Bands defined in sub-clause 5.1(a)~~	-96 dBm	100 kHz	
II	1850 - 1910 MHz ~~For operation in Frequency Bands defined in sub-clause 5.1(b)~~	-96 dBm	100kHz	

9.2.2.2 Co-location with UTRA-FDD BS

This requirement may be applied for the protection of UTRA-FDD BS receivers when UTRA-FDD Repeater and UTRA-FDD BS are co-located. The requirement applies only to the down-link direction of the repeater.

9.2.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 9.8: UTRA Repeater spurious emissions limits for protection of co-located UTRA FDD BS receiver

Operating Band	Band	Maximum Level	Measurement Bandwidth	Note
I	1920 - 1980MHz ~~For operation in Frequency Bands defined in sub-clause 5.1(a)~~	-96 dBm	100 kHz	
II	1850-1910 MHz ~~For operation in Frequency Bands defined in sub-clause 5.1(b)~~	-96 dBm	100kHz	

========== NEXT CHANGED SECTION ==========

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Donor coupling loss: is the coupling loss between the repeater and the donor base station.

Down-link: Signal path where base station transmits and mobile receives.

~~Operating~~ Pass band: The repeater can have one or several ~~operating~~ pass bands. The ~~operating~~pass band is the frequency range that the repeater operates in with operational configuration. This frequency range can correspond to one or several consecutive nominal 5 MHz channels. If they are not consecutive each subset of channels shall be considered as an individual ~~operating~~ pass band.

Repeater: A device that receives, amplifies and transmits the radiated or conducted RF carrier both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station)

Up-link: Signal path where mobile transmits and base station receives.

========== NEXT CHANGED SECTION ==========

6.1 Maximum output power

Maximum output power, Pmax, of the repeater is the mean power level per carrier measured at the antenna connector in specified reference condition.

6.1.1 Minimum Requirements

The requirements shall apply at maximum gain, with WCDMA signals in the ~~operating~~ pass band of the repeater, at levels that produce the maximum rated output power per channel.

When the power of all signals is increased by 10 dB, compared to the power level that produce the maximum rated output power, the requirements shall still be met.

In normal conditions, the Repeater maximum output power shall remain within limits specified in Table 6.1 relative to the manufacturer's rated output power.

Table 6.1: Repeater output power; normal conditions

Rated output power	Limit
P ≥ 43 dBm	+2 dB and -2 dB
39 ≤ P < 43 dBm	+2 dB and -2 dB
31 ≤ P < 39 dBm	+2 dB and -2 dB
P < 31 dBm	+3 dB and -3 dB

In extreme conditions, the Repeater maximum output power shall remain within the limits specified in Table 6.2 relative to the manufacturer's rated output power.

Table 6.2: Repeater output power; extreme conditions

Rated output power	Limit
P ≥ 43 dBm	+2,5 dB and -2,5 dB
39 ≤ P < 43 dBm	+2,5 dB and -2,5 dB
31 ≤ P < 39 dBm	+2,5 dB and -2,5 dB
P < 31 dBm	+4 dB and -4 dB

In certain regions, the minimum requirement for normal conditions may apply also for some conditions outside the ranges of conditions defined as normal.

========== NEXT CHANGED SECTION ==========

8 Out of band gain

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

Table 8.1: Out of band gain limits 1

Frequency offset from the carrier frequency, f_offset	Maximum gain
2,7 ≤ f_offset < 3,5 MHz	60 dB
3,5 ≤ f_offset < 7,5 MHz	45 dB
7,5 ≤ f_offset < 12,5 MHz	45 dB
12,5 MHz ≤ f_offset	35 dB

For 12,5 MHz ≤ f_offset 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 ≤ minimum donor coupling loss
31 dBm ≤ P < 43 dBm	Out of band gain ≤ minimum donor coupling loss
P ≥ 43 dBm	Out of band gain ≤ minimum donor coupling loss – (P-43dBm)
Note 1: The out of band gain is considered with 12,5 MHz ≤ f_offset	

9 Unwanted emission

9.1 Out of band emission

Out of band emissions are unwanted emissions immediately outside the ~~operating~~pass band resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission requirement is specified in terms of a spectrum emission mask.

9.1.1 Spectrum emission mask

The mask defined in tables 9.1 to 9.4 below may be mandatory in certain regions. In other regions this mask may not be applied.

For regions where this clause applies, the requirement shall be met by a repeater's RF-signal output at maximum gain with WCDMA signals in the ~~operating~~pass band of the repeater, at levels that produce the maximum rated output power per channel. The requirements shall also apply at maximum gain without WCDMA signals in the ~~operating~~pass band.

Emissions shall not exceed the maximum level specified in tables 9.1 to 9.4 for the appropriate repeater maximum output power, in the frequency range from Δf = 2,5 MHz to Δf_{max} from the 5 MHz channel, where:

- Δf is the separation between the centre frequency of first or last 5 MHz channel used in the ~~operating~~pass band and the nominal –3 dB point of the measuring filter closest to the carrier frequency.
- f_offset is the separation between the centre frequency of first or last 5 MHz channel in the ~~operating~~pass band and the centre of the measuring filter.
- f_offset_{max} is either 12,5 MHz or the offset to the UTRA band edge at both up- and down-link as defined in section 5.1, whichever is the greater.
- Δf_{max} is equal to f_offset_{max} minus half of the bandwidth of the measurement filter.

