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**Title: Liaison Statement to Standards Development Organizations –
Unwanted Emissions**

Agenda item: 8.1

Document for:

Decision	
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Information	X



INTERNATIONAL TELECOMMUNICATION UNION

**RADIOCOMMUNICATION
STUDY GROUPS**

**Revision 1 to
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**2nd Meeting of Working Party 8F
21 - 25 August 2000, San Diego, USA**



Working Party 8F

LIAISON STATEMENT TO STANDARDS DEVELOPMENT ORGANIZATIONS¹

UNWANTED EMISSIONS

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During the second meeting of ITU-R Working Party P 8F (San Diego, 21-25.8.00), it has been decided to continue the development of Recommendation ITU-R M.[IMT-UNWANT] aiming at specifying the unwanted emissions of IMT-2000 mobile and base station. The purpose for such recommendation is to give technical information to Administrations in order to:

- 1** Support and facilitate global circulation
- 2** Support and facilitate the equipment access to a global market
- 3** Ensure the coexistence of different systems and the protection of other services in adjacent bands.

It should be noted that, in relation with item 3, there might be some differences between the unwanted emission requirement applying to different frequency plan. It has not been decided yet which frequency bands/plans the first version of IMT.UNWANT will cover.

¹ ARIB, CWTS, ETSI, Committee T1, TTA, TTC, TIA, TIA TR-45.3, TIA TR-45.5, 3GPP and 3GPP2

For instance, it has also been noted that there is currently a considerable amount of ongoing work within ETSI with participation from partners of both 3GPP and 3GPP2 to develop Standards for IMT-2000, giving a presumption of conformity with the requirements of the R&TTE Directive which includes the fulfilment of item 3. Input related to this item is requested from all SDOs that are considering this matter to advance the work on this issue within ITU-R WP 8F. It is planned that this will result, amongst other items, in limits for unwanted emissions and immunity against other emissions caused by other equipment. It is understood that this work is carried out with participation of experts in all radio interfaces and that the results of this work will be input to WP8F.

SDOs are requested to ensure that the information already provided to ITU-R are completed in order to:

- ?? take into account unwanted emission requirement which applies to terminals or base stations in addition to those contained in the specifications (e.g. national regulations, coexistence rules...)
- ?? include the unwanted emission of base station
- ?? specify clearly to which frequency band/plan it applies
- ?? take into account national/regional regulations (e.g. for spurious emissions)

The existing text of IMT.UNWANT is attached for information.

Attachment:1 [in Doc. 8F/2, Attachment 9, dated 30.6.00]

ATTACHMENT 9

(Source: Document 8F/2, Attachment 10)

PRELIMINARY DRAFT NEW RECOMMENDATION ITU-R M.[IMT.UNWANT]*

GENERIC UNWANTED EMISSION CHARACTERISTICS ASSOCIATED WITH THE TERRESTRIAL RADIO INTERFACES OF IMT-2000

(Question ITU-R 39/8)

[This material was prepared to examine the possibility of defining common global unwanted emission limits.]

Summary

This Recommendation contains information on the unwanted emission limits for the IMT-2000 terrestrial radio interfaces as contained in Recommendation ITU-R M.[IMT.RSPC].

Its objective is to protect other radio systems and services from interference and to enable coexistence between different technologies, and to facilitate the deployment of equipment for worldwide use.

The ITU Radiocommunication Assembly,

considering

- a) that unwanted emissions consist of both spurious and out-of-band emissions according to Radio Regulations (RR) No. S1.146 and that spurious and out-of-band emissions are defined in RR Nos. S1.145 and S1.144, respectively;
- b) that limitation of the maximum permitted levels of unwanted emissions of IMT-2000 terminals is necessary to protect other radio systems and services from interference and to enable coexistence between different technologies;
- c) that too stringent limits may lead to an increase in size or in complexity of IMT-2000 radio equipment;
- d) that every effort should be made to keep limits for unwanted emissions at the lowest possible values taking account of economic factors and technological limitations;
- e) that Recommendation ITU-R SM.328 gives definitions and explanatory notes which should be used when dealing with spectra and bandwidth of emissions;
- f) that Recommendation ITU-R SM.329 relates to the effects, measurements and limits to be applied to spurious emissions;
- g) that the levels of spurious emissions of IMT-2000 terminals shall comply with the limits specified in RR Appendix S3,

* This Recommendation should be brought to the attention of Radiocommunication Study Group 1.

noting

1 that spurious and out-of-band emissions are defined in the radio regulations and in Recommendation ITU-R SM.329-[8] as in Annex 6,

recommends

1 that the unwanted emission characteristics of IMT-2000 terminals should be based on the information contained in Annexes 1 to 5 for the radio interface specifications contained in Recommendation ITU-R [IMT.RSPC];

2 that the unwanted emission characteristics of IMT-2000 base stations should be based on the information contained in Annexes 1 to 5 for the radio interface specifications contained in Recommendation ITU-R [IMT.RSPC].

