TSG RAN Meeting #16 **RP-020281**
Marco Island, FL, USA, 4 - 7 June 2002

Title **CRs (R'99 and Rel-4/Rel-5 Category A) to TS 25.105**
Source **TSG RAN WG4**
Agenda Item **7.4.3**

RAN4 Tdoc	Spec	Curr Ver	New Ver	CR	R	Cat	Ph	Title	Acronym
R4-020695	25.105	3.10.0	3.11.0	111		F	R99	Correction of power terms and definitions	TEI
R4-020696	25.105	4.4.0	4.5.0	112		A	Rel-4	Correction of power terms and definitions	TEI
R4-020697	25.105	5.0.0	5.1.0	113		A	Rel-5	Correction of power terms and definitions	TEI
R4-020825	25.105	3.10.0	3.11.0	117		F	R99	ACLR and spurious emission requirements for coexistence	TEI
R4-020826	25.105	4.4.0	4.5.0	118		F	Rel-4	ACLR and spurious emission requirements for coexistence for 3.84 Mcps and 1.28 Mcps TDD	TEI, LCRTDD-RF

3GPP TSG RAN WG4 Meeting #23 **R4-020695**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.105** **CR** **111** ⌘ ev **-** ⌘ Current version: **3.10.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of power terms and definitions
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	R99

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)*

Reason for change: ⌘ The existing requirements relating to power are incomplete, inconsistent and ambiguous. The proposed changes remove the possibility of misinterpreting the specification.

Summary of change: ⌘ 3.1 Definitions - Average Power deleted, Clarification of power spectral density added. Mean power (consistant with ITU radio regulation), RRC filtered mean power, Code domain power, and Output power added; Maximum output power and Rated output power are now related to mean power

3.3. Abbreviations – definition of I_{oc} and $\hat{I}_{or}$ corrected.

6.2. typo corrected.

6.4.1 Inner loop power control - output power and mean output power replaced by code domain power

6.4.2 Power control steps - transmitter output power and mean power replaced by code domain power

6.4.3 Power control dynamic range - output power replaced by code domain power

6.4.5 Primary CCPCH power – defined as code domain power, total power replaced by output power

6.5.1 Transmit OFF power - average power replaced by RRC filtered mean power

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR) – changed to RRC filtered mean power terminology

		6.7 Transmit intermodulation - subject and interferer signals defined as mean power 7.2, 7.2.1 Reference sensitivity level - defined as mean power, FER removed 7.3.1 Receiver dynamic range - Wanted signal defined as mean power, wanted signal level given as –79 dBm (according formula: REFSENS + 30 dB : -109dBm+30 dB) 7.4, 7.4.1 Adjacent Channel Selectivity (ACS) - Wanted and interfering signals defined as mean power, interferer defined as single code to match existing test. Missing "offset" added to Fuw definition. wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.5 Blocking characteristics - Wanted and interfering signals defined as mean power, wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.6 Intermodulation characteristics - Wanted and interfering signals defined as mean power Annex B.2: Average power replaced by relative mean power
Consequences if not approved:	⌘	Existing power specifications are incomplete, inconsistent and ambiguous which will lead to different interpretation of power quantities (e.g. ACLR, P-CCPCH power, Interferer levels etc.). This will lead to inconsistent performance measurement results. Isolated impact statement: Correction of requirements. Correct interpretation of the existing specification will not affect implementations or system performance. However, incorrect interpretation may impact conformance test implementation and conformance test results.

Clauses affected:	⌘	3.1, 3.3, 6.4.1, 6.4.2, 6.4.3, 6.4.5, 6.5.1, 6.6.2.2, 6.7, 7.2, 7.2.1, 7.3.1, 7.4, 7.4.1, 7.5, 7.5.1, 7.6, Annex B2		
Other specs affected:	⌘	[ ] Other core specifications [X] Test specifications [ ] O&M Specifications	⌘	25.142
Other comments:	⌘	Equivalent CRs in other Releases: CR112 cat. A to 25.105 v4.4.0, CR113 cat. A to 25.105 v5.0.0		

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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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply.

Power Spectral Density: The units of Power Spectral Density (PSD) are extensively used in this document. PSD is a function of power versus frequency and when integrated across a given bandwidth, the function represents the mean power in such a bandwidth. When the mean power is normalised to (divided by) the chip-rate it represents the mean energy per chip. Some signals are directly defined in terms of energy per chip, (DPCH_Ec, Ec, and P-CCPCH_Ec) and others defined in terms of PSD (Io, Ioc, Ior and Îor). There also exist quantities that are a ratio of energy per chip to PSD (DPCH_Ec/Ior, Ec/Ior etc.). This is the common practice of relating energy magnitudes in communication systems.
It can be seen that if both energy magnitudes in the ratio are divided by time, the ratio is converted from an energy ratio to a power ratio, which is more useful from a measurement point of view. It follows that an energy per chip of X dBm/3.84 MHz can be expressed as a mean power per chip of X dBm. Similarly, a signal PSD of Y dBm/3.84 MHz can be expressed as a signal power of Y dBm.

~~**Average Power**: The thermal power as measured through a root raised cosine filter with roll-off α=0.22 and a bandwidth equal to the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.~~

Mean power: When applied to a CDMA modulated signal this is the power (transmitted or received) in a bandwidth of at least (1+ α) times the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.

NOTE: The roll-off factor α is defined in section 6.8.1.

RRC filtered mean power: The mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode.

NOTE: The RRC filtered mean power of a perfectly modulated CDMA signal is 0.246 dB lower than the mean power of the same signal.

Code domain power: That part of the mean power which correlates with a particular (OVSF) code channel. The sum of all powers in the code domain equals the mean power in a bandwidth of (1+ α) times the chip rate of the radio access mode.

Output power: The mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Maximum ~~O~~output ~~P~~power: The mean power level per carrier ~~maximum Output Power~~ of the base station ~~per carrier~~ measured at the antenna connector ~~(i.e. the actual broadband power as would be measured assuming no measurement error) for~~ in a specified reference condition. The period of measurement shall be a transmit timeslot excluding the guard period.

Rated ~~O~~output ~~P~~power~~, PRAT~~: Rated ~~The O~~output ~~P~~power of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.

--- next changed section ---

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACIR	Adjacent Channel Interference Ratio
ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity

BER	Bit Error Rate
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
$DPCH_o$	A mechanism used to simulate an individual intracell interferer in the cell with one code and a spreading factor of 16
$\frac{DPCH\_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the $DPCH_o$ to the total transmit power spectral density of all users in the cell in one timeslot as measured at the BS antenna connector
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
FER	Frame Error Rate
I_{oc}	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited white noise source (simulating interference ~~o~~rom other cells) as measured at the BS antenna connector.
$\hat{I}_{or}$	The received power spectral density (integrated in a bandwidth (1+α) times the chip rate and normalized to the chip rate) of all users in the cell in one timeslot as measured at the BS antenna connector
PPM	Parts Per Million
Pout	Output power.
PRAT	Rated Output power
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up link (reverse link)
UTRA	UMTS Terrestrial Radio Access

--- next changed section ---

6.2 Base station output power

The rated output power of the base station ~~are~~ is defined in section 3.1.

--- next changed section ---

6.4 Output power dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

6.4.1 Inner loop power control

Inner loop power control is the ability of the BS transmitter to adjust its ~~output~~ code domain power in response to the UL received signal.

For inner loop correction on the Downlink Channel, the base station adjusts the ~~mean output~~ code domain power ~~level~~ of a power controlled CCTrCH in response to each valid power control bit received from the UE on the Uplink Traffic Channel based on the mapping of the TPC bits in uplink CCTrCH to downlink CCTrCH. Inner loop control is based on SIR measurements at the UE receiver and the corresponding TPC commands are generated by the UE.

6.4.2 Power control steps

The power control step is the step change in the DL ~~transmitter output~~ code domain power in response to a TPC message from the UE.

6.4.2.1 Minimum Requirement

Down link (DL) 1, 2, 3 dB

The tolerance of the ~~transmitter output~~ code domain power and the greatest average rate of change in ~~mean~~ code domain power due to the power control step shall be within the range shown in Table 6.1.

Table 6.1: power control step size tolerance

Step size	Tolerance	Range of average rate of change in ~~mean~~ code domain power per 10 steps	
		minimum	maximum
1dB	+/-0.5dB	+/-8dB	+/-12dB
2dB	+/-0.75dB	+/-16dB	+/-24dB
3dB	+/-1dB	+/-24dB	+/-36dB

6.4.3 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum ~~output~~ code domain power of one power controlled code channel for a specified reference condition

6.4.3.1 Minimum Requirement

Down link (DL) power control dynamic range shall be greater than or equal to 30 dB

6.4.4 Minimum output power

The minimum controlled output power of the BS is when the power is set to a minimum value.

6.4.4.1 Minimum Requirement

Down link (DL) minimum output power shall be lower than or equal to:

Maximum output power – 30dB

6.4.5 Primary CCPCH power

Primary CCPCH power is the ~~transmission~~ code domain power of the primary common control physical channel averaged over the transmit timeslot. Primary CCPCH power is signalled over the BCH.

The error between the BCH-broadcast value of the Primary CCPCH power and the Primary CCPCH power averaged over the timeslot shall not exceed the values in table 6.2. The error is a function of the ~~total~~ output power averaged over the timeslot, Pout, and the manufacturer's rated output power, PRAT.

Table 6.2: Errors between Primary CCPCH power and the broadcast value

~~Total~~ Output power in slot, dB	PCCPCH power tolerance
PRAT-3 < Pout ≤ PRAT+2	+/- 2.5 dB
PRAT-6 < Pout ≤ PRAT-3	+/- 3.5 dB
PRAT-13 < Pout ≤ PRAT-6	+/- 5 dB

6.5 Transmit ON/OFF power

6.5.1 Transmit OFF power

Transmit OFF power is defined as the ~~average~~ RRC filtered mean power measured over one chip when the transmitter is off. The transmit OFF power state is when the BS does not transmit.