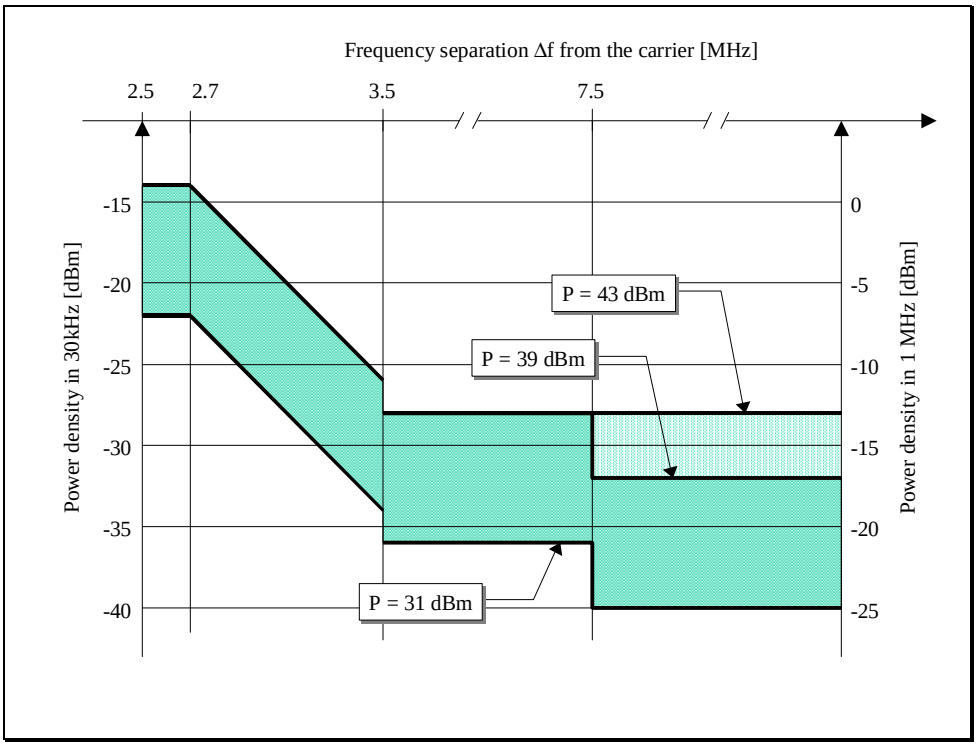

Figure 9.1: Illustrative diagram of spectrum emission mask

Table 9.1: Spectrum emission mask values, maximum output power P ≥ 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-14 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-14\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right) \text{dB}$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-26 dBm	30 kHz
3,5 MHz ≤ Δf ≤ f_{max}	4,0MHz ≤ f_offset < f_offset_{max}	-13 dBm	1 MHz

Table 9.2: Spectrum emission mask values, maximum output power 39 ≤ P < 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-14 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-14\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right) \text{dB}$	30 kHz
(see note)	3,515MHz ≤ f_offset < 4,0MHz	-26 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0MHz ≤ f_offset < 8,0MHz	-13 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P - 56 dB	1 MHz

Table 9.3: Spectrum emission mask values, maximum output power 31 ≤ P < 39 dBm

Frequency offset of measurement filter – 3dB point,Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	P - 53 dB	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$P - 53dB - 15 \cdot \left(\frac{f\_offset}{MHz} - 2,715 \right) dB$	30 kHz
(see note)	3,515MHz ≤ f_offset < 4,0MHz	P-65 dB	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0MHz ≤ f_offset < 8,0MHz	P - 52 dB	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P - 56 dB	1 MHz

Table 9.4: Spectrum emission mask values, maximum output power P < 31 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-22 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-22dBm - 15 \cdot \left(\frac{f\_offset}{MHz} - 2,715 \right) dB$	30 kHz
(see note)	3,515MHz ≤ f_offset < 4,0MHz	-34 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0MHz ≤ f_offset < 8,0MHz	-21 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	-25 dBm	1 MHz

NOTE: This frequency range ensures that the range of values of f_offset is continuous.

9.2 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the repeaters RF output port.

Unless otherwise stated, all requirements are measured as mean power.

9.2.1 General Requirements

The requirements of either subclause 9.2.1.1 or subclause 9.2.1.2 shall apply whatever the type of repeater considered (one or several ~~operating~~pass bands). It applies for all configurations foreseen by the manufacturer's specification.

Either requirement applies at frequencies within the specified frequency ranges that are more than 12,5 MHz below the centre frequency of the first 5 MHz channel or more than 12,5 MHz above the centre frequency of the last 5 MHz channel in the ~~operating~~pass band.

9.2.1.1 Minimum Requirement (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [1], are applied.

At maximum repeater gain, with WCDMA signals in the ~~operating~~pass band of the repeater, at levels that produce the maximum rated output power per channel, the power of any spurious emission shall not exceed the limits specified in table 9.5. The requirements shall also apply at maximum gain without WCDMA signals in the ~~operating~~pass band.

When the power in all channels is increased by 10 dB, compared to the input level producing the maximum rated output power, the requirement shall still be met.

Table 9.5: Up-link and down-link: General spurious emissions limits, Category A

Band	Maximum level	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
1GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329 [1], s2.5 table 1

9.2.1.2 Minimum Requirement (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [1], are applied.

At maximum repeater gain, with WCDMA signals in the ~~operating~~pass band of the repeater, at levels that produce the maximum rated power output per channel, the power of any spurious emission shall not exceed the limits specified in tables 9.6 and 9.7 for the down- and up-link, respectively. The requirements shall also apply at maximum gain without WCDMA signals in the ~~operating~~pass band.

When the power in all channels is increased by 10 dB, compared to the input level producing the maximum rated output power, the requirement shall still be met.

Table 9.6: Down-link: General spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329, s4.1
1GHz ↔ Fc1 - 60 MHz or 2100 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [1], s4.1
Fc1 – 60 MHz or 2100 MHz *whichever is the higher* ↔ Fc1 – 50 MHz or 2100 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc1 – 50 MHz or 2100 MHz *whichever is the higher* ↔ Fc2 + 50 MHz or 2180 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc2 + 50 MHz or 2180 MHz *whichever is the lower* ↔ Fc2 + 60 MHz or 2180 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc2 + 60 MHz or 2180 MHz *whichever is the lower* ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [1], s4.1. Upper frequency as in ITU-R SM.329 [1], s2.5 table 1

Table 9.7: Up-link: General spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329 [1], s4.1
1GHz ↔ Fc1 - 60 MHz or 1910 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [1], s4.1
Fc1 – 60 MHz or 1910 MHz *whichever is the higher* ↔ Fc1 – 50 MHz or 1910 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc1 – 50 MHz or 1910 MHz *whichever is the higher* ↔ Fc2 + 50 MHz or 1990 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc2 + 50 MHz or 1990 MHz *whichever is the lower* ↔ Fc2 + 60 MHz or 1990 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [1], s4.3 and Annex 7
Fc2 + 60 MHz or 1990 MHz *whichever is the lower* ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [1], s4.1. Upper frequency as in ITU-R SM.329 [1], s2.5 table 1

Fc1: Centre frequency of emission of the first 5 MHz channel in an ~~operating~~pass band.

