

**TSG-RAN Meeting #9**  
**Oahu, HI, USA, 20 - 22 September 2000**

**RP-000467**

(R4-000xxx, to TSG-RAN) Proposed response to LS (ITU-R WP 8F) on Unwanted emissions

**Source:** WG4  
**To:** RAN  
**Title:** Proposed answer to ITU-R WP 8F on unwanted emissions  
**Document for:** Approval

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3GPP TSG RAN thank ITU-R WP 8F for the Liaison Statement on Unwanted Emissions containing the Preliminary Draft New Recommendation (PDNR) "Generic Unwanted Emission Characteristics Associated with the Terrestrial Radio Interfaces of IMT-2000" (IMT.UNWANT).

3GPP TSG RAN note that the material provided in October 1999, and currently contained in Annex 1 and 3 of IMT.UNWANT, needs to be updated. Actually, it may not be practical to continue to update this material on a regular basis for the future. This approach may also lead to inconsistencies between IMT.UNWANT and Recommendation ITU-R M.1457 (that contains references to the approved material developed by External Organizations).

Based on the above considerations, 3GPP TSG RAN would prefer to use references also for IMT.UNWANT. However, if this approach can not be agreed by ITU-R WP 8F, Annex 1 and 2 contains the updated material, as requested. These annexes should replace current Annex 1 and 3 of IMT.UNWANT respectively.

With reference to the unwanted emissions of base stations, 3GPP TSG RAN note that guidance from National Regulators is required.

## ANNEX 1

# Unwanted Emission Characteristics for IMT-2000 CDMA Direct Spread Radio Interface

[From 3G TS25.101 V3.3.1 (2000-06) and 3G TS25.104 V3.3.0 (2000-06)]

## 1 Unwanted Emissions for terminals

### 1.1 Out of band emission

Out of band emissions are unwanted emissions immediately outside the nominal channel 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

#### 1.1.1 Spectrum emission mask

The spectrum emission mask of the UE applies to frequencies, which are between 2.5 MHz and 12.5 MHz away from the UE centre carrier frequency. The out of channel emission is specified relative to the UE output power measured in a 3.84 MHz bandwidth.

##### 1.1.1.1 Minimum requirement

The power of any UE emission shall not exceed the levels specified in Table 1.1.1

**Table 1.1.1: Spectrum Emission Mask Requirement**

Frequency offset from carrier $\Delta f$	Minimum requirement	Measurement bandwidth
2.5 - 3.5 MHz	-35 -15*( $\Delta f - 2.5$ ) dBc	30 kHz *
3.5 - 7.5 MHz	-35- 1*( $\Delta f-3.5$ ) dBc	1 MHz *
7.5 - 8.5 MHz	-39 - 10*( $\Delta f - 7.5$ ) dBc	1 MHz *
8.5 - 12.5 MHz	-49 dBc	1 MHz *

Note \*:

1. The first and last measurement position with a 30 kHz filter is 2.515 MHz and 3.485 MHz.
2. The first and last measurement position with a 1 MHz filter is 4 MHz and 12 MHz.
3. The lower limit shall be -50 dBm/3.84 MHz or which ever is higher.

### 1.2 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.

The frequency boundary and the detailed transitions of the limits between the requirement for out band emissions and spectrum emissions are based on ITU-R Recommendations SM.329.

#### 1.2.1 Minimum requirement

These requirements are only applicable for frequencies, which are greater than 12.5 MHz away from the UE centre carrier frequency.

**Table 1.1.2: General spurious emissions requirements**

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36 dBm
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36 dBm
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36 dBm
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	1 MHz	-30 dBm

**Table 1.1.3: Additional spurious emissions requirements**

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$1893.5 \text{ MHz} < f < 1919.6 \text{ MHz}$	300 kHz	-41 dBm
$925 \text{ MHz} \leq f \leq 935 \text{ MHz}$	100 kHz	-67 dBm *
$935 \text{ MHz} < f \leq 960 \text{ MHz}$	100 kHz	-79 dBm *
$1805 \text{ MHz} \leq f \leq 1880 \text{ MHz}$	100 kHz	-71 dBm *

NOTE \*: The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 1.1.3 are permitted for each UARFCN used in the measurement.