[There is still discussions on the need to include base station limits.]

NOTE – Annexes 1 to 5 correspond to the radio interface specifications described in sections 5.1 to 5.5 of Recommendation ITU-R [IMT.RSPC], respectively.

[Editor's note: It would be desirable in the future to seek commonalities between the annexes, and if possible to reduce the number by merging some or all of them.]

ANNEX 1

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

(From Doc. 8-1/455 of ARIB, including Corr.1, and 8-1/466 of 3GPP TSG RAN, with only editorial modifications. Conformity with regional regulation needs to be checked)

1 Unwanted emission for terminals

1.1 Unwanted emission for carrier off-state

The transmit OFF power state is when the User Equipment (UE) does not transmit except during uplink discontinuous transmission (DTX) mode. This parameter is defined as the maximum output transmit power within the channel bandwidth when the transmitter is OFF. The requirement for the transmit OFF power shall be better than -50 dBm measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

1.2 Unwanted emission for carrier on-state

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 Leakage power Ratio. 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.

1.2.1 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 center carrier frequency. The out of channel emission is specified relative to the UE output power measured in a 3.84 MHz bandwidth.

The power of any UE emission shall not exceed the levels specified in Table 1.1.

TABLE 1.1

Spectrum emission mask requirement

Frequency offset from carrier Δf	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 should be -50 dBm/3.84 MHz or which ever is higher.

1.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent channel(s). Both the transmitted power and the received power are measured with a filter that has a Root-Raised Cosine (RRC) filter response with roll-off $\beta=0.22$ and a bandwidth equal to the chip rate.

The ACLR shall be better than the value specified in Table 1.2. Power class 3 is equal to a maximum power of 24 dBm with a tolerance of +1 dB and -3 dB. Power class 4 is equal to a maximum power of 21 dBm with a tolerance of ± 2 dB.

TABLE 1.2
User equipment ACLR

Power class	UE channel	ACLR limit
3	+ 5 MHz or - 5 MHz	β 33 dB or -50 dBm which ever is higher
3	+ 10 MHz or -10 MHz	β 43 dB or -50 dBm which ever is higher
4	+ 5 MHz or - 5 MHz	33 dB or -50 dBm which ever is higher
4	+ 10 MHz or -10 MHz	43 dB or -50 dBm which ever is higher

[Editor's note: A more appropriate wording is whichever is less stringent.]

Note:

1. The ACLR due to switching transients shall not exceed the limits in Table 1.2.
2. The ACLR requirements reflect what can be achieved with present state of the art technology.
3. Requirement on the UE shall be reconsidered when the state of the art technology progresses.

1.2.3 Spurious emissions

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

The requirements in Tables 1.3a and 1.3b are only applicable for frequencies, which are greater than 12.5 MHz away from the UE center carrier frequency.

TABLE 1.3a
General spurious emissions requirements

Frequency band	Resolution bandwidth	Minimum requirement
9 kHz β f < 150 kHz	1 kHz	-36 dBm
150 kHz β f < 30 MHz	10 kHz	-36 dBm
30 MHz β f < 1 000 MHz	100 kHz	-36 dBm
1 GHz β f < 12.75 GHz	1 MHz	-30 dBm

TABLE 1.3b

Additional spurious emissions requirements

Frequency bandwidth	Resolution bandwidth	Minimum requirement
1 893.5 MHz <f<1 919.6 MHz	300 kHz	-41 dBm
925 MHz <f< 935 MHz	100 kHz	-67 dBm *
935 MHz <f< 960 MHz	100 kHz	-79 dBm *
1 805 MHz <f< 1 880 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 1.3a are permitted for each UTRA Absolute Radio Frequency Channel Number (UARFCN) used in the measurement.

[Editor's note: The frequency bands in this table require clearer justification.]

2 Unwanted emission for base stations

[Editor's note: No material available at this meeting.]