Fc2: Centre frequency of emission of the last 5 MHz channel in an ~~operating~~pass band.

========== NEXT CHANGED SECTION ==========

10 Modulation accuracy

10.1 Error Vector Magnitude

The modulation accuracy is defined by the Error Vector Magnitude (EVM), which is a measure of the difference between the theoretical waveform and a modified version of the measured waveform. This difference is called the error vector. The measured waveform is modified by first passing it through a matched root raised cosine filter with bandwidth 3.84 MHz and roll-off α=0.22. The waveform is then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as root of the ratio of the mean error vector power to the mean reference signal power expressed as a %.

The measurement interval is one power control group (timeslot). The repeater shall operate with an ideal WCDMA signal in the ~~operating~~pass band of the repeater at a level, which produce the maximum rated output power per channel, as specified by the manufacturer.

10.1.1 Minimum requirement

The Error Vector Magnitude shall not be worse than 12,5 %.

10.2 Peak code domain error

The peak code domain error is computed by projecting the power of the error vector (as defined in subclause 10.1) onto the code domain at a specified spreading factor. The code domain error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The peak code domain error is defined as the maximum value for the code domain error for all codes. The measurement interval is one power control group (timeslot).

10.2.1 Minimum requirement

The peak code domain error shall not exceed -35 dB at spreading factor 256.

11 Input Intermodulation

The input intermodulation is a measure of the capability of the repeater to inhibit the generation of interference in the ~~operating~~pass band, in the presence of interfering signals on frequencies other than the ~~operating~~pass band.

11.1 General Requirement

The following requirement applies for interfering signals in the frequency bands defined in sub-clause 5.1~~(a) or 5.1(b)~~, depending on the repeaters ~~operating~~pass band. The requirement shall bet met with the repeater ~~operating~~pass at maximum gain.

11.1.1 Minimum requirement

For the parameters specified in table 11.1, the power in the ~~operating~~pass band, shall not increase with more than 10 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

The frequency separation between the two interfering signals shall be adjusted so that the 3rd order intermodulation product is positioned in the centre of the ~~operating~~pass band.

Table 11.1 specifies the parameters for two interfering signals, where:

– f_offset is the separation between the centre frequency of first or last 5 MHz channel in the ~~operating~~pass band and one the interfering signals.

Table 11.1: Input intermodulation requirement

f_offset	Interfering Signal Levels	Type of signals	Measurement bandwidth
3,5 MHz	-40 dBm	2 CW carriers	1 MHz

11.2 Co-location with GSM 900 and/or DCS 1800

The following requirement may be applied when GSM 900 BTS and/or DCS 1800 BTS and UTRA-FDD Repeaters are co-located. The requirement shall bet met with the repeater ~~operating~~pass at maximum gain.

11.2.1 Minimum requirements

For the parameters specified in table 11.2, the power in the ~~operating~~pass band shall not increase with more than 10 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

The frequency separation between the two interfering signals shall be adjusted so that the lowest order intermodulation product is positioned in the centre of the ~~operating~~pass band.

NOTE 1: The lowest intermodulation products corresponds to the 4th and 3rd order for the GSM 900 and DCS 1800 bands, respectively.

Table 11.2: Input intermodulation requirements for interfering signals in the GSM 900 and DCS 1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
921 - 960 MHz	+16 dBm	2 CW carriers	1 MHz
1805 - 1880 MHz	+16 dBm	2 CW carriers	1 MHz

11.3 Co-existence with GSM 900 and/or DCS 1800

The following requirement may be applied when GSM 900 BTS and/or DCS 1800 BTS and UTRA-FDD Repeaters co-exist. The requirement shall bet met with the repeater ~~operating~~pass at maximum gain.

11.3.1 Minimum requirements

For the parameters specified in table 11.3, the power in the ~~operating~~pass band shall not increase with more than 10 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

The frequency separation between the two interfering signals shall be adjusted so that the lowest order intermodulation product is positioned in the centre of the ~~operating~~pass band.

NOTE 1: The lowest intermodulation products corresponds to the 4th and 3rd order for the GSM 900 and DCS 1800 bands, respectively.

Table 11.3: Input intermodulation requirements for interfering signals in the GSM 900 and DCS 1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
876 - 915 MHz	–15 dBm	2 CW carriers	1 MHz
1710 - 1785 MHz	–15 dBm	2 CW carriers	1 MHz

12 Output intermodulation

3GPP TSG RAN WG4 (Radio) Meeting #28 **R4-030762**

Sophia Antipolis, France 18 - 22 August 2003

CR-Form-v7

CHANGE REQUEST

⌘ **25.143** **CR** **035** ⌘ **rev** ⌘ Current version: **5.5.0** ⌘

*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:	⌘	Correction of naming of frequency bands and operating band. Introduction of pass band
Source:	⌘	RAN WG4
Work item code:	⌘	RInImp-REP
Date:	⌘	08/09/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one 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 one 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 naming of the frequency bands was the old version.
Summary of change:	⌘	Renaming of the frequency bands according to the other specification (e.g. 25.141). This caused a collison of the expression "operating band". The new expression for the repeater operating band is "pass band".
Consequences if not approved:	⌘	Naming of frequency bands in Repeater specification would differ from the other specifications.