## 2. Unwanted Emissions for Base Station

### 2.1 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 requirement is specified both in terms of a spectrum emission mask and adjacent channel power ratio for the transmitter.

#### 2.1.1 Spectrum emission mask

The mask defined in Tables 2.1 to 2.4 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 base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 2.1.1 to 2.1.4 for the appropriate BS maximum output power, in the frequency range from  $\Delta f = 2.5 \text{ MHz}$  to  $f_{\text{offset}_{\text{max}}}$  from the carrier frequency, where:

- $\Delta f$  is the separation between the carrier frequency and the nominal  $-3\text{dB}$  point of the measuring filter closest to the carrier frequency.
- $F_{\text{offset}}$  is the separation between the carrier frequency and the centre of the measuring filter.
- $f_{\text{offset}_{\text{max}}}$  is either 12.5 MHz or the offset to the UMTS Tx band edge, whichever is the greater.

**Table 2.1.1: Spectrum emission mask values, BS maximum output power  $P \geq 43 \text{ dBm}$** 

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7 \text{ MHz}$	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-14 dBm	30 kHz
$2.7 \leq \Delta f < 3.5 \text{ MHz}$	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-14 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f \text{ MHz}$	$4.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

**Table 2.1.2: Spectrum emission mask values, BS maximum output power  $39 \leq P < 43$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-14 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-14 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	-13 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 56$ dBm	1 MHz

**Table 2.1.3: Spectrum emission mask values, BS maximum output power  $31 \leq P < 39$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	$P - 53$ dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$P - 53 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	$P - 52$ dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 56$ dBm	1 MHz

**Table 2.1.4: Spectrum emission mask values, BS maximum output power  $P < 31$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-22 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-22 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	-21 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-25 dBm	1 MHz

NOTE: This frequency range ensures that the range of values of  $f_{\text{offset}}$  is continuous.

## 2.1.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured in an adjacent channel. Both the transmitted power and the adjacent channel power are measured through a matched filter (Root Raised Cosine and roll-off 0.22) with a noise power bandwidth equal to the chip rate. The requirements shall apply for all configurations of BS (single carrier or multiple carrier), and for all operating modes foreseen by the manufacturer's specification.

### 2.1.2.1 Minimum requirement

The ACLR shall be higher than the value specified in Table 2.1.5.

**Table 2.1.5: BS ACLR**

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	50 dB

## 2.1.3 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 base station RF output port.

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

### 2.1.3.1 Mandatory Requirements

The requirements of either subclause 2.3.1.1 or subclause 2.3.1.2 shall apply whatever the type of transmitter considered (single carrier or multiple-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

Either requirement applies at frequencies within the specified frequency ranges that are more than 12.5MHz below the first carrier frequency used or more than 12.5MHz above the last carrier frequency used.

#### 2.1.3.1.1 Spurious emissions (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

##### 2.1.3.1.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.6: BS Mandatory spurious emissions limits, Category A**

Band	Maximum level	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU-R SM.329-7, s2.6

#### 2.1.3.1.2 Spurious emissions (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

##### 2.1.3.1.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.7: BS Mandatory spurious emissions limits, Category B**

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
1GHz ↔ Fc1 - 60 MHz or 2100 MHz <i>whichever is the higher</i>	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1
Fc1 – 60 MHz or 2100 MHz <i>whichever is the higher</i> ↔ Fc1 – 50 MHz or 2100 MHz <i>whichever is the higher</i>	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc1 – 50 MHz or 2100 MHz <i>whichever is the higher</i> ↔ Fc2 + 50 MHz or 2180 MHz <i>whichever is the lower</i>	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc2 + 50 MHz or 2180 MHz <i>whichever is the lower</i> ↔ Fc2 + 60 MHz or 2180 MHz <i>whichever is the lower</i>	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc2 + 60 MHz or 2180 MHz <i>whichever is the lower</i> ↔ 12.75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1. Upper frequency as in ITU-R SM.329-7, s2.6

Fc1: Center frequency of emission of the first carrier transmitted by the BS.

Fc2: Center frequency of emission of the last carrier transmitted by the BS.