ANNEX 2

Unwanted Emission Characteristics for IMT-2000 CDMA Multi-Carrier Radio Interface

(From Docs. 8-1/455 of ARIB and 8-1/450 of TIA TR-45.5, For carrier off-state, Doc. 8-1/455 has been used. Accuracy of the text and conformity with regional regulation need to be checked)

1 Unwanted emission for terminals

1.1 Unwanted emission for carrier off-state

When the transmitter is OFF, it is considered adequate to have the output noise power spectral density of the transmitter at $-61\text{dBm}/1\text{MHz}$ or less at the antenna terminal of the mobile station in the frequency of the transmit band.

1.2 Unwanted emission for carrier on-state

1.2.1 Spectrum emission mask

a) 1X

TABLE 2.1

Frequency offset [? f]	Maximum spurious emission
1.25–1.98 MHz	Shall not exceed $-42\text{ dBc}/30\text{ kHz}$ or $-54\text{ dBm}/1.23\text{ MHz}$, whichever is greater.
1.98–2.25 MHz	Shall not exceed $-50\text{ dBc}/30\text{ kHz}$ or $-54\text{ dBm}/1.23\text{ MHz}$, whichever is greater.
2.25–6.25 MHz	$-13\text{ dBm}/1\text{ MHz}$

Note that ? f shall be the frequency band from the central frequency to the end of the closest measured band.

[Editor's note: Additional text from TIA TR45.5 "The $-13\text{ dBm}/1\text{ MHz}$ emission limit is based on FCC rules, which are more stringent than ITU Category A emission limits. Current radio regulation rules shall also apply."]

[Editor's note: the conformity of this limit to SM.329 – in particular Category B –, considering a carrier spacing of 1.6 MHz, need to be checked.]

[Editor's note: Need for limit for frequency offset 0.625-1.25 MHz ?]

b) 3X

TABLE 2.2

Frequency offset [Δf]	Maximum Spurious emission
2.5–2.7 MHz	-14 dBm/30 kHz
2.7–3.5 MHz	-[14+15 Δf (Δf -2.7)] dBm/30 kHz
3.5–7.5 MHz	-13 dBm/1 MHz
7.5–10 MHz	-23 dBm/1 MHz
[ARIB : 10–12.5 MHz] [TIA TR-45.5: 10–15 MHz]	[ARIB: -27 dBm/1 MHz] [TIA TR-45.5: -30 dBm/MHz (applicable to equipment operating in the S5.388 band only) What about other classes ?]

[Doc 8-1/450:

NOTE – All frequencies in the measurement bandwidth shall satisfy the restrictions on Δf , where Δf = center frequency - closer measurement edge frequency and Pout is the average transmitter power as measured in [1] MHz.

Current radio regulation rules shall also apply.

Transmitter Radiated Emissions Requirements (Carrier on-state)

Currently, the specifications only reference local radio regulations.]

1.3 Spurious emission

[Editor’s note: No spurious emission limits available outside the masks defined above.]

[Doc. 8-1/455: “Take note that for the PHS band, the tolerable values below apply. However, when the above frequency offset specifications are applicable, the above values shall be given higher priority.”]

[Editor’s proposal: “Additional spurious emission requirement:”]

TABLE 2.3

Frequency range	Tolerable values	Measured bandwidth
1 893.5MHz–1 919.6MHz	-41 dBm	300 kHz

[Editor’s note: The frequency bands in this table require clearer justification.]

2 Unwanted emission for base stations

[Editor’s note: No material available at this meeting.]

ANNEX 3

Unwanted Emission Characteristics for IMT-2000 CDMA TDD Radio Interface

(From Doc. 8-1/466 of 3GPP TSG RAN + materials given by CWTS, Accuracy of the text and conformity with regional regulation need to be checked)

1 Unwanted emission for terminals

1.1 Unwanted emission for carrier off-state

The transmit OFF power state is when the UE does not transmit. This parameter is defined as the maximum output transmit power within the channel bandwidth when the transmitter is OFF.

The requirement for transmit OFF power shall be better than -65 dBm measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\beta = 0.22$ and a bandwidth equal to the chip rate.

1.2 Unwanted emission for carrier on-state

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. 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.

1.2.1 Spectrum emission mask

1) 5 MHz channel spacing

The spectrum emission mask of the terminal UE is requirement that applies to frequencies, which are between 2.5 and 12.5 MHz 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.

The power of the 21 dBm power class 3 UE emission shall not exceed the levels specified in Table 3.1a.

TABLE 3.1a

Spectrum emission mask requirement

Frequency offset from carrier Δf	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 $-50 \text{ dBm}/3.84 \text{ MHz}$ or which ever is the higher.

2) 1.6 MHz channel spacing (TD-SCDMA)

The spectrum emission mask of the terminal UE is requirement that applies to frequencies, which are between 0.8 and 4.2 MHz from a carrier frequency. The out of channel emission is specified relative to the UE output power in measured in a 1.6 MHz bandwidth.