Clauses affected:	⌘	3.1, 4, 8, 9, 11, 12

	Y	N			
Other specs affected:	X		Other core specifications	⌘	TS25.106
		X	Test specifications		
		X	O&M Specifications		

Other comments: ⌘

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.
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.

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.

4 Frequency bands and channel arrangement

4.1 Frequency bands

a) A UTRA/FDD Repeater is designed to operate in one or several ~~operating~~ pass bands within either of the following paired frequency bands;

~~a) 1920 – 1980 MHz: Up-link (Mobile transmit, base receive)~~
~~2110 – 2170 MHz: Down-link (Base transmit, mobile receive)~~

~~b) 1850 – 1910 MHz: Up-link (Mobile transmit, base receive)~~
~~1930 – 1990 MHz: Down-link (Base transmit, mobile receive)~~
~~(Note 1)~~

Table 4.1: Frequency bands

Operating Band	UL Frequencies UE transmit, Node B receive	DL frequencies UE receive, Node B transmit
I	1920 – 1980 MHz	2110 –2170 MHz
II	1850 –1910 MHz	1930 –1990 MHz

~~NOTE 1: Used in Region 2. Additional allocations in ITU region 2 are FFS.~~

~~NOTE 2:~~ b) Deployment in other frequency bands is not precluded.

4.2 ~~Up-link to down-link~~ TX–RX frequency separation

a) A UTRA/FDD repeaters is designed to operate with the following TX to RX frequency separation

Table 4.2: TX–RX frequency separation

Operating Band	TX-RX frequency separation
I	190 MHz
II	80 MHz.

~~a) The minimum up-link to down-link frequency separation is 134.8 MHz and the maximum value is 245.2 MHz and all UTRA/FDD repeaters shall support an up-link to down-link frequency separation of 190 MHz when operating in the paired frequency band defined in sub-clause 5.1(a).~~

b) A UTRA/FDD repeater can support both fixed and variable up-link to down-link frequency separation.

~~c) When operating in the paired frequency band defined in sub-clause 5.1(b), all UTRA/FDD repeaters shall support an up-link to down-link frequency separation of 80 MHz.~~

~~d~~c) The use of other up-link to down-link frequency separations in existing or other frequency bands shall not be precluded.

4.3 Channel arrangement

4.3.1 Channel spacing

The nominal channel spacing is 5 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

4.3.2 Channel raster

The channel raster is 200 kHz, which for all bands except Band II means that the centre frequency must be an integer multiple of 200 kHz. In Band II, 12 additional centre frequencies are specified according to the table 4.3 and the centre frequencies for these channels are shifted 100 kHz relative to the normal raster.

4.3.3 Channel number

The carrier frequency is designated by the UTRA Absolute Radio Frequency Channel Number (UARFCN). The UARFCN values ~~of the UARFCN in the IMT2000 band is~~ are defined as follows:

Table 4.~~1~~3: UTRA Absolute Radio Frequency Channel Number

Up-link	$N_u = 5 * F_{uplink}$	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where F_{uplink} is the up-link frequency in MHz
Down-link	$N_d = 5 * F_{downlink}$	0.0 MHz ≤ $F_{downlink}$ ≤ 3276.6 MHz where $F_{downlink}$ is the down-link frequency in MHz

Table 5.2: UARFCN definition (Band II additional channels)

	UARFCN	Carrier Frequency [MHz]
Uplink	$N_u = 5 * (F_{uplink} - 1850.1\ MHz)$	F_{uplink} = 1852.5, 1857.5, 1862.5, 1867.5, 1872.5, 1877.5, 1882.5, 1887.5, 1892.5, 1897.5, 1902.5, 1907.5
Downlink	$N_d = 5 * (F_{downlink} - 1850.1\ MHz)$	$F_{downlink}$ = 1932.5, 1937.5, 1942.5, 1947.5, 1952.5, 1957.5, 1962.5, 1967.5, 1972.5, 1977.5, 1982.5, 1987.5

========== NEXT CHANGED SECTION ==========

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Donor coupling loss: is the coupling loss between the repeater and the donor base station.

D~~d~~own-link: signal path where base station transmits and mobile receives

Maximum output power, Pmax: This is the mean power level per carrier measured at the antenna connector of the Repeater in specified reference condition.

~~operating~~Pass band: the Repeater can have one or several ~~operating~~pass bands. The ~~operating~~pass band is the frequency range that the Repeater operates in with operational configuration. This frequency range can correspond to one or several consecutive nominal 5 MHz channels. If they are not consecutive each subset of channels shall be considered as an individual ~~operating~~pass band.

Repeater: a device that receives, amplifies and transmits the radiated or conducted RF carrier both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station).

U~~u~~p-link: signal path where mobile transmits and base station receives.

========== NEXT CHANGED SECTION ==========

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~~pass 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~~pass 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~~pass band.

Table 8.1: Out of band gain limits 1

Frequency offset from the carrier frequency, f_offset	Maximum gain
2,7 ≤ f_offset < 3,5 MHz	60 dB
3,5 ≤ f_offset < 7,5 MHz	45 dB
7,5 ≤ f_offset < 12,5 MHz	45 dB
12,5 MHz ≤ f_offset	35 dB

For 12,5 MHz ≤ f_offset 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 ≤ minimum donor coupling loss
31 dBm ≤ P < 43 dBm	Out of band gain ≤ minimum donor coupling loss
P ≥ 43 dBm	Out of band gain ≤ minimum donor coupling loss – (P-43dBm)
Note: The out of band gain is considered with 12,5 MHz ≤ f_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~~pass 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~~pass bands. In addition the test shall also be performed for all harmonic frequencies of the repeaters ~~operating~~pass 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~~pass band, would produce the maximum rated output power, as declared by the manufacturer. This is to ensure that the equipment is ~~operating~~pass 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 ≤ f_offset < 3,5 MHz	60,5 dB
3,5 ≤ f_offset < 7,5 MHz	45,5 dB
7,5 ≤ f_offset < 12,5 MHz	45,5 dB
12,5 MHz ≤ f_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 ≤ minimum donor coupling loss + 0,5 dB
31 dBm ≤ P < 43 dBm	Out of band gain ≤ minimum donor coupling loss + 0,5 dB
P ≥ 43 dBm	Out of band gain ≤ minimum donor coupling loss – (P-43dBm) + 0,5 dB
Note: The donor coupling loss is considered with 12,5 MHz ≤ f_offset	

9 Unwanted emission

9.1 Out of band emission

Out of band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask.