### 2.1.3.2 Protection of the BS receiver

This requirement may be applied in order to prevent the receiver of the BS being desensitised by emissions from the BS transmitter, which are coupled between the antennas of the BS. This is measured at the transmit antenna port.

#### 2.1.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.8: BS Spurious emissions limits for protection of the BS receiver**

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980MHz For operation in Frequency Bands defined in sub-clause 5.2(a) as specified in 3G TS 25.104	-96 dBm	100 kHz	
1850-1910 MHz For operation in Frequency Bands defined in sub-clause 5.2(b) as specified in 3G TS 25.104	-96 dBm	100kHz	

### 2.1.3.3 Co-existence with GSM 900

#### 2.1.3.3.1 Operation in the same geographic area

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

##### 2.1.3.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.9: BS Spurious emissions limits for BS in geographic coverage area of GSM 900 MS receiver**

Band	Maximum Level	Measurement Bandwidth	Note
921 – 960 MHz	-57 dBm	100 kHz	

#### 2.1.3.3.2 Co-located base stations

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

##### 2.1.3.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.10: BS Spurious emissions limits for protection of the GSM 900 BTS receiver**

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

### 2.1.3.4 Co-existence with DCS 1800

#### 2.1.3.4.1 Operation in the same geographic area

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

##### 2.1.3.4.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.11: BS Spurious emissions limits for BS in geographic coverage area of DCS 1800 MS receiver**

Band	Maximum Level	Measurement Bandwidth	Note
1805 – 1880 MHz	-47 dBm	100 kHz	

#### 2.1.3.4.2 Co-located base stations

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

##### 2.1.3.4.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.13: BS Spurious emissions limits for BS co-located with DCS 1800 BTS**

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

### 2.1.3.5 Co-existence with PHS

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

#### 2.1.3.5.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.1.14: BS Spurious emissions limits for BS in geographic coverage area of PHS**

Band	Maximum Level	Measurement Bandwidth	Note
1893.5 – 1919.6 MHz	-41 dBm	300 kHz	

### 2.1.3.6 Co-existence with services in adjacent frequency bands

This requirement may be applied for the protection in bands adjacent to 2110-2170 MHz, as defined in sub-clause 5.2(a) of 3G TS 25.104 and 1930-1990 MHz, as defined in sub-clause 5.2(b) of 3G TS 25.104 in geographic areas in which both an adjacent band service and UTRA are deployed.

#### 2.1.3.6.1 Minimum requirement

The power of any spurious emission shall not exceed:

**Table 2.1.15: BS spurious emissions limits for protection of adjacent band services**

Band (f)	Maximum Level	Measurement Bandwidth	Note
2100-2105 MHz For operation in frequency bands as defined in sub-clause 5.2(a)	$-30 + 3.4 \cdot (f - 2100 \text{ MHz}) \text{ dBm}$	1 MHz	
2175-2180 MHz For operation in frequency bands as defined in sub-clause 5.2(a)	$-30 + 3.4 \cdot (2180 \text{ MHz} - f) \text{ dBm}$	1 MHz	
1920-1925 MHz For operation in frequency bands as defined in sub-clause 5.2(b)	$-30 + 3.4 \cdot (f - 1930 \text{ MHz}) \text{ dBm}$	1 MHz	
1995-2000 MHz For operation in frequency bands as defined in sub-clause 5.2(b)	$-30 + 3.4 \cdot (2000 \text{ MHz} - f) \text{ dBm}$	1 MHz	

### 2.1.3.7 Co-existence with UTRA-TDD

#### 2.1.3.7.1 Operation in the same geographic area

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD are deployed.

##### 2.1.3.7.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:



**Table 2.1.16: BS Spurious emissions limits for BS in geographic coverage area of UTRA-TDD**

<b>Band</b>	<b>Maximum Level</b>	<b>Measurement Bandwidth</b>	<b>Note</b>
1900 – 1920 MHz	-52 dBm	1 MHz	
2010 – 2025 MHz	-52 dBm	1 MHz	

2.1.3.7.2 Co-located base stations

This requirement may be applied for the protection of UTRA-TDD BS receivers when UTRA-TDD BS and UTRA FDD BS are co-located.