The power of any UE emission shall not exceed the levels specified in Table 3.1b.

TABLE 3.1b
Spectrum emission mask requirement

Frequency offset from carrier Δf	Minimum requirement	Measurement bandwidth
0.8–1.2 MHz	$-35 - 15 * (\Delta f - 2.5) \text{ dBc}$	30 kHz *
1.2–2.5 MHz	$-35 - 1 * (\Delta f - 3.5) \text{ dBc}$	1 MHz *
2.5–2.8 MHz	$-39 - 10 * (\Delta f - 7.5) \text{ dBc}$	1 MHz *
2.8-4.2 MHz	-49 dBc	1 MHz *

*Note

1. The first and last measurement position with a 30 kHz filter is 815 MHz and 1.185 MHz.
2. The first and last measurement position with a 1 MHz filter is 1.7 MHz and 3.7 MHz.
3. The lower limit shall be $[-50 \text{ dBm}/3.84 \text{ MHz}]$ or which ever is the higher.

1.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receive filter in the adjacent channels(s). Both the transmitted power and the received power are measured with a filter response that has a Root-Raised Cosine (RRC) filter response with roll-off $\beta = 0.22$ and a bandwidth equal to the chip rate.

The ACLR shall be better than the value specified in Table 3.2.

TABLE 3.2
UE ACLR

Power class	UE channel	ACLR limit
3	± 5 MHz	33 dB or -50 dBm which ever is higher
3	± 10 MHz	43 dB or -50 dBm which ever is higher
4	± 5 MHz	33 dB or -50 dBm which ever is higher
4	± 10 MHz	43 dB or -50 dBm which ever is higher
5*	± 1.6 MHz	33 dB or -50 dBm which ever is higher
5*	± 3.2 MHz	43 dB or -50 dBm which ever is higher

* For TD-SCDMA, power class 5 is equal to a maximum power of 21 dBm with a tolerance of ±2 dB.

NOTE 1 – The ACLR due to switching transients shall not exceed the limits in the above table.

1.2.3 Spurious emissions

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

The requirements in Tables 3.3a and 3.3b are only applicable for frequencies that are greater than 12.5 MHz away from the UE center carrier frequency.

TABLE 3.3a
General spurious emissions requirements

Frequency bandwidth	Resolution bandwidth	Minimum requirement
9 kHz ? $f < 150$ kHz	1 kHz	-36 dBm
150 kHz ? $f < 30$ MHz	10 kHz	-36 dBm
30 MHz ? $f < 1000$ MHz	100 kHz	-36 dBm
1 GHz ? $f < 12.75$ GHz	1 MHz	-30 dBm

TABLE 3.3b
Additional spurious emissions requirements

Frequency bandwidth	Resolution bandwidth	Minimum requirement
925 MHz ? $f ? 935$ MHz	100 KHz	-67 dBm*
935 MHz < $f ? 960$ MHz	100 KHz	-79 dBm*
1805 MHz ? $f ? 1880$ 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 3.3a are permitted for each UARFCN used in the measurement.

[Editor’s note: The frequency bands in this table require clearer justification.]

2 Unwanted emission for base stations

[Editor’s note: No material available at this meeting.]

ANNEX 4

Unwanted Emission Characteristics for IMT-2000 TDMA Single-Carrier Radio Interface

(Directly input by TR45-3 in TG8-1, valid for 200 kHz channel spacing,
conformity with regional regulation need to be checked)

1 Unwanted emission for terminals

1.1 Unwanted emission for idle mode and sleep mode

A mobile station is defined to be in Idle mode when reading a control channel with the receiver active. Applicable limits are given in Table 4.1. A mobile station is defined to be in Sleep mode when camped on a control channel but not actively reading the control channel.

TABLE 4.1

Spurious emissions, idle mode

Band	Frequency offset	Measurement bandwidth	Minimum requirement
9 kHz - 824 MHz	-	100 kHz	-57 dBm
824-849 MHz	-	100 kHz	-59 dBm
849-1 000 MHz	-	100 kHz	-57 dBm
1 850-1 910 MHz	-	100 kHz	-53 dBm
all other bands 1-12.75 GHz	-	100 kHz	-47 dBm

1.1.1 Spurious emissions, sleep mode:

When a mobile is operating in sleep mode its emissions shall not exceed -117 dBm.

1.2 Unwanted emission for carrier on-state

1.2.1 Spectrum emission mask

Out-of-band emissions for the mobile station (in dB, relative to a measurement in 30 kHz on the carrier) are given in Table 4.2 for the 200 kHz carrier and in Table 4.3 for the 1.6 MHz carrier.