6.5.1.1 Minimum Requirement

The ~~requirement of~~ transmit OFF power shall be less than –79 dBm ~~measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate~~.

--- next changed section ---

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the ~~average~~ RRC filtered mean power centered on the assigned channel frequency to the ~~average~~ RRC filtered mean power centered on an adjacent channel frequency. ~~In both cases the power is measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off α=0.22and a 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.

6.6.2.2.1 Minimum Requirement

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.7.

Table 6.7: BS ACLR

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.2 Requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is operated in proximity to another TDD BS or FDD BS operating on the first or second adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.8.

Table 6.8: BS ACLR in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	70 dB
10 MHz	70 dB

NOTE: The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS or FDD BS in proximity.

6.6.2.2.3 Requirement in case of co-siting with TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is co-sited to another TDD BS or FDD BS operating on the first or second adjacent frequency, the requirement is specified in terms of the adjacent channel power level of the BS measured in the adjacent channel. The adjacent channel power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limit in Table 6.9.

Table 6.9: BS ACLR in case of co-sitting

BS adjacent channel offset below the first or above the last carrier frequency use	Maximum Level	Measurement Bandwidth
5 MHz	-80 dBm	3.84 MHz
10 MHz	-80 dBm	3.84 MHz

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS or FDD BS.

--- next changed section ---

6.7 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a CDMA modulated interference signal is injected into the antenna connector at a mean power level of 30 dB lower than that of the mean power of the subject signal. The frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the subject signal.

6.7.1 Minimum Requirement

The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

--- next changed section ---

7.2 Reference sensitivity level

The reference sensitivity level is the minimum ~~receiver input~~ mean power ~~measured~~ received at the antenna connector at which the ~~FER/~~BER ~~does~~ shall not exceed the specific value indicated in section 7.2.1.

7.2.1 Minimum Requirement

~~For~~ Using the reference measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table 7.1 ~~below~~.

Table 7.1: BS reference sensitivity level~~s~~

Reference measurement channel ~~D~~data rate	**BS reference sensitivity level ~~(dBm)~~**	**~~FER/~~BER**
12.2 kbps	-109 dBm	BER shall not exceed 0.001

7.3 Dynamic range

Receiver dynamic range is the receiver ability to handle a rise of interference in the reception frequency channel. The receiver shall fulfil a specified BER requirement for a specified sensitivity degradation of the wanted signal in the presence of an interfering AWGN signal in the same reception frequency channel.

7.3.1 Minimum requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.2.

Table 7.2: Dynamic Range

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~<REFSENS> + 30 dB~~ –79	dBm
Interfering AWGN signal	-73	dBm/3.84 MHz

7.4 Adjacent Channel Selectivity (ACS)

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of a~~n~~ single code CDMA modulated adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel(s).

7.4.1 Minimum Requirement

The BER shall not exceed 0.001 for the parameters specified in table 7.3.

Table 7.3 : Adjacent channel selectivity

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~Reference sensitivity level + 6dB~~ –103	dBm
Interfering signal mean power	–52	dBm
Fuw offset (Modulated)	5	MHz

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels. The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

The static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

Table 7.4 (a): Blocking requirements for operating bands defined in 5.2(a)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1920 – 1980 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1880 MHz, 1980 – 1990 MHz, 2045 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(b) : Blocking requirements for operating bands defined in 5.2(b)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1830 – 1850 MHz, 1990 – 2010 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1830 MHz, 2010 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(c) : Blocking requirements for operating bands defined in 5.2(c)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1910 – 1930 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1890 – 1910 MHz, 1930 – 1950 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1890 MHz, 1950 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.5.1 Co-location with GSM900 and/or DCS 1800

This additional blocking requirement may be applied for the protection of TDD BS receivers when GSM900 and/or DCS1800 BTS are co-located with UTRA TDD BS.

The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

In case this additional blocking requirement is applied, the static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

Table 7.4(d): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with GSM900

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
921 – 960 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(e): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with DCS1800

Center Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1805 ~~-~~ – 1880 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.6 Intermodulation characteristics

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 receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

The static reference performance as specified in clause 7.2.1 should be met when the following signals are coupled to BS antenna input.

- A wanted signal at the assigned channel frequency, with mean power 6 dB above the static reference level.
- Two interfering signals with the following parameters.

Table 7.5 : Intermodulation requirement

Interfering Signal ~~Level~~ Mean Power	Offset	Type of Interfering Signal
- 48 dBm	10 MHz	CW signal
- 48 dBm	20 MHz	WCDMA signal with one code

--- next changed section ---

B.2 Multi-path fading propagation conditions

Table B1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum, defined as:

(CLASS) $$S(f) \propto 1/(1-(f/f_D)^2)^{0.5}$$ for f ∈ -f_d, f_d.

Table B.1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, speed 120 km/h	
Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]
0	0	0	0	0	0
976	-10	976	0	260	-3
		12000	0	521	-6
				781	-9

3GPP TSG RAN WG4 Meeting #23 **R4-020696**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.105** **CR** **112** ⌘ ev **-** ⌘ Current version: **4.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of power terms and definitions
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**A**
Release:	⌘	Rel-4

Use one of the following categories:
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B *(addition of feature),*
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Use one of the following releases:
2 *(GSM Phase 2)*
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3.3. Abbreviations – definition of I_{oc} and $\hat{I}_{or}$ corrected.

6.4.1 Inner loop power control - output power and mean output power replaced by code domain power

6.4.2, 6.4.2.1 Power control steps - transmitter output power and mean power replaced by code domain power

6.4.3 Power control dynamic range - output power replaced by code domain power

6.4.5 Primary CCPCH power – defined as code domain power, total power replaced by output power

6.5.1, 6.5.1.1.1 Transmit OFF power - average power replaced by RRC filtered mean power

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR) – changed to RRC filtered mean power terminology

6.7 Transmit intermodulation - subject and interferer signals defined as mean

		power 7.2, 7.2.1.1 Reference sensitivity level - defined as mean power, FER removed 7.3.1.1 Receiver dynamic range - Wanted signal defined as mean power, wanted signal level given as –79 dBm (according formula: REFSENS + 30 dB : -109dBm+30 dB) 7.4, 7.4.1.1 Adjacent Channel Selectivity (ACS) - Wanted and interfering signals defined as mean power, interferer defined as single code to match existing test. Missing "offset" added to Fuw definition. wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.5.0.1, 7.5.1.1 Blocking characteristics - Wanted and interfering signals defined as mean power, wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.6.1 Intermodulation characteristics - Wanted and interfering signals defined as mean power Annex B.2.1: Average power replaced by relative mean power
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Clauses affected:	⌘	3.1, 3.3, 6.4.1, 6.4.2, 6.4.2.1, 6.4.3, 6.4.5, 6.5.1, 6.5.1.1.1, 6.6.2.2, 6.7, 7.2, 7.2.1.1, 7.3.1.1, 7.4, 7.4.1.1, 7.5.0.1, 7.5.1.1, 7.6.1, Annex B2.1		
Other specs affected:	⌘	[ ] Other core specifications [X] Test specifications [ ] O&M Specifications	⌘	25.142
Other comments:	⌘	Equivalent CRs in other Releases: CR111 cat. F to 25.105 v3.10.0, CR113 cat. A to 25.105 v5.0.0		

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply.

Power Spectral Density: The units of Power Spectral Density (PSD) are extensively used in this document. PSD is a function of power versus frequency and when integrated across a given bandwidth, the function represents the mean power in such a bandwidth. When the mean power is normalised to (divided by) the chip-rate it represents the mean energy per chip. Some signals are directly defined in terms of energy per chip, (DPCH_Ec, Ec, and P-CCPCH_Ec) and others defined in terms of PSD (Io, Ioc, Ior and Îor). There also exist quantities that are a ratio of energy per chip to PSD (DPCH_Ec/Ior, Ec/Ior etc.). This is the common practice of relating energy magnitudes in communication systems.
It can be seen that if both energy magnitudes in the ratio are divided by time, the ratio is converted from an energy ratio to a power ratio, which is more useful from a measurement point of view. It follows that an energy per chip of X dBm/3.84 MHz (3.84 Mcps TDD option) or X dBm/1.28 MHz (1.28 Mcps TDD option) can be expressed as a mean power per chip of X dBm. Similarly, a signal PSD of Y dBm/3.84 MHz (3.84 Mcps TDD option) or Y dBm/1.28 MHz (1.28 Mcps TDD option) can be expressed as a signal power of Y dBm.

~~**Average Power**: The thermal power as measured through a root raised cosine filter with roll-off α=0.22 and a bandwidth equal to the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.~~

Mean power: When applied to a CDMA modulated signal this is the power (transmitted or received) in a bandwidth of at least (1+ α) times the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.

NOTE: The roll-off factor α is defined in section 6.8.1.

RRC filtered mean power: The mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode.

NOTE: The RRC filtered mean power of a perfectly modulated CDMA signal is 0.246 dB lower than the mean power of the same signal.

Code domain power: That part of the mean power which correlates with a particular (OVSF) code channel. The sum of all powers in the code domain equals the mean power in a bandwidth of (1+ α) times the chip rate of the radio access mode.

Output power: The mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Maximum ~~O~~output ~~P~~power: The mean power level per carrier ~~maximum Output Power~~ of the base station ~~per carrier~~ measured at the antenna connector ~~(i.e. the actual broadband power as would be measured assuming no measurement error) for~~ in a specified reference condition. The period of measurement shall be a transmit timeslot excluding the guard period.

Rated ~~O~~output ~~P~~power~~, PRAT~~: **Rated** ~~The O~~output ~~P~~ower of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.