2.1.3.7.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 6.1.18: BS Spurious emissions limits for BS co-located with UTRA-TDD**

<b>Band</b>	<b>Maximum Level</b>	<b>Measurement Bandwidth</b>	<b>Note</b>
1900 – 1920 MHz	-86 dBm	1 MHz	
2010 – 2025 MHz	-86 dBm	1 MHz	

## ANNEX 2

[From 3G TS25.102 V3.3.0 (2000-06) and 3G TS25.105 V3.3.0 (2000-06) for the 3.84 Mcps TDD mode]

*[The work on RF parameters for the 1.28 Mcps TDD Mode as part of the 3GPP TSG RAN feature 1.28 Mcps TDD is ongoing. Therefore the requirements in the related 3GPP TSG RAN WG4 technical report (25.945) are in square brackets. The relevant sections 1.1.1.2, 2.1.1.2 and 2.2.1.2.2 below should be updated as soon as the work on the 1.28 Mcps TDD feature is finalised in 3GPP.]*

### Unwanted Emission Characteristics for IMT-2000 CDMA TDD Radio Interface

#### 1. Unwanted Emissions for terminals

##### 1.1 Out of band emission

Out of band emissions are unwanted emissions immediately outside the nominal channel 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 and adjacent channel power ratio.

##### 1.1.1 Spectrum emission mask

###### 1.1.1.1 Spectrum emission mask, 3.84 Mcps TDD

The spectrum emission mask of the UE applies to frequencies, which are between 2.5 and 12.5MHz from a carrier frequency. The out of channel emission is specified relative to the UE output power in measured in a 3.84 MHz bandwidth.

###### 1.1.1.1.1 Minimum Requirement

The power of the 21dBm power class 3 UE emission shall not exceed the levels specified in table 1.1.1.

**Table 1.1.1 : Spectrum Emission Mask Requirement**

Frequency offset from carrier $\Delta f$	Minimum requirement	Measurement bandwidth
2.5 - 3.5 MHz	-35 -15*( $\Delta f - 2.5$ ) dBc	30 kHz *
3.5 - 7.5 MHz	-35- 1*( $\Delta f-3.5$ ) dBc	1 MHz *
7.5 - 8.5 MHz	-39 - 10*( $\Delta f - 7.5$ ) dBc	1 MHz *
8.5 - 12.5 MHz	-49 dBc	1 MHz *

Note\*

1. The first and last measurement position with a 30 kHz filter is 2.515 MHz and 3.485 MHz
2. The first and last measurement position with a 1 MHz filter is 4 MHz and 12 MHz
3. The lower limit shall be -50dBm/3.84 MHz or which ever is the higher

###### 1.1.1.2 Spectrum emission mask, 1.28 Mcps TDD

For the 1.28Mcps chip rate option, UE emission shall not exceed the levels specified in the following table 1.1.2.

**Table 1.1.2: UE Spectrum Emission Mask Requirement(1.28Mcps chip rate)**

Frequency offset from carrier $\Delta f$	Minimum requirement	Measurement bandwidth
0.8 – 1.12 MHz	[-35] – [31]*( $\Delta f - [0.8]$ ) dBc	30 kHz *
1.12 - 2.4 MHz	[-35] – [2.5]*( $\Delta f - [1.12]$ ) dBc	[0.3] MHz *
2.4 – 2.72 MHz	[-39] – [31]*( $\Delta f - [2.4]$ )dBc	[0.3] MHz *
2.72 – 4.0 MHz	[-49] dBc	[0.3] MHz *

Note\*

The first and last measurement position with a 30 kHz filter is 0.815 MHz and 1.105 MHz

The first and last measurement position with a [0.3] MHz filter is 1.27 MHz and 4 MHz

## 1.2 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. The frequency boundary and the detailed transitions of the limits between the requirement for out band emissions and spectrum emissions are based on ITU-R Recommendations SM.329.

### 1.2.1 Minimum Requirement

These requirements are only applicable for frequencies which are greater than 12.5 MHz away from the UE center carrier frequency.