9.1.1 Spectrum emission mask

9.1.1.1 Definitions and applicability

The masks defined in Table 9.1, Table 9.2, Table 9.3, and Table 9.4 below may be mandatory in certain regions. In other regions this mask may not be applied.

9.1.1.2 Minimum Requirements

For regions where this clause applies, the requirement shall be met by a repeater's RF-signal output at maximum gain with WCDMA signals in the ~~operating~~pass band of the Repeater, at levels that produce the maximum rated output power per channel. In normal conditions as specified in section 5.4.1 emissions shall not exceed the maximum level specified in Table 9.1, Table 9.2, Table 9.3, and Table 9.4 for the appropriate Repeater maximum output power, in the frequency range from Δf = 2,5 MHz to Δf_{max} from the 5 MHz channel, where:

- Δf is the separation between the centre frequency of first or last 5 MHz channel used in the ~~operating~~pass band and the nominal –3 dB point of the measuring filter closest to the carrier frequency.
- f_offset is the separation between the centre frequency of first or last 5 MHz channel in the ~~operating~~pass band and the centre of the measuring filter.
- f_offset_{max} is either 12,5 MHz or the offset to the UTRA band edge at both up- and down-link as defined in section 4.1, whichever is the greater.
- Δf_{max} is equal to f_offset_{max} minus half of the bandwidth of the measurement filter.

If the ~~operating~~pass band corresponds to two or more consecutive nominal 5 MHz channels, the requirement shall be met with any combination of two WCDMA modulated signals of equal power in the repeaters ~~operating~~pass band.

To select the table of the maximum level for the spectrum emission mask test, use the maximum output power as defined in subclause 3.1 Definition. If one channel is used for the spectrum emission mask test use this power for the selection. If two channels are used for the spectrum emission mask test use the power of one of these.

Table 9.1: Spectrum emission mask values, maximum output power P ≥ 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-14 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-14\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right)\text{dB}$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-26 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-13 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0 MHz ≤ f_offset < f_offset_{max}	-13 dBm	1 MHz

Table 9.2: Spectrum emission mask values, maximum output power 39 ≤ P < 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-14 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-14\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right)\text{dB}$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-26 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-13 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P - 56 dB	1 MHz

Table 9.3: Spectrum emission mask values, maximum output power 31 ≤ P < 39 dBm

Frequency offset of measurement filter – 3dB point,Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	P - 53 dB	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$P - 53dB - 15 \cdot \left(\frac{f\_offset}{MHz} - 2,715 \right) dB$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	P - 65 dB	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	P - 52 dB	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P - 56 dB	1 MHz

Table 9.4: Spectrum emission mask values, maximum output power P < 31 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-22 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-22dBm - 15 \cdot \left(\frac{f\_offset}{MHz} - 2,715 \right) dB$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-34 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-21 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	-25 dBm	1 MHz

9.1.1.3 Test purpose

The purpose of this test is to verify that the Repeater meet the spectrum emission requirements as specified in TS 25.106.

9.1.1.4 Method of test

9.1.1.4.1 Initial conditions

1) Set-up the equipment as shown in annex A.

2) Connect a signal generator to the input port of the Repeater for tests of repeaters with an ~~operating~~pass band corresponding to one 5 MHz channel. If the ~~operating~~pass band corresponds to two or more 5 MHz carriers, two signal generators with a combining circuit or one signal generator with the ability to generate several WCDMA carriers is connected to the input.

3) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.

4) Measurements with an offset from the carrier centre frequency between 4,0 MHz and (Δfmax – 500 kHz) shall use a 1 MHz measurement bandwidth. The 1MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements.

5) Detection mode: True RMS.

9.1.1.4.2 Procedures

1) Set the Repeater to maximum gain.

2) Set the signal generator(s) to generate signal(s) in accordance to test model 1, TS 25.141 subclause 6.2.1.1.1, at level(s) which produce the manufacturer specified maximum output power at maximum gain.

3) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

4) Increase the power with 10 dB compare to the level obtained in step 2.

5) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

6) If the ~~operating~~pass band corresponds to two or more consecutive nominal 5 MHz channels, repeat step 1) to 5) with any combination of two WCDMA modulated signals of equal power in the repeaters ~~operating~~pass band.

7) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

8) Repeat the test for the opposite path of the Repeater.

9.1.1.5 Test requirements

The measurement result of step 3 and 5 of 9.1.4.2 shall not exceed the maximum level specified in tables 9.5 to 9.8 for the appropriate Repeater maximum output power.

Table 9.5: Spectrum emission mask values, maximum output power P ≥ 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-12,5 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-12{,}5\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right) \text{dB}$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-24,5 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-11,5 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0 MHz ≤ f_offset < f_offset_{max}	-11,5 dBm	1 MHz

Table 9.6: Spectrum emission mask values, maximum output power 39 ≤ P < 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-12,5 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-12{,}5\text{dBm} - 15 \cdot \left(\frac{\text{f\_offset}}{\text{MHz}} - 2{,}715 \right) \text{dB}$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-24,5 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-11,5 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P – 54,5 dB	1 MHz

Table 9.7: Spectrum emission mask values, maximum output power 31 ≤ P < 39 dBm

Frequency offset of measurement filter – 3dB point,Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	P – 51,5 dB	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$P - 51{,}5dB - 15 \cdot \left(\frac{f\_offset}{MHz} - 2{,}715 \right) dB$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	P – 63,5 dB	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	P – 50,5 dB	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	P – 54,5 dB	1 MHz