TABLE 4.2

OOB emissions for the 200 kHz carrier

Power Level	100*	200*	250*	400*	? 600 < 1200*	? 1200 < 1800*	? 1800 < 6000*	? 6000*
? 33 dBm	+0.5	-30	-33	-60	-60	-60	-68	-76
32 dBm	+0.5	-30	-33	-60	-60	-60	-67	-75
30 dBm	+0.5	-30	-33	-60	-60†	-60	-65	-73
28 dBm	+0.5	-30	-33	-60	-60†	-60	-63	-71
26 dBm	+0.5	-30	-33	-60	-60†	-60	-61	-69
? 24 dBm	+0.5	-30	-33	-60	-60†	-60	-59	-67

* Frequency offset from the carrier, in kHz.

† For equipment supporting 8-PSK, the requirement for 8-PSK modulation is -54 dB.

TABLE 4.3

OOB emissions for the 1.6 MHz carrier

Power Level	1600*	3200*	4800*	> 4800*
? 33 dBm	-26	-45	-52	-52

* Frequency offset from the carrier, in kHz.

1.2.3 Spurious emissions

A mobile station is defined to be in Active mode when assigned to a packet channel with the transmitter and receiver active. Limits are given in Table 4.4.

TABLE 4.4
Spurious emissions, active mode

Band	Frequency offset	Measurement bandwidth	Minimum requirement
869-894 MHz	? 1.8 MHz (offset from carrier)	30 kHz	-79 dBm
1 930-1 990 MHz	? 6 MHz (offset from carrier)	100 kHz	-71 dBm
100 kHz - 50 MHz	-	10 kHz	-36 dBm
50-500 MHz	-	100 kHz	-36 dBm
above 500 MHz (outside the relevant transmit band)	offset from edge of the relevant above band		
	? 2 MHz	30 kHz	-36 dBm
	? 5 MHz	100 kHz	-36 dBm
	? 10 MHz	300 kHz	-36 dBm
	? 20 MHz	1 MHz	-36 dBm
	? 30 MHz	3 MHz	-30 dBm

2 Unwanted emission for base stations

[Editor's note: No material available at this meeting.]

ANNEX 5

Unwanted Emission Characteristics for IMT-2000 TDMA Multi-Carrier Radio Interface

(From Doc. 8-1/429R1 of EP-DECT, conformity with regional regulation need to be checked)

1 Unwanted emission for terminals and base stations

1.1 Adjacent Channel Leakage power ratio

- first adjacent channel: 160 μ W
- second adjacent channel: 1 μ W
- third adjacent channel: 40 nW
- >3 adjacent channel : 20 nW

1.2 Out-of-band and spurious emissions

The peak power level of any RF emissions outside the radio frequency band allocated to DECT, when a radio end point has an allocated physical channel, shall not exceed 250 nW at frequencies below 1 GHz and 1 μ W at frequencies above 1 GHz. The power shall be defined in the bandwidths given in the table below. If a radio end point has more than one transceiver, any out of band transmitter intermodulation products shall also be within these limits.

Frequency offset, fo from edge of band	Measurement bandwidth
0 MHz < fo < 2 MHz	30 kHz
2 MHz < fo < 5 MHz	30 kHz
5 MHz < fo < 10 MHz	100 kHz
10 MHz < fo < 20 MHz	300 kHz
20 MHz < fo < 30 MHz	1 MHz
30 MHz < fo < 12,75 GHz	3 MHz

[Editor's note: The "band" not being explicit here, there is a need to specify the unwanted emission in an other way.]

ANNEX 6

Definition of spurious and out-of-band emissions

1 Spurious emissions

Radio Regulations (S5.145):

“Emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions.”

In addition, Recommendation ITU-R SM.329-[8] states:

“NOTE 1 – For the purpose of this Recommendation all emissions which fall at frequencies separated from the centre frequency of the emission by 250% or more of the necessary bandwidth of the emission will generally be considered spurious emissions?”

2 Out-of-band emissions

Radio Regulations (S5.144):

“Emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions.”

In addition, Recommendation ITU-R SM.329-[8] states:

“NOTE 1 – For the purpose of this recommendation, any unwanted emission which falls at frequencies separated from the centre frequency of the emission by less than 250% of the necessary bandwidth of the emission will generally be considered out-of-band emission”

3 Unwanted emissions

Radio Regulations (S5.146):

“Consist of spurious emissions and out-of-band emissions.”