--- next changed section ---

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACIR Adjacent Channel Interference Ratio
ACLR Adjacent Channel Leakage power Ratio

ACS	Adjacent Channel Selectivity
BER	Bit Error Rate
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
$DPCH_o$	A mechanism used to simulate an individual intracell interferer in the cell with one code and a spreading factor of 16
$\frac{DPCH_o \_ E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the $DPCH_o$ to the total transmit power spectral density of all users in the cell in one timeslot as measured at the BS antenna connector
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
FER	Frame Error Rate
I_{oc}	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited white noise source (simulating interference f~~o~~rom other cells) as measured at the BS antenna connector.
$\hat{I}_{or}$	The received power spectral density (integrated in a bandwidth (1+α) times the chip rate and normalized to the chip rate) of all users in the cell in one timeslot as measured at the BS antenna connector
PPM	Parts Per Million
Pout	Output power.
PRAT	Rated Output power
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up link (reverse link)
UTRA	UMTS Terrestrial Radio Access

--- next changed section ---

6.4 Output power dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

6.4.1 Inner loop power control

Inner loop power control is the ability of the BS transmitter to adjust its ~~output~~ code domain power in response to the UL received signal.

For inner loop correction on the Downlink Channel, the base station adjusts the ~~mean output~~ code domain power ~~level~~ of a power controlled CCTrCH in response to each valid power control bit received from the UE on the Uplink Traffic Channel based on the mapping of the TPC bits in uplink CCTrCH to downlink CCTrCH. Inner loop control is based on SIR measurements at the UE receiver and the corresponding TPC commands are generated by the UE.

6.4.2 Power control steps

The power control step is the step change in the DL ~~transmitter output~~ code domain power in response to a TPC message from the UE.

6.4.2.1 Minimum Requirement

Down link (DL) 1, 2, 3 dB

The tolerance of the ~~transmitter output~~ code domain power and the greatest average rate of change in ~~mean~~ code domain power due to the power control step shall be within the range shown in Table 6.1.

Table 6.1: power control step size tolerance

Step size	Tolerance	Range of average rate of change in ~~mean~~ code domain power per 10 steps	
		minimum	maximum
1dB	+/-0.5dB	+/-8dB	+/-12dB
2dB	+/-0.75dB	+/-16dB	+/-24dB
3dB	+/-1dB	+/-24dB	+/-36dB

6.4.3 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum ~~output~~ code domain power of one power controlled code channel for a specified reference condition

6.4.3.1 Minimum Requirement

Down link (DL) power control dynamic range shall be greater or equal to 30 dB

6.4.4 Minimum output power

The minimum controlled output power of the BS is when the power is set to a minimum value.

6.4.4.1 Minimum Requirement

Down link (DL) minimum output power shall be lower than or equal to:

Maximum output power – 30dB

6.4.5 Primary CCPCH power

Primary CCPCH power is the ~~transmission~~ code domain power of the primary common control physical channel averaged over the transmit timeslot. Primary CCPCH power is signalled over the BCH.

The error between the BCH-broadcast value of the Primary CCPCH power and the Primary CCPCH power averaged over the timeslot shall not exceed the values in table 6.2. The error is a function of the ~~total~~ output power averaged over the timeslot, Pout, and the manufacturer's rated output power, PRAT.

Table 6.2: Errors between Primary CCPCH power and the broadcast value

~~Total~~ Output power in slot, dB	PCCPCH power tolerance
PRAT-3 < Pout ≤ PRAT+2	+/- 2.5 dB
PRAT-6 < Pout ≤ PRAT-3	+/- 3.5 dB
PRAT-13 < Pout ≤ PRAT-6	+/- 5 dB

6.4.6 Differential accuracy of Primary CCPCH power

The differential accuracy of the Primary CCPCH power is the relative transmitted power accuracy of PCCPCH in consecutive frames when the nominal PCCPCH power is not changed.

6.4.6.1 Minimum Requirement for Differential accuracy of PCCPCH power

Differential accuracy of PCCPCH power: +/- 0.5 dB

6.5 Transmit ON/OFF power

6.5.1 Transmit OFF power

Transmit OFF power is defined as the ~~average~~ RRC filtered mean power measured over one chip when the transmitter is off. The transmit OFF power state is when the BS does not transmit.

6.5.1.1 Minimum Requirement

6.5.1.1.1 3,84 Mcps TDD Option

The ~~requirement of~~ transmit OFF power shall be less than –79 dBm ~~measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate~~.

6.5.1.1.2 1,28 Mcps TDD Option

The requirement of transmit OFF power shall be less than –82 dBm measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate.

--- next changed section ---

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the ~~average~~ RRC filtered mean power centered on the assigned channel frequency to the ~~average~~ RRC filtered mean power centered on an adjacent channel frequency. ~~In both cases the power is measured with filter that has a Root Raised Cosine (RRC) filter response with roll off α=0.22 and a 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.

The requirement depends on the deployment scenario. Three different deployment scenarios have been defined as given below.

6.6.2.2.1 Minimum Requirement

6.6.2.2.1.1 3,84 Mcps TDD Option

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.7.

Table 6.7: BS ACLR

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.1.2 1,28 Mcps TDD Option

For the 1.28Mcps chip rate option, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be better than the value specified in Table 6.7A

Table 6.7A: BS ACLR (1.28Mcps chip rate)

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
1.6 MHz	40 dB
3.2 MHz	45 dB

NOTE: This requirement is valid for co-existence with frame and switching point synchronised systems, or for non-synchronised systems if the path loss between the BSs is greater than 107dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.2 Additional requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

6.6.2.2.2.1 3,84 Mcps TDD Option

In case the equipment is operated in proximity to another TDD BS or FDD BS operating on the first or second adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.8.

Table 6.8: BS ACLR in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	70 dB
10 MHz	70 dB

NOTE: The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS or FDD BS in proximity.

6.6.2.2.2 1,28 Mcps TDD Option

In case the equipment is operated in proximity to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band , the requirement is specified in terms of power level of the transmitting BS. This requirement is valid for co-existence with non-frame and non-switching point synchronised systems operating on the closest used carrier. The interference power level shall not exceed the limit in Table 6.8A.

Table 6.8A: BS ACLR in case of operation in proximity

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier	-36 dBm	chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual} - (-106dBm)$.

6.6.2.3 Additional requirement in case of co-siting with TDD BS or FDD BS operating on an adjacent frequency

6.6.2.3.1 3,84 Mcps TDD Option

In case the equipment is co-sited to another TDD BS or FDD BS operating on the first or second adjacent frequency, the requirement is specified in terms of the adjacent channel power level of the BS measured in the adjacent channel. The adjacent channel power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limit in Table 6.9.

Table 6.9: BS ACLR in case of co-sitting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
5 MHz	-80 dBm	3.84 MHz
10 MHz	-80 dBm	3.84 MHz

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS or FDD BS.

6.6.2.3.2 1,28 Mcps TDD Option

In case the equipment is co-sited to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band, the requirement is specified in terms of power level of the transmitting BS. This requirement is valid for co-existence with a non-frame and non-switching point synchronised systems operating on closest used carrier. The interference power level shall not exceed the limit in Table 6.9A.

Table 6.9A: BS ACLR in case of co-sitting

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier	-76 dBm	chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual MCL_{actual} is higher than 30dB, this requirement may be relaxed by the amount MCL_{actual} – 30dB.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).

--- next changed section ---

6.7 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a CDMA modulated interference signal is injected into the antenna connector at a mean power level of 30 dB lower than that of the mean power of the subject signal.

6.7.1 Minimum Requirement

6.7.1.1 3,84 Mcps TDD Option

The frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the subject signal. The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

6.7.1.2 1,28 Mcps TDD Option:

The frequency of the interference signal shall be ±1.6 MHz, ±3.2 MHz and ±4.8 MHz offset from the subject signal. The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

--- next changed section ---

7.2 Reference sensitivity level

The reference sensitivity level is the minimum ~~receiver input~~ mean power ~~measured~~ received at the antenna connector at which the ~~FER/~~BER ~~does~~ shall not exceed the specific value indicated in section 7.2.1.

7.2.1 Minimum Requirement

7.2.1.1 3,84 Mcps TDD Option

~~For~~ Using the reference measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table 7.1 ~~below~~.

Table 7.1: BS reference sensitivity levels

Reference measurement channel ~~D~~data rate	BS reference sensitivity level ~~(dBm)~~	~~FER/~~BER
12.2 kbps	-109 dBm	BER shall not exceed 0.001

7.2.1.2 1,28 Mcps TDD Option

For the measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table7.1A

Table7.1A: BS reference sensitivity levels

Data rate	BS reference sensitivity level (dBm)	FER/BER
12.2 kbps	-110 dBm	BER shall not exceed 0.001

7.3 Dynamic range

Receiver dynamic range is the receiver ability to handle a rise of interference in the reception frequency channel. The receiver shall fulfil a specified BER requirement for a specified sensitivity degradation of the wanted signal in the presence of an interfering AWGN signal in the same reception frequency channel.

7.3.1 Minimum requirement

7.3.1.1 3,84 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in Table 7.2.

Table 7.2: Dynamic Range

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~<REFSENS> + 30 dB~~ –79	dBm
Interfering AWGN signal	-73	dBm/3.84 MHz

7.3.1.2 1,28 Mcps TDD Option:

The BER shall not exceed 0.001 for the parameters specified in Table7.2A

Table 7.2A: Dynamic Range

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	<REFSENS> + 30 dB	dBm
Interfering AWGN signal	-76dBm	dBm/1.28 MHz

7.4 Adjacent Channel Selectivity (ACS)

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of a~~n~~ single code CDMA modulated adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel(s).

7.4.1 Minimum Requirement

7.4.1.1 3,84 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in table 7.3.