Table 9.8: Spectrum emission mask values, maximum output power P < 31 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2,5 MHz ≤ Δf < 2,7 MHz	2,515MHz ≤ f_offset < 2,715MHz	-20,5 dBm	30 kHz
2,7 MHz ≤ Δf < 3,5 MHz	2,715MHz ≤ f_offset < 3,515MHz	$-20{,}5dBm - 15 \cdot \left(\frac{f\_offset}{MHz} - 2{,}715 \right) dB$	30 kHz
	3,515MHz ≤ f_offset < 4,0MHz	-32,5 dBm	30 kHz
3,5 MHz ≤ Δf < 7,5 MHz	4,0 MHz ≤ f_offset < 8,0MHz	-19,5 dBm	1 MHz
7,5 MHz ≤ Δf ≤ f_{max}	8,0MHz ≤ f_offset < f_offset_{max}	-23,5 dBm	1 MHz

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 5.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex B.

9.2 Spurious emissions

9.2.1 Definition and applicability

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the Repeater output port.

The requirements of either subclause 9.2.2.1 or subclause 9.2.2.2 shall apply whatever the type of Repeater considered (one or several ~~operating~~pass bands). It applies for all configurations foreseen by the manufacturer's specification.

Either requirement applies at frequencies within the specified frequency ranges that are more than 12,5 MHz below the centre frequency of the first 5 MHz channel or more than 12,5 MHz above the centre frequency of the last 5 MHz channel in the ~~operating~~pass band.

Unless otherwise stated, all requirements are measured as mean power (RMS).

9.2.2 Minimum Requirements

In normal conditions as specified in section 5.4.1 the following requirements shall be met.

9.2.2.1 Spurious emission (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-9 [4], are applied.

At maximum Repeater gain, with WCDMA signals in the ~~operating~~pass band of the Repeater, at levels that produce the maximum rated output power per channel, the power of any spurious emission shall not exceed the limits specified in Table 9.9.

When the power in all channels is increased by 10 dB the requirements shall still be met.

The requirement shall apply both with or without an input signal applied.

NOTE 1: If the ~~operating~~pass band corresponds to two or more consecutive nominal 5 MHz channels, the requirement shall be met with any combination of two WCDMA modulated signals of equal power in the repeaters ~~operating~~pass band.

Table 9.9: Up-link and down-link: General spurious emissions limits, Category A

Band	Maximum level	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
1GHz – 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329 [4], s2.5 table 1

9.2.2.2 Spurious emission (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329 [4], are applied.

At maximum Repeater gain, with WCDMA signals in the ~~operating~~pass band of the Repeater, at levels that produce the maximum rated power output per channel, the power of any spurious emission shall not exceed the limits specified in Table 9.10 and Table 9.11 for the down- and up-link, respectively.

When the power in all channels is increased by 10 dB the requirements shall still be met.

The requirement shall apply both with or without an input signal applied.

NOTE 1: If the ~~operating~~pass band corresponds to two or more consecutive nominal 5 MHz channels, the requirement shall be met with any combination of two WCDMA modulated signals of equal power in the repeaters ~~operating~~pass band.

Table 9.10: Down-link: General spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
1GHz ↔ Fc1 - 60 MHz or 2100 MHz whichever is the higher	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [4], s4.1
Fc1 – 60 MHz or 2100 MHz whichever is the higher ↔ Fc1 – 50 MHz or 2100 MHz whichever is the higher	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc1 – 50 MHz or 2100 MHz whichever is the higher ↔ Fc2 + 50 MHz or 2180 MHz whichever is the lower	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc2 + 50 MHz or 2180 MHz whichever is the lower ↔ Fc2 + 60 MHz or 2180 MHz whichever is the lower	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc2 + 60 MHz or 2180 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [4], s4.1. Upper frequency as in ITU-R SM.329 [4], s2.5 table 1

Table 9.11: Up-link: General spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329 [4], s4.1
1GHz ↔ Fc1 - 60 MHz or 1910 MHz whichever is the higher	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [4], s4.1
Fc1 – 60 MHz or 1910 MHz whichever is the higher ↔ Fc1 – 50 MHz or 1910 MHz whichever is the higher	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc1 – 50 MHz or 1910 MHz whichever is the higher ↔ Fc2 + 50 MHz or 1990 MHz whichever is the lower	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc2 + 50 MHz or 1990 MHz whichever is the lower ↔ Fc2 + 60 MHz or 1990 MHz whichever is the lower	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329 [4], s4.3 and Annex 7
Fc2 + 60 MHz or 1990 MHz whichever is the lower ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329 [4], s4.1. Upper frequency as in ITU-R SM.329 [4], s2.5 table 1

Fc1: Centre frequency of emission of the first 5 MHz channel in an ~~operating~~pass band.

Fc2: Centre frequency of emission of the last 5 MHz channel in an ~~operating~~pass band.

9.2.2.3 Co-existence with UTRA-FDD BS

9.2.2.3.1 Operation in the same geographic area

This requirement shall be applied for the protection of UTRA-FDD BS receivers in geographic areas in which UTRA-FDD Repeater and UTRA-FDD BS are deployed. The requirement applies only to the down-link direction of the Repeater.

9.2.2.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 9.11A: UTRA Repeater Spurious emissions limits in geographic coverage area of UTRA FDD BS receiver

Operating Band	Band	Maximum Level	Measurement Bandwidth	Note
I	1920 - 1980MHz ~~For operation in Frequency Bands defined in sub-clause 4.1 (a)~~	-96 dBm	100 kHz	
II	1850 - 1910 MHz ~~For operation in Frequency Bands defined in sub-clause 4.1 (b)~~	-96 dBm	100kHz	

9.2.2.3.2 Co-location with UTRA-FDD BS

This requirement may be applied for the protection of UTRA-FDD BS receivers when UTRA-FDD Repeater and UTRA-FDD BS are co-located. The requirement applies only to the down-link direction of the Repeater.