**Table 1.2.1 : General Spurious emissions requirements**

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	1 kHz	-36 dBm
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	10 kHz	-36 dBm
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	100 kHz	-36 dBm
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	1 MHz	-30 dBm

**Table 1.2.4 : Additional Spurious emissions requirements**

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
$925 \text{ MHz} \leq f \leq 935 \text{ MHz}$	100 KHz	-67 dBm*
$935 \text{ MHz} < f \leq 960 \text{ MHz}$	100 KHz	-79 dBm*
$1805 \text{ MHz} \leq f \leq 1880 \text{ MHz}$	100 KHz	-71 dBm*

Note

\* The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 1.2.1 are permitted for each UARFCN used in the measurement.

## 2. Unwanted Emissions for Base Station

### 2.1 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 requirement is specified both in terms of a spectrum emission mask and adjacent channel power ratio for the transmitter.

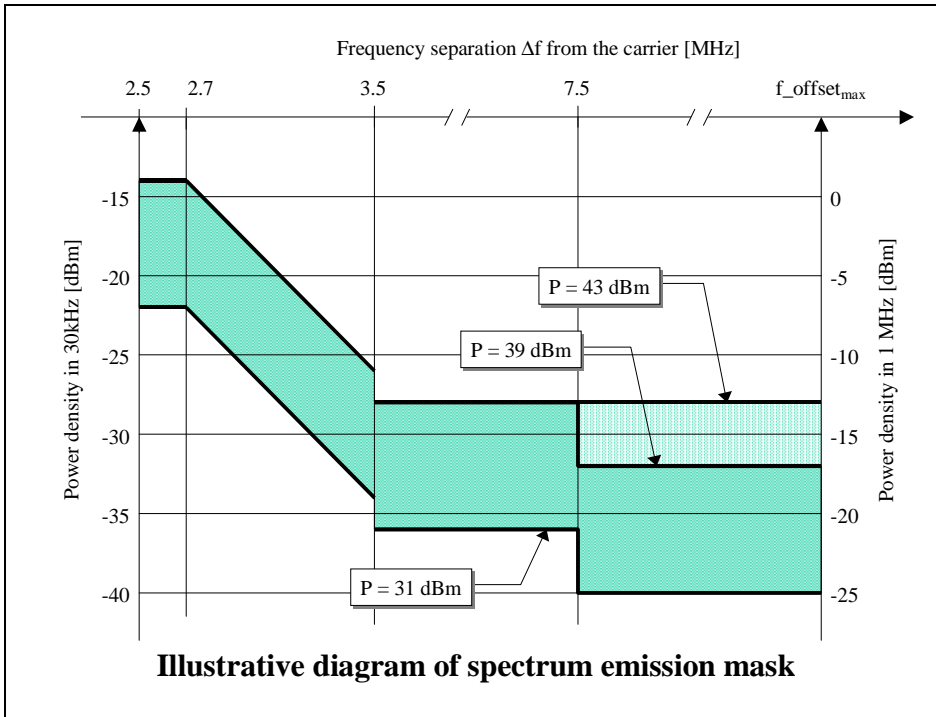
#### 2.1.1 Spectrum emission mask

##### 2.1.1.1 Spectrum emission mask, 3.84 Mcps

The mask defined in Table 2.1.1 to 2.1.4 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 base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 3.1 to 3.4 for the appropriate BS maximum output power, in the frequency range from  $\Delta f = 2.5 \text{ MHz}$  to  $f_{\text{offset}_{\text{max}}}$  from the carrier frequency, where:

- $f_{\text{offset}_{\text{max}}}$  is either 12.5 MHz or the offset to the UMTS Tx band edge as defined in section 5.2 of 25.102 version 3.2.0 whichever is the greater.