Table 7.3: Adjacent channel selectivity

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~Reference sensitivity level + 6dB~~ –103	dBm
Interfering signal	–52	dBm
Fuw offset (Modulated)	5	MHz

7.4.1.2 1,28 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in table7.3A

Table 7.3A: Adjacent channel selectivity

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	Reference sensitivity level + 6dB	dBm
Interfering signal	–55	dBm
Fuw (Modulated)	1.6	MHz

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels. The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

7.5.0 Minimum requirement

The static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

7.5.0.1 3,84 Mcps TDD Option

Table 7.4 (a): Blocking requirements for operating bands defined in 5.2(a)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1920 – 1980 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1880 MHz, 1980 – 1990 MHz, 2045 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(b) : Blocking requirements for operating bands defined in 5.2(b)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1830 – 1850 MHz, 1990 – 2010 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1830 MHz, 2010 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(c) : Blocking requirements for operating bands defined in 5.2(c)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1910 – 1930 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1890 – 1910 MHz, 1930 – 1950 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1890 MHz, 1950 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.5.0.2 1,28 Mcps TDD Option

Table 7.4A(a): Blocking requirements for operating bands defined in 5.2(a)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1920 – 1980 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1 – 1880 MHz, 1980 – 1990 MHz, 2045 – 12750 MHz	-15dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A(b): Blocking requirements for operating bands defined in 5.2(b)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1830 – 1850 MHz, 1990 – 2010 MHz	-40 dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1 – 1830 MHz, 2010 – 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A(c): Blocking requirements for operating bands defined in 5.2(c)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1910 – 1930 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1890 – 1910 MHz, 1930 – 1950 MHz	-40dBm	<REFSENS> + 6 dB	3.2 MHz	Narrow band CDMA signal with one code
1 – 1890 MHz, 1950 – 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

7.5.1 Co-location with GSM900 and/or DCS 1800

This additional blocking requirement may be applied for the protection of TDD BS receivers when GSM900 and/or DCS1800 BTS are co-located with UTRA TDD BS.

The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

In case this additional blocking requirement is applied, the static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

7.5.1.1 3,84 Mcps TDD Option

Table 7.4 (d): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with GSM900

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
921 – 960 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4 (e): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with DCS1800

Center Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1805 – 1880 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.5.1.2 1,28 Mcps TDD Option

Table 7.4A (d): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with GSM900

Centre Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
921 – 960 MHz	+16 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A (e): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with DCS1800

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1805 -– 1880	+16 dBm	<REFSENS> + 6 dB	—	CW carrier

7.6 Intermodulation characteristics

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 receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

7.6.1 Minimum requirement

The static reference performance as specified in clause 7.2.1 should be met when the following signals are coupled to BS antenna input.

- A wanted signal at the assigned channel frequency, with mean power 6 dB above the static reference level.
- Two interfering signals with the following parameters.

7.6.1.1 3,84 Mcps TDD Option

Table 7.5 : Intermodulation requirement

Interfering Signal ~~Level~~ Mean Power	Offset	Type of Interfering Signal
- 48 dBm	10 MHz	CW signal
- 48 dBm	20 MHz	WCDMA signal with one code

7.6.1.2 1,28 Mcps TDD Option

Table7.5A: Intermodulation requirement

Interfering Signal Level	Offset	Type of Interfering Signal
- 48 dBm	3.2 MHz	CW signal
- 48 dBm	6.4 MHz	1,28 Mcps TDD Option signal with one code

--- next changed section ---

B.2 Multi-path fading propagation conditions

B.2.1 3,84 Mcps TDD Option

Table B1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum, defined as:

(CLASS) $$S(f) \propto 1/(1-(f/f_D)^2)^{0.5}$$ for f ∈ -f_d, f_d.

Table B.1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, speed 120 km/h	
Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]
0	0	0	0	0	0
976	-10	976	0	260	-3
		12000	0	521	-6
				781	-9

B.2.2 1,28 Mcps TDD Option

TableB2 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum, defined as:

(CLASS) $$S(f) \propto 1/(1-(f/f_D)^2)^{0.5}$$ for f ∈ -f_d, f_d.

TableB2: Propagation Conditions for Multi-Path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3km/h		Case 3, speed 120km/h	
Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]
0	0	0	0	0	0
2928	-10	2928	0	781	-3
		12000	0	1563	-6
				2344	-9

3GPP TSG RAN WG4 Meeting #23 **R4-020697**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.105** **CR** **113** ⌘ ev **-** ⌘ Current version: **5.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of power terms and definitions
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**A**
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)*

Reason for change: ⌘ The existing requirements relating to power are incomplete, inconsistent and ambiguous. The proposed changes remove the possibility of misinterpreting the specification.

Summary of change: ⌘ 3.1 Definitions - Average Power deleted, Clarification of power spectral density added. Mean power (consistant with ITU radio regulation), RRC filtered mean power, Code domain power, and Output power added; Maximum output power and Rated output power are now related to mean power

3.3. Abbreviations – definition of I_{oc} and $\hat{I}_{or}$ corrected.

6.4.1 Inner loop power control - output power and mean output power replaced by code domain power

6.4.2, 6.4.2.1 Power control steps - transmitter output power and mean power replaced by code domain power

6.4.3 Power control dynamic range - output power replaced by code domain power

6.4.5 Primary CCPCH power – defined as code domain power, total power replaced by output power

6.5.1, 6.5.1.1.1 Transmit OFF power - average power replaced by RRC filtered mean power

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR) – changed to RRC filtered mean power terminology

6.7 Transmit intermodulation - subject and interferer signals defined as mean

		power 7.2, 7.2.1.1 Reference sensitivity level - defined as mean power, FER removed 7.3.1.1 Receiver dynamic range - Wanted signal defined as mean power, wanted signal level given as –79 dBm (according formula: REFSENS + 30 dB : -109dBm+30 dB) 7.4, 7.4.1.1 Adjacent Channel Selectivity (ACS) - Wanted and interfering signals defined as mean power, interferer defined as single code to match existing test. Missing "offset" added to Fuw definition. wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.5.0.1, 7.5.1.1 Blocking characteristics - Wanted and interfering signals defined as mean power, wanted signal level given as –103 dBm (according formula: REFSENS + 6 dB : -109dBm+6 dB) 7.6.1 Intermodulation characteristics - Wanted and interfering signals defined as mean power Annex B.2.1: Average power replaced by relative mean power
Consequences if not approved:	⌘	Existing power specifications are incomplete, inconsistent and ambiguous which will lead to different interpretation of power quantities (e.g. ACLR, P-CCPCH power, Interferer levels etc.). This will lead to inconsistent performance measurement results. Isolated impact statement: Correction of requirements. Correct interpretation of the existing specification will not affect implementations or system performance. However, incorrect interpretation may impact conformance test implementation and conformance test results.

Clauses affected:	⌘	3.1, 3.3, 6.4.1, 6.4.2, 6.4.2.1, 6.4.3, 6.4.5, 6.5.1, 6.5.1.1.1, 6.6.2.2, 6.7, 7.2, 7.2.1.1, 7.3.1.1, 7.4, 7.4.1.1, 7.5.0.1, 7.5.1.1, 7.6.1, Annex B2.1		
Other specs affected:	⌘	[ ] Other core specifications [X] Test specifications [ ] O&M Specifications	⌘	25.142
Other comments:	⌘	Equivalent CRs in other Releases: CR111 cat. F to 25.105 v3.10.0, CR112 cat. A to 25.105 v4.4.0		

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply.

Power Spectral Density: The units of Power Spectral Density (PSD) are extensively used in this document. PSD is a function of power versus frequency and when integrated across a given bandwidth, the function represents the mean power in such a bandwidth. When the mean power is normalised to (divided by) the chip-rate it represents the mean energy per chip. Some signals are directly defined in terms of energy per chip, (DPCH_Ec, Ec, and P-CCPCH_Ec) and others defined in terms of PSD (Io, Ioc, Ior and Îor). There also exist quantities that are a ratio of energy per chip to PSD (DPCH_Ec/Ior, Ec/Ior etc.). This is the common practice of relating energy magnitudes in communication systems.
It can be seen that if both energy magnitudes in the ratio are divided by time, the ratio is converted from an energy ratio to a power ratio, which is more useful from a measurement point of view. It follows that an energy per chip of X dBm/3.84 MHz (3.84 Mcps TDD option) or X dBm/1.28 MHz (1.28 Mcps TDD option) can be expressed as a mean power per chip of X dBm. Similarly, a signal PSD of Y dBm/3.84 MHz (3.84 Mcps TDD option) or Y dBm/1.28 MHz (1.28 Mcps TDD option) can be expressed as a signal power of Y dBm.

~~**Average Power**: The thermal power as measured through a root raised cosine filter with roll-off α=0.22 and a bandwidth equal to the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.~~

Mean power: When applied to a CDMA modulated signal this is the power (transmitted or received) in a bandwidth of at least (1+ α) times the chip rate of the radio access mode. The period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated.

NOTE: The roll-off factor α is defined in section 6.8.1.

RRC filtered mean power: The mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode.

NOTE: The RRC filtered mean power of a perfectly modulated CDMA signal is 0.246 dB lower than the mean power of the same signal.

Code domain power: That part of the mean power which correlates with a particular (OVSF) code channel. The sum of all powers in the code domain equals the mean power in a bandwidth of (1+ α) times the chip rate of the radio access mode.

Output power: The mean power of one carrier of the base station, delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Maximum ~~O~~output ~~P~~power: The mean power level per carrier ~~maximum Output Power~~ of the base station ~~per carrier~~ measured at the antenna connector ~~(i.e. the actual broadband power as would be measured assuming no measurement error) for~~ in a specified reference condition. The period of measurement shall be a transmit timeslot excluding the guard period.

Rated ~~O~~output ~~P~~power~~, PRAT~~: **Rated** ~~The O~~output ~~P~~ower of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.