9.2.2.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 9.12: UTRA Repeater Spurious emissions limits for protection of co-located UTRA FDD BS receiver

Operating Band	Band	Maximum Level	Measurement Bandwidth	Note
I	1920 - 1980MHz ~~For operation in Frequency Bands defined in sub-clause 4.1(a)~~	-96 dBm	100 kHz	
II	1850-1910 MHz ~~For operation in Frequency Bands defined in sub-clause 4.1(b)~~	-96 dBm	100kHz	

9.2.2.4 Co-existence with GSM 900

9.2.2.4.1 Operation in the same geographic area

This requirement may be applied for the protection of GSM 900 MS and GSM 900 BTS receivers in geographic areas in which both GSM 900 and UTRA-FDD Repeaters are deployed.

9.2.2.4.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 9.13: UTRA Repeater Spurious emissions limits in geographic coverage area of GSM 900 MS receiver

Band	Maximum Level	Measurement Bandwidth	Note
876 - 915 MHz	-61 dBm	100 kHz	
921 - 960 MHz	-57 dBm	100 kHz	

9.2.2.4.2 Co-located Repeaters and GSM 900 base stations

This requirement may be applied for the protection of GSM 900 BTS receivers when GSM 900 BTS and UTRA-FDD Repeaters are co-located.

9.2.2.4.2.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.14: UTRA Repeater Spurious emissions limits for Repeater co-located with GSM 900 BTS receiver

Band	Maximum Level	Measurement Bandwidth	Note
876-915 MHz	-98 dBm	100 kHz	

9.2.2.5 Co-existence with DCS 1800

9.2.2.5.1 Operation in the same geographic area

This requirement may be applied for the protection of DCS 1800 MS and DCS 1800 BTS receivers in geographic areas in which both DCS 1800 and UTRA-FDD Repeaters are deployed.

9.2.2.5.1.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.15: UTRA Repeater Spurious emissions limits in geographic coverage area of DCS 1800 MS receiver

Band	Maximum Level	Measurement Bandwidth	Note
1710 - 1785 MHz	-61 dBm	100 kHz	
1805 - 1880 MHz	-47 dBm	100 kHz	

9.2.2.5.2 Co-located Repeaters and DCS 1800 base stations

This requirement may be applied for the protection of DCS 1800 BTS receivers when DCS 1800 BTS and UTRA-FDD Repeaters are co-located.

9.2.2.5.2.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.16: UTRA Repeater Spurious emissions limits for Repeater co-located with DCS 1800 BTS

Band	Maximum Level	Measurement Bandwidth	Note
1710 - 1785 MHz	-98 dBm	100 kHz	

9.2.2.6 Co-existence with PHS

This requirement may be applied for the protection of PHS in geographic areas in which both PHS and UTRA-FDD Repeaters are deployed.

9.2.2.6.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.17: UTRA Repeater Spurious emissions limits for in geographic coverage area of PHS

Band	Maximum Level	Measurement Bandwidth	Note
1893,5 - 1919,6 MHz	-41 dBm	300 kHz	

9.2.2.7 Co-existence with UTRA-TDD

9.2.2.7.1 Operation in the same geographic area

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD Repeaters are deployed. The requirement applies only to the down-link direction of the repeater.

9.2.2.7.1.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.18: UTRA Repeater Spurious emissions limits in geographic coverage area of UTRA-TDD

Band	Maximum Level	Measurement Bandwidth	Note
1900 - 1920 MHz	-52 dBm	1 MHz	
2010 - 2025 MHz	-52 dBm	1 MHz	

9.2.2.7.2 Co-located Repeaters and UTRA-TDD base stations

This requirement may be applied for the protection of UTRA-TDD BS receivers when UTRA-TDD BS and UTRA-FDD Repeater are co-located. The requirement applies only to the down-link direction of the repeater.

9.2.2.7.2.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 9.19: UTRA Repeater Spurious emissions limits for protection of co-located UTRA TDD BS receiver

Band	Maximum Level	Measurement Bandwidth	Note
1900 - 1920 MHz	-86 dBm	1 MHz	
2010 - 2025 MHz	-86 dBm	1 MHz	

9.2.3 Test purpose

This test measure conducted spurious emission from the Repeater transmitter antenna connector, while the Repeater is in operation.

9.2.4 Method of test

9.2.4.1 Initial conditions

1) Set-up the equipment as shown in annex A.

2) Connect a signal generator to the input port of the Repeater for tests of repeaters with an ~~operating~~pass band corresponding to one 5 MHz channel. If the ~~operating~~pass band corresponds to two or more 5 MHz carriers, two signal generators with a combining circuit or one signal generator with the ability to generate several WCDMA carriers is connected to the input.

3) Detection mode: True RMS.

9.2.4.2 Procedures

1) Set the Repeater to maximum gain.

2) Set the signal generator(s) to generate signal(s) in accordance to test model 1, TS 25.141 subclause 6.2.1.1.1, at level(s) which produce the manufacturer specified maximum output power at maximum gain.

3) The detecting device shall be configured with a measurement bandwidth as stated in the tables.

4) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

5) Increase the input power with 10 dB compare to the level obtained in step 2.

6) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

7) If the ~~operating~~pass band corresponds to two or more consecutive nominal 5 MHz channels, repeat step 1) to 6) with any combination of two WCDMA modulated signals of equal power in the repeaters ~~operating~~pass band.

8) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value.

9.2.5 Test requirements

In all measurements, the requirements according to subclause 9.2.2 shall be fulfilled.

========== NEXT CHANGED SECTION ==========

11 Input intermodulation

The input intermodulation is a measure of the capability of the Repeater to inhibit the generation of interference in the ~~operating~~pass band, in the presence of interfering signals on frequencies other than the ~~operating~~pass band.

11.1 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 Repeater to maintain the wanted frequency free of internally created interference.

This test applies to Uplink and Downlink path of the Repeater.