**Table 2.1.1: Spectrum emission mask values, BS maximum output power  $P \geq 43$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-14 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-14 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-13 dBm	1 MHz

**Table 2.1.2: Spectrum emission mask values, BS maximum output power  $39 \leq P < 43$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-14 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-14 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	-13 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 56$ dBm	1 MHz

**Table 2.1.3: Spectrum emission mask values, BS maximum output power  $31 \leq P < 39$  dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	$P - 53$ dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$P - 53 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	$P - 52$ dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 56$ dBm	1 MHz

**Table 2.1.4: Spectrum emission mask values, BS maximum output power P < 31 dBm**

Frequency offset of measurement filter – 3dB point, $\Delta f$	Frequency offset of measurement filter centre frequency, $f_{\text{offset}}$	Maximum level	Measurement bandwidth
$2.5 \leq \Delta f < 2.7$ MHz	$2.515\text{MHz} \leq f_{\text{offset}} < 2.715\text{MHz}$	-22 dBm	30 kHz
$2.7 \leq \Delta f < 3.5$ MHz	$2.715\text{MHz} \leq f_{\text{offset}} < 3.515\text{MHz}$	$-22 - 15 \cdot (f_{\text{offset}} - 2.715)$ dBm	30 kHz
(see note)	$3.515\text{MHz} \leq f_{\text{offset}} < 4.0\text{MHz}$	-26 dBm	30 kHz
$3.5 \leq \Delta f < 7.5$ MHz	$4.0\text{MHz} \leq f_{\text{offset}} < 8.0\text{MHz}$	-21 dBm	1 MHz
$7.5 \leq \Delta f$ MHz	$8.0\text{MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-25 dBm	1 MHz

NOTE: This frequency range ensures that the range of values of  $f_{\text{offset}}$  is continuous.

### 2.1.1.2 Spectrum emission mask, 1.28 Mcps

**Table 2.1.5: BS Spectrum Emission Mask Requirement(1.28Mcps chip rate)**

Frequency offset from carrier $\Delta f$	Maximum level	Measurement bandwidth
0.8 – 1.12 MHz	[-22]dBm	30 kHz *
1.12 - 2.4 MHz		[0.3] MHz *
2.4 – 2.72 MHz	[-21]dBm	[0.3] MHz *
2.72 – 4.0 MHz	[-25]dBm	[0.3] MHz *

Note\*

The first and last measurement position with a 30 kHz filter is 0.815 MHz and 1.105 MHz

The first and last measurement position with a [0.3] MHz filter is 1.27 MHz and 4 MHz

## 2.1.2 Adjacent Channel Leakage power Ratio (ACLR)

### 2.1.2.1 Adjacent Channel Leakage power Ratio (ACLR), 3.84 Mcps

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured in an adjacent channel. Both the transmitted and the adjacent channel power are measured through a matched filter (Root Raised Cosine and roll-off 0.22) with a noise power bandwidth equal to the chip rate. The requirements shall apply for all configurations of BS (single carrier or multi-carrier), and for all operating modes foreseen by the manufacturer's specification.

#### 2.1.2.1.1 Minimum Requirement

The ACLR shall be higher than the value specified in Table 2.1.6.

**Table 2.1.6: BS ACLR**

BS adjacent channel offset	ACLR limit
$\pm 5$ MHz	45 dB
$\pm 10$ MHz	55 dB

### 2.1.2.2 Adjacent Channel Leakage power Ratio (ACLR), 1.28 Mcps

For the 1.28Mcps chip rate option, the ACLR shall be better than the value specified in the following Table 2.1.7.

**Table 2.1.7 : BS ACLR (1.28Mcps chip rate)**

BS adjacent channel offset	ACLR limit
$\pm 1.6$ MHz	[40] dB
$\pm 3.2$ MHz	[50] dB

## 2.2 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 base station RF output port.

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

## 2.2.1 Mandatory Requirements

The requirements of either subclause 2.2.1.1 or subclause 2.2.1.2 shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's. Either requirement applies at frequencies within the specified frequency ranges which are more than 12.5MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

### 2.2.1.1 Spurious emissions (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

#### 2.2.1.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.1: BS Mandatory spurious emissions limits, Category A**

Band	Minimum requirement	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU SM.329-7, s2.6

### 2.2.1.2 Spurious emissions (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

#### 2.2.1.2.1 Spurious emissions (Category B), 3.84 Mcps TDD

##### 2.2.1.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.2: BS Mandatory spurious emissions limits, Category B**