--- next changed section ---

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACIR Adjacent Channel Interference Ratio
ACLR Adjacent Channel Leakage power Ratio

ACS	Adjacent Channel Selectivity
BER	Bit Error Rate
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
$DPCH_o$	A mechanism used to simulate an individual intracell interferer in the cell with one code and a spreading factor of 16
$\frac{DPCH_o \_ E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the $DPCH_o$ to the total transmit power spectral density of all users in the cell in one timeslot as measured at the BS antenna connector
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
FER	Frame Error Rate
I_{oc}	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited white noise source (simulating interference f~~o~~rom other cells) as measured at the BS antenna connector.
$\hat{I}_{or}$	The received power spectral density (integrated in a bandwidth (1+α) times the chip rate and normalized to the chip rate) of all users in the cell in one timeslot as measured at the BS antenna connector
PPM	Parts Per Million
Pout	Output power.
PRAT	Rated Output power
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up link (reverse link)
UTRA	UMTS Terrestrial Radio Access

--- next changed section ---

6.4 Output power dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

6.4.1 Inner loop power control

Inner loop power control is the ability of the BS transmitter to adjust its ~~output~~ code domain power in response to the UL received signal.

For inner loop correction on the Downlink Channel, the base station adjusts the ~~mean output~~ code domain power ~~level~~ of a power controlled CCTrCH in response to each valid power control bit received from the UE on the Uplink Traffic Channel based on the mapping of the TPC bits in uplink CCTrCH to downlink CCTrCH. Inner loop control is based on SIR measurements at the UE receiver and the corresponding TPC commands are generated by the UE.

6.4.2 Power control steps

The power control step is the step change in the DL ~~transmitter output~~ code domain power in response to a TPC message from the UE.

6.4.2.1 Minimum Requirement

Down link (DL) 1, 2, 3 dB

The tolerance of the ~~transmitter output~~ code domain power and the greatest average rate of change in ~~mean~~ code domain power due to the power control step shall be within the range shown in Table 6.1.

Table 6.1: power control step size tolerance

Step size	Tolerance	Range of average rate of change in ~~mean~~ code domain power per 10 steps	
		minimum	maximum
1dB	+/-0.5dB	+/-8dB	+/-12dB
2dB	+/-0.75dB	+/-16dB	+/-24dB
3dB	+/-1dB	+/-24dB	+/-36dB

6.4.3 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum ~~output~~ code domain power of one power controlled code channel for a specified reference condition

6.4.3.1 Minimum Requirement

Down link (DL) power control dynamic range shall be greater or equal to 30 dB

6.4.4 Minimum output power

The minimum controlled output power of the BS is when the power is set to a minimum value.

6.4.4.1 Minimum Requirement

Down link (DL) minimum output power shall be lower than or equal to:

Maximum output power – 30dB

6.4.5 Primary CCPCH power

Primary CCPCH power is the ~~transmission~~ code domain power of the primary common control physical channel averaged over the transmit timeslot. Primary CCPCH power is signalled over the BCH.

The error between the BCH-broadcast value of the Primary CCPCH power and the Primary CCPCH power averaged over the timeslot shall not exceed the values in table 6.2. The error is a function of the ~~total~~ output power averaged over the timeslot, Pout, and the manufacturer's rated output power, PRAT.

Table 6.2: Errors between Primary CCPCH power and the broadcast value

~~Total~~ Output power in slot, dB	PCCPCH power tolerance
PRAT-3 < Pout ≤ PRAT+2	+/- 2.5 dB
PRAT-6 < Pout ≤ PRAT-3	+/- 3.5 dB
PRAT-13 < Pout ≤ PRAT-6	+/- 5 dB

6.4.6 Differential accuracy of Primary CCPCH power

The differential accuracy of the Primary CCPCH power is the relative transmitted power accuracy of PCCPCH in consecutive frames when the nominal PCCPCH power is not changed.

6.4.6.1 Minimum Requirement for Differential accuracy of PCCPCH power

Differential accuracy of PCCPCH power: +/- 0.5 dB

6.5 Transmit ON/OFF power

6.5.1 Transmit OFF power

Transmit OFF power is defined as the ~~average~~ RRC filtered mean power measured over one chip when the transmitter is off. The transmit OFF power state is when the BS does not transmit.

6.5.1.1 Minimum Requirement

6.5.1.1.1 3,84 Mcps TDD Option

The ~~requirement of~~ transmit OFF power shall be less than –79 dBm ~~measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate~~.

6.5.1.1.2 1,28 Mcps TDD Option

The requirement of transmit OFF power shall be less than –82 dBm measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate.

--- next changed section ---

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the ~~average~~ RRC filtered mean power centered on the assigned channel frequency to the ~~average~~ RRC filtered mean power centered on an adjacent channel frequency. ~~In both cases the power is measured with filter that has a Root Raised Cosine (RRC) filter response with roll off α=0.22 and a 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.

The requirement depends on the deployment scenario. Three different deployment scenarios have been defined as given below.

6.6.2.2.1 Minimum Requirement

6.6.2.2.1.1 3,84 Mcps TDD Option

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.7.

Table 6.7: BS ACLR

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.1.2 1,28 Mcps TDD Option

For the 1.28Mcps chip rate option, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be better than the value specified in Table 6.7A

Table 6.7A: BS ACLR (1.28Mcps chip rate)

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
1.6 MHz	40 dB
3.2 MHz	45 dB

NOTE: This requirement is valid for co-existence with frame and switching point synchronised systems, or for non-synchronised systems if the path loss between the BSs is greater than 107dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.2 Additional requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

6.6.2.2.2.1 3,84 Mcps TDD Option

In case the equipment is operated in proximity to another TDD BS or FDD BS operating on the first or second adjacent frequency, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.8.

Table 6.8: BS ACLR in case of operation in proximity

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	70 dB
10 MHz	70 dB

NOTE: The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS or FDD BS in proximity.

6.6.2.2.2 1,28 Mcps TDD Option

In case the equipment is operated in proximity to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band , the requirement is specified in terms of power level of the transmitting BS. This requirement is valid for co-existence with non-frame and non-switching point synchronised systems operating on the closest used carrier. The interference power level shall not exceed the limit in Table 6.8A.

Table 6.8A: BS ACLR in case of operation in proximity

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier	-36 dBm	chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual} - (-106dBm)$.

6.6.2.3 Additional requirement in case of co-siting with TDD BS or FDD BS operating on an adjacent frequency

6.6.2.3.1 3,84 Mcps TDD Option

In case the equipment is co-sited to another TDD BS or FDD BS operating on the first or second adjacent frequency, the requirement is specified in terms of the adjacent channel power level of the BS measured in the adjacent channel. The adjacent channel power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limit in Table 6.9.

Table 6.9: BS ACLR in case of co-sitting

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
5 MHz	-80 dBm	3.84 MHz
10 MHz	-80 dBm	3.84 MHz

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS or FDD BS.

6.6.2.3.2 1,28 Mcps TDD Option

In case the equipment is co-sited to another TDD BS or FDD BS and both BSs operating on an adjacent frequency band, the requirement is specified in terms of power level of the transmitting BS. This requirement is valid for co-existence with a non-frame and non-switching point synchronised systems operating on closest used carrier. The interference power level shall not exceed the limit in Table 6.9A.

Table 6.9A: BS ACLR in case of co-sitting

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier	-76 dBm	chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:

a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual MCL_{actual} is higher than 30dB, this requirement may be relaxed by the amount MCL_{actual} – 30dB.

If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than –106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).

--- next changed section ---

6.7 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a CDMA modulated interference signal is injected into the antenna connector at a mean power level of 30 dB lower than that of the mean power of the subject signal.

6.7.1 Minimum Requirement

6.7.1.1 3,84 Mcps TDD Option

The frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the subject signal. The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

6.7.1.2 1,28 Mcps TDD Option:

The frequency of the interference signal shall be ±1.6 MHz, ±3.2 MHz and ±4.8 MHz offset from the subject signal. The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

--- next changed section ---

7.2 Reference sensitivity level

The reference sensitivity level is the minimum ~~receiver input~~ mean power ~~measured~~ received at the antenna connector at which the ~~FER/~~BER ~~does~~ shall not exceed the specific value indicated in section 7.2.1.

7.2.1 Minimum Requirement

7.2.1.1 3,84 Mcps TDD Option

~~For~~ Using the reference measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table 7.1 ~~below~~.

Table 7.1: BS reference sensitivity levels

Reference measurement channel ~~D~~data rate	BS reference sensitivity level ~~(dBm)~~	~~FER/~~BER
12.2 kbps	-109 dBm	BER shall not exceed 0.001

7.2.1.2 1,28 Mcps TDD Option

For the measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table7.1A

Table7.1A: BS reference sensitivity levels

Data rate	BS reference sensitivity level (dBm)	FER/BER
12.2 kbps	-110 dBm	BER shall not exceed 0.001

7.3 Dynamic range

Receiver dynamic range is the receiver ability to handle a rise of interference in the reception frequency channel. The receiver shall fulfil a specified BER requirement for a specified sensitivity degradation of the wanted signal in the presence of an interfering AWGN signal in the same reception frequency channel.

7.3.1 Minimum requirement

7.3.1.1 3,84 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in Table 7.2.

Table 7.2: Dynamic Range

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~<REFSENS> + 30 dB~~ –79	dBm
Interfering AWGN signal	-73	dBm/3.84 MHz

7.3.1.2 1,28 Mcps TDD Option:

The BER shall not exceed 0.001 for the parameters specified in Table7.2A

Table 7.2A: Dynamic Range

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	<REFSENS> + 30 dB	dBm
Interfering AWGN signal	-76dBm	dBm/1.28 MHz

7.4 Adjacent Channel Selectivity (ACS)

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of a~~n~~ single code CDMA modulated adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel(s).

7.4.1 Minimum Requirement

7.4.1.1 3,84 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in table 7.3.