11.2 Minimum Requirements

11.2.1 General requirement

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.1: General input intermodulation requirement

f_offset	Interfering Signal Levels	Type of signals	Measurement bandwidth
3,5 MHz	-40 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.1, the power in the ~~operating~~pass band shall not increase by more than 10 dB at the output of the Repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

11.2.2 Co-location with GSM900 and/or DCS1800

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.2: Input intermodulation requirements for interfering signals in the GSM900 and DCS1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
921 - 960 MHz	+16 dBm	2 CW carriers	1 MHz
1805 - 1880 MHz	+16 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.2, the power in the ~~operating~~pass band shall not increase with more than 10 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

11.2.3 Co-existence with GSM900 and/or DCS1800

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.2A: Input intermodulation requirements for interfering signals in the GSM900 and DCS1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
876 - 915 MHz	-15 dBm	2 CW carriers	1 MHz
1710 - 1785 MHz	-15 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.2A, the power in the ~~operating~~pass band shall not increase with more than 10 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

11.3 Test purpose

The purpose of this test is to verify that the Repeater meets the intermodulation characteristics requirements as specified in TS 25.106, subclause 11.1.

11.4 Method of test

11.4.1 Initial conditions

1) Set-up the equipment as shown in annex A.
2) Set the Repeater to maximum gain.
3) Connect two signal generators with a combining circuit or one signal generator with the ability to generate several CW carriers to the input.
4) Connect a spectrum analyser to the output of the Repeater. Set the resolution bandwidth to 1 MHz in the centre of the ~~operating~~pass band. Set averaging to 1 second or more.

11.4.2 Procedure

1) Adjust the frequency of the input signals, either below or above the ~~operating~~pass band, so that the lowest order intermodulation product is positioned in the centre of the ~~operating~~pass band, according to subclause 11.2.
2) Take the measurement of the rise of the output signal.
3) Repeat the measurement for the opposite path of the Repeater.

11.5 Test requirements

11.5.1 Mandatory requirement

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.3: Input intermodulation requirement

f_offset	Interfering Signal Levels	Type of signals	Measurement bandwidth
3,5 MHz	-40 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.3, the power in the ~~operating~~pass band shall not increase by more than 11,2 dB at the output of the Repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

11.5.2 Co-location with GSM900 and/or DCS1800

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.4: Input intermodulation requirements for interfering signals in the GSM900 and DCS1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
921 - 960 MHz	+16 dBm	2 CW carriers	1 MHz
1805 - 1880 MHz	+16 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.4, the power in the ~~operating~~pass band shall not increase with more than 11,2 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

11.5.3 Co-existence with GSM900 and/or DCS1800

In normal conditions as specified in section 5.4.1 the intermodulation performance should be met when the following signals are applied to the Repeater:

Table 11.4A: Input intermodulation requirements for interfering signals in the GSM900 and DCS1800 bands

Frequency of interfering signals	Interfering Signal Levels	Type of signals	Measurement bandwidth
876 - 915 MHz	-15 dBm	2 CW carriers	1 MHz
1710 - 1785 MHz	-15 dBm	2 CW carriers	1 MHz

For the parameters specified in table 11.4A, the power in the ~~operating~~pass band shall not increase with more than 11,2 dB at the output of the repeater as measured in the centre of the ~~operating~~pass band, compared to the level obtained without interfering signals applied.

12 Output intermodulation

The output intermodulation requirement is a measure of the ability of the repeater to inhibit the generation of intermodulation products signals created by the presence of an interfering signal reaching the repeater via the output port.

12.1 Definition and applicability

The output intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into the output port at a level of 30 dB lower than that of the wanted signal. The frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the wanted signal, but within the frequency band allocated for UTRA FDD downlink as specified in subclause 4.1.

The requirement is applicable for downlink signals.

The normative reference for this requirement is in TS25.106 [12] section 12.

12.2 Minimum requirement

In normal conditions as specified in section 5.4.1, the output intermodulation level shall not exceed the out of band emission or the spurious emission requirements of section 9.1 and 9.2.

12.3 Test purpose

The test purpose is to verify the ability of the repeater to restrict the generation of intermodulation products in the presence of a subject signal on the repeater input and output ports, and an interfering signal applied at the repeater output port.

12.4 Method of test

12.4.1 Initial conditions

1) Set-up the equipment as shown in annex A.

2) Connect a signal generator to the input port of the Repeater for tests of repeaters with an ~~operating~~pass band corresponding to one 5 MHz channel. Connect a signal generator to the circulator on the output port and make sure the signal generator power is directed to the repeater output port.

3) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4,0 MHz shall use a 30 kHz measurement bandwidth.

4) Measurements with an offset from the carrier centre frequency between 4,0 MHz and (Δfmax – 500 kHz) shall use a 1 MHz measurement bandwidth. The 1MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurements

5) Detection mode: True RMS.

12.4.2 Procedures

1) Set the Repeater to maximum gain.

2) Set the signal generator at the repeater input port (subject signal) to generate a signal in accordance to test model 1, TS 25.141 subclause 6.1.1.1, at the level which produce the manufacturer specified maximum output power at maximum gain.

3) Set the signal generator at the repeater output port (interference signal) to generate a signal in accordance to test model 1, TS 25.141 subclause 6.1.1.1, at the level producing signal power corresponding to 30 dB below the manufacturer specified maximum output power at the repeater output port with the specified frequency offset from the wanted signal.

4) Measure the emission at the specified frequencies with specified measurement bandwidth and note that the measured value does not exceed the specified value. Measurements in the band of the interfering signal shall be excluded. The measurements can be limited to the power of all third and fifth order intermodulation products.

5) Repeat from clause 3 until interference signals ±5 MHz, ±10 MHz and ±15 MHz frequency offset from the wanted signal has been tested. Note that interfering signals outside the UTRA-FDD allocated frequency band , as specifies in section 4.1. need not be tested.

12.5 Test requirements

In all measurements, the requirements according to sections 9.1.1.5 and the downlink requirements in section 9.2.2.1 or 9.2.2.2 shall be fulfilled.