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz	-36 dBm	10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz ↔ Fc1-60 MHz or FI -10 MHz <i>whichever is the higher</i>	-30 dBm	1 MHz	Bandwidth as in ITU SM.329-7, s4.1
Fc1 – 60 MHz or FI -10 MHz <i>whichever is the higher</i> ↔ Fc1 – 50 MHz or FI -10 MHz <i>whichever is the higher</i>	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc1 – 50 MHz or FI -10 MHz <i>whichever is the higher</i> ↔ Fc2 + 50 MHz or Fu +10 MHz <i>whichever is the lower</i>	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc2 + 50 MHz or Fu + 10 MHz	-25 dBm	1 MHz	Specification in

<i>whichever is the lower</i> ↔ Fc2 + 60 MHz or Fu + 10 MHz <i>whichever is the lower</i>			accordance with ITU-R SM.329-7, s4.1
Fc2 + 60 MHz or Fu + 10 MHz <i>whichever is the lower</i> ↔ 12,5 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1. Upper frequency as in ITU-R SM.329-7, s2.6

Fc1: Center frequency of emission of the first carrier transmitted by the BS

Fc2: Center frequency of emission of the last carrier transmitted by the BS

Fl : Lower frequency of the band in which TDD operates

Fu : Upper frequency of the band in which TDD operates

#### 2.2.1.2.2 Spurious emissions (Category B), 1.28 Mcps TDD

##### 2.2.1.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.3 BS Mandatory spurious emissions limits, Category B**

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz ↔ Fc1-19.2 MHz or Fl –3.2 MHz <i>whichever is the higher</i>	-30 dBm	1 MHz	Bandwidth as in ITU SM.329-7, s4.1
Fc1 – 19.2 MHz or Fl -3.2MHz <i>whichever is the higher</i> ↔ Fc1 - 16 MHz or Fl –3.2 MHz <i>whichever is the higher</i>	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc1 - 16 MHz or Fl –3.2 MHz <i>whichever is the higher</i> ↔ Fc2 + 16 MHz or Fu +3.2 MHz <i>whichever is the lower</i>	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc2 + 16 MHz or Fu + 3.2MHz <i>whichever is the lower</i> ↔ Fc2 +19.2 MHz or Fu + 3.2MHz <i>whichever is the lower</i>	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-7, s4.1
Fc2 + 19.2 MHz or Fu +3.2 MHz <i>whichever is the lower</i> ↔ 12,5 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1. Upper frequency as in ITU-R SM.329-7, s2.6

Fc1: Center frequency of emission of the first carrier transmitted by the BS

Fc2: Center frequency of emission of the last carrier transmitted by the BS

Fl : Lower frequency of the band in which TDD operates

Fu : Upper frequency of the band in which TDD operates

## 2.2.2 Co-existence with GSM 900

### 2.2.2.1 Operation in the same geographic area

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

#### 2.2.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.4: BS Spurious emissions limits for BS in geographic coverage area of GSM 900 MS receiver**

Band	Maximum Level	Measurement Bandwidth	Note
921 – 960MHz		-57 dBm	

### 2.2.2.2 Co-located base stations

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

#### 2.2.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.5: BS Spurious emissions limits for protection of the GSM 900 BTS receiver**

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

## 2.2.3 Co-existence with DCS 1800

### 2.2.3.1 Operation in the same geographic area

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

#### 2.2.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.6: BS Spurious emissions limits for BS in geographic coverage area of DCS 1800 MS receiver**

Band	Maximum Level	Measurement Bandwidth	Note
1805 – 1880MHz	-47 dBm	100 kHz	

### 2.2.3.2 Co-located basestations

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

#### 2.2.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.7: BS Spurious emissions limits for BS co-located with DCS 1800 BTS**

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



## 2.2.4 Co-existence with UTRA-FDD

### 2.2.4.1 Operation in the same geographic area

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD are deployed.

#### 2.2.4.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.8: BS Spurious emissions limits for BS in geographic coverage area of UTRA-FDD**

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-32 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

### 2.2.4.2 Co-located base stations

This requirement may be applied for the protection of UTRA-FDD BS receivers when UTRA-TDD BS and UTRA FDD BS are co-located.

#### 2.2.4.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

**Table 2.2.9: BS Spurious emissions limits for BS co-located with UTRA-FDD**

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-86 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	