Table 7.3: Adjacent channel selectivity

Parameter	Level	Unit
Reference measurement channel ~~D~~data rate	12.2	kbps
Wanted signal mean power	~~Reference sensitivity level + 6dB~~ –103	dBm
Interfering signal	–52	dBm
Fuw offset (Modulated)	5	MHz

7.4.1.2 1,28 Mcps TDD Option

The BER shall not exceed 0.001 for the parameters specified in table7.3A

Table 7.3A: Adjacent channel selectivity

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	Reference sensitivity level + 6dB	dBm
Interfering signal	–55	dBm
Fuw (Modulated)	1.6	MHz

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels. The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

7.5.0 Minimum requirement

The static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

7.5.0.1 3,84 Mcps TDD Option

Table 7.4 (a): Blocking requirements for operating bands defined in 5.2(a)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1920 – 1980 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1880 MHz, 1980 – 1990 MHz, 2045 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(b) : Blocking requirements for operating bands defined in 5.2(b)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1830 – 1850 MHz, 1990 – 2010 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1830 MHz, 2010 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4(c) : Blocking requirements for operating bands defined in 5.2(c)

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1910 – 1930 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1890 – 1910 MHz, 1930 – 1950 MHz	-40 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	10 MHz	WCDMA signal with one code
1 – 1890 MHz, 1950 – 12750 MHz	-15 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.5.0.2 1,28 Mcps TDD Option

Table 7.4A(a): Blocking requirements for operating bands defined in 5.2(a)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1920 – 1980 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1 – 1880 MHz, 1980 – 1990 MHz, 2045 – 12750 MHz	-15dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A(b): Blocking requirements for operating bands defined in 5.2(b)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1830 – 1850 MHz, 1990 – 2010 MHz	-40 dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1 – 1830 MHz, 2010 – 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A(c): Blocking requirements for operating bands defined in 5.2(c)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1910 – 1930 MHz	-40dBm	<REFSENS> + 6 dB	3.2MHz	Narrow band CDMA signal with one code
1890 – 1910 MHz, 1930 – 1950 MHz	-40dBm	<REFSENS> + 6 dB	3.2 MHz	Narrow band CDMA signal with one code
1 – 1890 MHz, 1950 – 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

7.5.1 Co-location with GSM900 and/or DCS 1800

This additional blocking requirement may be applied for the protection of TDD BS receivers when GSM900 and/or DCS1800 BTS are co-located with UTRA TDD BS.

The blocking performance requirement applies to interfering signals with center frequency within the ranges specified in the tables below, using a 1MHz step size.

In case this additional blocking requirement is applied, the static reference performance as specified in clause 7.2.1 shall be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

7.5.1.1 3,84 Mcps TDD Option

Table 7.4 (d): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with GSM900

Centre Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
921 – 960 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

Table 7.4 (e): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with DCS1800

Center Frequency of Interfering Signal	Interfering Signal ~~Level~~ Mean Power	Wanted Signal ~~Level~~ Mean Power	Minimum Offset of Interfering Signal	Type of Interfering Signal
1805 – 1880 MHz	+16 dBm	~~<REFSENS> + 6 dB~~ –103 dBm	—	CW carrier

7.5.1.2 1,28 Mcps TDD Option

Table 7.4A (d): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with GSM900

Centre Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
921 – 960 MHz	+16 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4A (e): Additional blocking requirements for operating bands defined in 5.2(a) when co-located with DCS1800

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1805 - 1880	+16 dBm	<REFSENS> + 6 dB	—	CW carrier

7.6 Intermodulation characteristics

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 receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

7.6.1 Minimum requirement

The static reference performance as specified in clause 7.2.1 should be met when the following signals are coupled to BS antenna input.

- A wanted signal at the assigned channel frequency, with mean power 6 dB above the static reference level.
- Two interfering signals with the following parameters.

7.6.1.1 3,84 Mcps TDD Option

Table 7.5 : Intermodulation requirement

Interfering Signal ~~Level~~ Mean Power	Offset	Type of Interfering Signal
- 48 dBm	10 MHz	CW signal
- 48 dBm	20 MHz	WCDMA signal with one code

7.6.1.2 1,28 Mcps TDD Option

Table7.5A: Intermodulation requirement

Interfering Signal Level	Offset	Type of Interfering Signal
- 48 dBm	3.2 MHz	CW signal
- 48 dBm	6.4 MHz	1,28 Mcps TDD Option signal with one code

--- next changed section ---

B.2 Multi-path fading propagation conditions

B.2.1 3,84 Mcps TDD Option

Table B1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum, defined as:

(CLASS) $$S(f) \propto 1/(1-(f/f_D)^2)^{0.5}$$ for $f \in -f_d, f_d$.

Table B.1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, speed 120 km/h	
Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]	Relative Delay [ns]	~~Average~~ Relative Mean Power [dB]
0	0	0	0	0	0
976	-10	976	0	260	-3
		12000	0	521	-6
				781	-9

B.2.2 1,28 Mcps TDD Option

TableB2 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum, defined as:

(CLASS) $$S(f) \propto 1/(1-(f/f_D)^2)^{0.5}$$ for $f \in -f_d, f_d$.

TableB2: Propagation Conditions for Multi-Path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3km/h		Case 3, speed 120km/h	
Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]
0	0	0	0	0	0
2928	-10	2928	0	781	-3
		12000	0	1563	-6
				2344	-9

3GPP TSG RAN WG4 Meeting #23 **R4-020825**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.105** **CR** **117** ⌘ **rev** **-** ⌘ Current version: **3.10.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Requirements for TDD ACLR and TDD Spurious Emission
Source:	⌘	RAN WG4
Work item code:	⌘	TEI
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	R99

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)

Reason for change:	⌘	Insufficient protection of FDD and TDD base stations in case of coexistence.
Summary of change:	⌘	Correction of the limits for the unwanted emission requirements.
Consequences if not approved:	⌘	Desensitisation of FDD and TDD base stations in case of coexistence in the same geographic area. Isolated Impact Analysis: Change of unwanted emission limits for the base station for coexistence with other systems. Does not effect UE-BS interworking.

Clauses affected:	⌘	6.6.2.2, 6.6.3.4		
Other specs affected:	⌘	☐ Other core specifications **X** Test specifications ☐ O&M Specifications	⌘	TS 25.142
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/3G_Specs/CRs.htm.
Below is a brief summary:

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the average power centered on the assigned channel frequency to the average power centered on an adjacent channel frequency. In both cases the power is measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off α=0.22 and a bandwidth equal to the chip rate.

In some cases the requirement is expressed as adjacent channel leakage power, which is the maximum absolute emission level on the adjacent channel frequency measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off α=0,22 and a bandwidth equal to the chip rate of the victim system.

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.

6.6.2.2.1 Minimum Requirement

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.7.

Table 6.7: BS ACLR

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.2 Requirement ~~in case of~~ for operation in the same geographic area with ~~proximity~~ FDD or unsynchronised ~~to~~ TDD ~~BS or FDD BS operating~~ on ~~an~~ adjacent channels~~frequency~~

6.6.2.2.2.1 Requirement for operation in the same geographic area with unsynchronised TDD on adjacent channels

In case the equipment is operated in the same geographic area with an unsynchronised ~~proximity to another~~ TDD BS ~~or FDD BS~~ operating on the first or second adjacent frequency, the ~~ACLR~~ adjacent channel leakage power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall ~~be higher than~~ not exceed the ~~value~~ limits specified in Table 6.8.

Table 6.8: ~~BS ACLR~~ Adjacent channel leakage power limits for ~~in case of~~ operation in the same geographic area with unsynchronised TDD on adjacent channels ~~proximity~~

BS adjacent channel offset below the first or above the last carrier frequency used	~~ACLR limit~~ Maximum Level	Measurement Bandwidth
5 MHz	~~70 dB~~ –29 dBm	3,84 MHz
10 MHz	~~70 dB~~ –29 dBm	3,84 MHz

NOTE: The requirement in Table 6.8 is based on ~~the assumption that the~~ a coupling loss of 74 dB between the unsynchronised TDD base stations ~~is at least 84dB~~. The scenario leading to this requirement is addressed in TR 25.942 [4].

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS ~~or FDD BS~~ in ~~proximity~~ the same geographic area.

6.6.2.2.2.2 Requirement for operation in the same geographic area with FDD on adjacent channels

In case the equipment is operated in the same geographic area with a FDD BS operating on the first or second adjacent channel, the adjacent channel leakage power shall not exceed the limits specified in Table 6.8AA.

Table 6.8AA: Adjacent channel leakage power limits for operation in the same geographic area with FDD on adjacent channels

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
+/- 5 MHz	–36 dBm	3,84 MHz
+/- 10 MHz	–36 dBm	3,84 MHz

NOTE: The requirement in Table 6.8AA is based on a coupling loss of 74 dB between the FDD and TDD base stations. The scenario leading to this requirement is addressed in TR 25.942 [4].

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the FDD BS in the same geographic area.

6.6.2.2.3 Requirement in case of co-siting with unsynchronised TDD BS or FDD BS operating on an adjacent channel~~frequency~~

6.6.2.2.3.1 Requirement in case of co-siting with unsynchronised TDD BS operating on an adjacent channel

In case the equipment is co-sited to ~~another~~ an unsynchronised TDD BS ~~or FDD BS~~ operating on the first or second adjacent frequency, the ~~requirement is specified in terms of the adjacent channel power level of the BS measured in the adjacent channel. The~~ adjacent channel leakage power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limits ~~speccified~~ in Table 6.9.

Table 6.9: ~~BS ACLR~~ Adjacent channel leakage power limits in case of co-si~~t~~ting with unsynchronised TDD on adjacent channel

BS adjacent channel offset below the first or above the last carrier frequency use	Maximum Level	Measurement Bandwidth
5 MHz	-73~~80~~ dBm	3.84 MHz
10 MHz	-73~~80~~ dBm	3.84 MHz

NOTE: The requirements in Table 6.9 are based on a coupling loss of 30 dB between the unsynchronised TDD base stations.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS ~~or FDD BS~~.

6.6.2.2.3.1 Requirement in case of co-siting with FDD BS operating on an adjacent channel

In case the equipment is co-sited to a FDD BS operating on the first or second adjacent channel, the adjacent channel leakage power shall not exceed the limits specified in Table 6.9AA.

Table 6.9AA: Adjacent channel leakage power limits in case of co-siting with FDD on adjacent channels

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
+/- 5 MHz	–80 dBm	3,84 MHz
+/- 10 MHz	–80 dBm	3,84 MHz

NOTE: The requirements in Table 6.9AA are based on a coupling loss of 30 dB between the FDD and TDD base stations.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited FDD BS.

6.6.3 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.

The requirements 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 which are more than 12.5 MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.
Unless otherwise stated, all requirements are measured as mean power.

6.6.3.1 Mandatory Requirements

The requirements of either subclause 6.6.3.1.1 or subclause 6.6.3.1.2 shall apply

6.6.3.1.1 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.329-8 [1], are applied.

6.6.3.1.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.10: BS Mandatory spurious emissions limits, Category A

Band	Minimum requirement	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU SM.329-8, s2.5 table 1

6.6.3.1.2 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.329-8 [1], are applied.

6.6.3.1.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.11: BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz ↔ Fc1-60 MHz or Fl -10 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU SM.329-8, s4.1
Fc1 - 60 MHz or Fl -10 MHz *whichever is the higher* ↔ Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher* ↔ Fc2 + 50 MHz or Fu +10 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 50 MHz or Fu + 10 MHz *whichever is the lower* ↔ Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower* ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.3 and Annex 7. Upper frequency as in ITU-R SM.329-8, s2.5 table 1

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

6.6.3.2 Co-existence with GSM 900

6.6.3.2.1 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.

6.6.3.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.12: 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	100 kHz	

6.6.3.2.2 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.

6.6.3.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.13: 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	

6.6.3.3 Co-existence with DCS 1800

6.6.3.3.1 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.

6.6.3.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.14: 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	

6.6.3.3.2 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.

6.6.3.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.15: 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	

6.6.3.4 Co-existence with UTRA-FDD

6.6.3.4.1 Operation in the same geographic area

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

6.6.3.4.1.1 Minimum Requirement

For TDD base stations which use carrier frequencies within the band 2010 – 2025 MHz the requirements applies at all frequencies within the specified frequency bands in Table 6.16. For TDD base stations which use a carrier frequency within the band 1900 – 1920 MHz the requirements applies at frequencies within the specified frequency range which are more than 12,5 MHz above the last carrier used in the frequency band 1900 – 1920 MHz.

The power of any spurious emission shall not exceed:

Table 6.16: BS Spurious emissions limits for BS in geographic coverage area of UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-43~~32~~ dBm (*)	~~1~~ 3,84 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

(*) The requirement shall be measured with the lowest center frequency of measurement at 1922,6 MHz or 15 MHz above the last TDD carrier used whichever is higher.

NOTE: The requirements in Table 6.16 are based on a coupling loss of 67 dB between the TDD and FDD base stations. The scenarios leading to these requirements are addressed in TR 25.942 [4].

6.6.3.4.2 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.

6.6.3.4.2.1 Minimum Requirement

For TDD base stations which use carrier frequencies within the band 2010 – 2025 MHz the requirements applies at all frequencies within the specified frequency bands in Table 6.17. For TDD base stations which use a carrier frequency within the band 1900 – 1920 MHz the requirements applies at frequencies within the specified frequency range which are more than 12,5 MHz above the last carrier used in the frequency band 1900 – 1920 MHz.

The power of any spurious emission shall not exceed:

Table 6.17: BS Spurious emissions limits for BS co-located with UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-8~~6~~0 dBm (*)	~~1~~ 3,84 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

(*) The requirement shall be measured with the lowest center frequency of measurement at 1922,6 MHz or 15 MHz above the last TDD carrier used whichever is higher.

NOTE: The requirements in Table 6.17 are based on a coupling loss of 30 dB between the TDD and FDD base stations.

3GPP TSG RAN WG4 Meeting #23 **R4-020826**

Gyeongju, Korea 13th -17th May, 2002

CR-Form-v5

CHANGE REQUEST

⌘ **25.105** **CR** **118** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Requirements for TDD ACLR and TDD Spurious Emission for 3.84 Mcps and 1.28 Mcps TDD option
Source:	⌘	RAN WG4
Work item code:	⌘	TEI, LCRTDD-RF
Date:	⌘	17/5/2002
Category:	⌘	**F**
Release:	⌘	Rel-4

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)

Reason for change:	⌘	Insufficient protection of FDD and TDD base stations in case of coexistence.
Summary of change:	⌘	Correction of the limits for the unwanted emission requirements. This CR includes the changes corresponding to CR 117 for R99.
Consequences if not approved:	⌘	Desensitisation of FDD and TDD base stations in case of coexistence in the same geographic area. Isolated Impact Analysis: Change of unwanted emission limits for the base station for coexistence with other systems. Does not effect UE-BS interworking.

Clauses affected:	⌘	6.6.2.2, 6.6.3.4		
Other specs affected:	⌘	☐ Other core specifications **X** Test specifications ☐ O&M Specifications	⌘	TS 25.142
Other comments:	⌘	This CR includes the changes corresponding to CR 117 for R99.		

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm.
Below is a brief summary:

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the average power centered on the assigned channel frequency to the average power centered on an adjacent channel frequency. In both cases the power is measured with filter that has a Root Raised Cosine (RRC) filter response with roll-off α=0~~.~~,22 and a~~-~~ 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.

In some cases the requirement is expressed as adjacent channel leakage power, which is the maximum absolute emission level on the adjacent channel frequency measured with a filter that has a Root Raised Cosine (RRC) filter response with roll-off α=0,22 and a bandwidth equal to the chip rate of the victim system.

The requirement depends on the deployment scenario. Three different deployment scenarios have been defined as given below.

6.6.2.2.1 Minimum Requirement

6.6.2.2.1.1 3,84 Mcps TDD Option

The ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be higher than the value specified in Table 6.7.

Table 6.7: BS ACLR

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
5 MHz	45 dB
10 MHz	55 dB

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.1.2 1,28 Mcps TDD Option

For the 1.28Mcps chip rate option, the ACLR of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall be better than the value specified in Table 6.7A

Table 6.7A: BS ACLR (1.28Mcps chip rate)

BS adjacent channel offset below the first or above the last carrier frequency used	ACLR limit
1.6 MHz	40 dB
3.2 MHz	45 dB

~~NOTE: This requirement is valid for co-existence with frame and switching point synchronised systems, or for non-synchronised systems if the path loss between the BSs is greater than 107dB.~~

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied individually to the single carriers or group of single carriers.

6.6.2.2.2 Additional requirement ~~in case of~~ for operation in the same geographic area with ~~proximity to~~ FDD or unsynchronised TDD ~~BS or FDD BS operating~~ on ~~an~~ adjacent channels~~frequency~~

6.6.2.2.2.1 3,84 Mcps TDD Option

6.6.2.2.2.1.1 Additional requirement for operation in the same geographic area with unsynchronised TDD on adjacent channels

In case the equipment is operated in the same geographic area with an unsynchronised ~~proximity to another~~ TDD BS ~~or FDD BS~~ operating on the first or second adjacent frequency, the ~~ACLR~~ adjacent channel leakage power of

a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall ~~be higher than~~ not exceed the ~~value~~ limits specified in Table 6.8.

Table 6.8: ~~BS ACLR~~ Adjacent channel leakage power limits for ~~in case of~~ operation in the same geographic area with unsynchronised TDD on adjacent channels ~~proximity~~

BS adjacent channel offset below the first or above the last carrier frequency used	~~ACLR limit~~ Maximum Level	Measurement Bandwidth
5 MHz	~~70 dB~~ –29 dBm	3,84 MHz
10 MHz	~~70 dB~~ –29 dBm	3,84 MHz

NOTE: The requirement in Table 6.8 are ~~is~~ based on ~~the assumption that the~~ a coupling loss of 74 dB between the unsynchronised TDD base stations ~~is at least 84dB~~. The scenarios leading to these requirements are addressed in TR 25.942 [4].

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the TDD BS ~~or FDD BS~~ in ~~proximity~~ the same geographic area.

6.6.2.2.2.1.2 Additional requirement for operation in the same geographic area with FDD on adjacent channels

In case the equipment is operated in the same geographic area with a FDD BS operating on the first or second adjacent channel , the adjacent channel leakage power shall not exceed the limits specified in Table 6.8AA.

Table 6.8AA: Adjacent channel leakage power limits for operation in the same geographic area with FDD on adjacent channels

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 5 MHz	- 36 dBm	3,84 MHz
± 10 MHz	– 36 dBm	3,84 MHz

NOTE: The requirements in Table 6.8AA are based on a coupling loss of 74 dB between the FDD and TDD base stations. The scenarios leading to these requirements are addressed in TR 25.942 [4].

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the FDD BS in the same geographic area.

6.6.2.2.2 1,28 Mcps TDD Option

6.6.2.2.2.1 Additional requirement for operation in the same geographic area with unsynchronised TDD on adjacent channels

In case the equipment is operated in the same geographic area with ~~proximity to another~~ an unsynchronised TDD BS ~~or FDD BS and both BSs~~ operating on an adjacent channel ~~frequency band~~, the requirement is specified in terms of adjacent channel leakage power ~~level of the transmitting BS~~. In geographic areas where only UTRA 1.28 Mcps TDD option is deployed, the adjacent channel leakage power limits shall not exceed the limits specified in Table 6.8A, otherwise the limits in Table 6.8B shall apply. ~~This requirement is valid for co-existence with non-frame and non-switching point synchronised systems operating on the closest used carrier. The interference power level shall not exceed the limit in Table 6.8A.~~

Table 6.8A: ~~BS ACLR~~ Adjacent channel leakage limits for ~~in case of~~ operation in the same geographic area with unsynchronised 1.28 Mcps TDD on adjacent channels~~proximity~~

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 1,6 MHz	-29 dBm	1,28 MHz
± 3,2 MHz	-29 dBm	1,28 MHz

Table 6.8B: Adjacent Channel leakage power limits for operation in the same geographic area with unsynchronised TDD on adjacent channels

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 3,4 MHz	-29 dBm	3,84 MHz

NOTE: The requirement in Table 6.8A and 6.8B are based on a coupling loss of 74 dB between the unsynchronised TDD base stations. The scenarios leading to these requirements are addressed in TR25.942 [4].

~~Center Frequency for Measurement~~	~~Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)~~	~~Measurement Bandwidth~~
~~Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier~~	~~-36 dBm~~	~~chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz~~

~~The closest used carrier with respect to the regarded carrier of one system is defined by:~~
~~a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.~~

~~If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than -106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).~~

6.6.2.2.2.2 Additional requirement for operation in the same geographic area with FDD on adjacent channels

In case the equipment is operated in the same geographic area with a FDD BS operating on an adjacent channel, the adjacent channel leakage power shall not exceed the limits specified in Table 6.8C. This requirement is only applicable if the equipment is intended to operate in frequency bands specified in 5.2 a) and the highest carrier frequency used is in the range 1916,2 – 1920 MHz.

Table 6.8C: Adjacent channel leakage power limits for operation in the same geographic area with FDD on adjacent channels

Center Frequency for Measurement	Maximum Level	Measurement Bandwidth
1922,6 MHz	-36 dBm	3,84 MHz

NOTE: The requirement in Table 6.8C is based on a relaxed coupling loss of 74 dB between the TDD and FDD base stations. The scenarios leading to these requirements are addressed in TR 25.942 [4].

6.6.2.3 Additional requirement in case of co-siting with unsynchronised TDD BS or FDD BS operating on an adjacent channel~~frequency~~

6.6.2.3.1 3,84 Mcps TDD Option

6.6.2.3.1.1 Additional requirement in case of co-siting with unsynchronised TDD BS operating on an adjacent channel

In case the equipment is co-sited to ~~another~~ an unsynchronised TDD BS ~~or FDD BS~~ operating on the first or second adjacent frequency, the ~~requirement is specified in terms of the adjacent channel power level of the BS measured in the adjacent channel. The~~ adjacent channel leakage power of a single carrier BS or a multi-carrier BS with contiguous carrier frequencies shall not exceed the limits specified in Table 6.9.

Table 6.9: ~~BS ACLR~~ Adjacent channel leakage power limits in case of co-si~~t~~ting with unsynchronised TDD on adjacent channel

BS adjacent channel offset below the first or above the last carrier frequency used	Maximum Level	Measurement Bandwidth
5 MHz	-73~~80~~ dBm	3.84 MHz
10 MHz	-73~~80~~ dBm	3.84 MHz

Note: The requirements in Table 6.9 are based on a minimum coupling loss of 30 dB between unsynchronised TDD base stations.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited TDD BS ~~or FDD BS~~.

6.6.2.2.3.1.2 Additional requirement in case of co-siting with FDD BS operating on an adjacent channel

In case the equipment is co-sited to a FDD BS operating on the first or second adjacent channel, the adjacent channel leakage power shall not exceed the limits specified in Table 6.9AA.

Table 6.9AA: Adjacent channel leakage power limits in case of co-siting with FDD on an adjacent channel

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 5 MHz	-80 dBm	3,84 MHz
± 10 MHz	-80 dBm	3,84 MHz

Note: The requirements in Table 6.9AA are based on a minimum coupling loss of 30 dB between base stations.

If a BS provides multiple non-contiguous single carriers or multiple non-contiguous groups of contiguous single carriers, the above requirements shall be applied to those adjacent channels of the single carriers or group of single channels which are used by the co-sited FDD BS.

6.6.2.2.3.2 1,28 Mcps TDD Option

6.6.2.2.3.2.1 Additional requirement in case of co-siting with unsynchronised TDD BS operating on an adjacent channel

In case the equipment is co-sited to ~~another~~ an unsynchronised TDD BS ~~or FDD BS and both BSs~~ operating on an adjacent frequency band, the requirement is specified in terms of adjacent channel leakage power ~~level of the transmitting BS~~. In geographic areas where only UTRA 1.28 Mcps TDD option is deployed, the adjacent channel leakage power shall not exceed the limits specified in Table 6.9A, otherwise the limits in Table 6.9B shall apply. ~~This requirement is valid for co-existence with a non-frame and non-switching point synchronised systems operating on closest used carrier. The interference power level shall not exceed the limit in Table 6.9A.~~

Table 6.9A: ~~BS ACLR~~ Adjacent channel leakage power limits in case of co-si~~t~~ting with unsynchronised 1.28 Mcps TDD on an adjacent channel

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 1,6 MHz	-73 dBm	1,28 MHz
± 3,2 MHz	-73 dBm	1,28 MHz

Table 6.9B: Adjacent Channel leakage power limits for operation in the same geographic area with unsynchronised TDD on an adjacent channel

BS Adjacent Channel Offset	Maximum Level	Measurement Bandwidth
± 3,4 MHz	-73 dBm	3,84 MHz

Note: The requirements in Table 6.9A and 6.9B are based on a minimum coupling loss of 30 dB between unsynchronised TDD base stations.

Center Frequency for Measurement	Maximum Level of the interference power (in case of multiple antennas the interference powers shall be summed at all antenna connectors)	Measurement Bandwidth
Closest used carrier of the victim receiver: Either FDD carrier Or 3.84 Mcps TDD carrier Or 1.28 Mcps TDD carrier	-76 dBm	chip rate of the victim receiver: In case of FDD: 3.84 MHz In case of 3.84 Mcps TDD: 3.84 MHz In case of 1.28 Mcps TDD: 1.28 MHz

The closest used carrier with respect to the regarded carrier of one system is defined by:
a minimum difference in centre frequency between the regarded carrier and the carriers used in the other system and the chip rate of the other system.

If the actual MCL_{actual} is higher than 30dB, this requirement may be relaxed by the amount MCL_{actual} – 30dB.
If the actual allowed interference level $P_{int, allowed, actual}$ at the victim receiver is higher than -106dBm, this requirement may be relaxed by the amount $P_{int, allowed, actual}$ – (-106dBm).

6.6.2.2.3.2.2 Additional requirement in case of co-siting with FDD BS operating on an adjacent channel

In case the equipment is co-sited to a FDD BS operating on an adjacent channel, the adjacent channel leakage power shall not exceed the limits specified in Table 6.9C. This requirement is only applicable if the equipment is intended to operate in frequency bands specified in 5.2 a) and the highest carrier frequency used is in the range 1916,2 – 1920 MHz.

Table 6.9C: Adjacent channel leakage power in case of co-siting with UTRA FDD on an adjacent channel

Center Frequency for Measurement	Maximum Level	Measurement Bandwidth
1922,6 MHz	-80 dBm	3,84 MHz

Note: The requirements in Table 6.9C are based on a minimum coupling loss of 30 dB between base stations.

6.6.3 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.

The requirements shall apply whatever the type of transmitter considered (single carrier or multi carrier). It applies for all transmission modes foreseen by the manufacturer's.

For 3.84 Mcps TDD option, either requirement applies at frequencies within the specified frequency ranges which are more than 12.5 MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

For 1.28 Mcps TDD option, either requirement applies at frequencies within the specified frequency ranges which are more than 4 MHz under the first carrier frequency used or more than 4 MHz above the last carrier frequency used.

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

6.6.3.1 Mandatory Requirements

The requirements of either subclause 6.6.3.1.1 or subclause 6.6.3.1.2 shall apply.

6.6.3.1.1 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.329-8 [1], are applied.

6.6.3.1.1.1 Minimum Requirement

6.6.3.1.1.1.1 3,84 Mcps TDD Option

The power of any spurious emission shall not exceed:

Table 6.10: BS Mandatory spurious emissions limits, Category A

Band	Minimum requirement	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU SM.329-8, s2.5 table 1

6.6.3.1.1.1.2 1,28 Mcps TDD Option

The power of any spurious emission shall not exceed:

Table 6.10A: BS Mandatory spurious emissions limits, Category A

Band	Minimum requirement	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU SM.329-8, s2.5 table 1

NOTE: only the measurement bands are different according to the occupied bandwidth.

6.6.3.1.2 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.329-8 [1], are applied.

6.6.3.1.2.1 Minimum Requirement

6.6.3.1.2.1.1 3,84 Mcps TDD Option

The power of any spurious emission shall not exceed:

Table 6.11: BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz ↔ Fc1-60 MHz or Fl -10 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU SM.329-8, s4.1
Fc1 - 60 MHz or Fl -10 MHz *whichever is the higher* ↔ Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc1 - 50 MHz or Fl -10 MHz *whichever is the higher* ↔ Fc2 + 50 MHz or Fu +10 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 50 MHz or Fu + 10 MHz *whichever is the lower* ↔ Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.3 and Annex 7
Fc2 + 60 MHz or Fu + 10 MHz *whichever is the lower* ↔ 12,75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.3 and Annex 7. Upper frequency as in ITU-R SM.329-8, s2.5 table 1

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

6.6.3.1.2.1.2 1,28 Mcps TDD Option

The power of any spurious emission shall not exceed:

Table 6.11A: BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU SM.329-8, s4.1
150kHz – 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU SM.329-8, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-8, s4.1
1GHz ↔ Fc1-19.2 MHz or Fl –3.2 MHz *whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU SM.329-8, s4.1
Fc1 – 19.2 MHz or Fl -3.2MHz *whichever is the higher* ↔ Fc1 - 16 MHz or Fl –3.2 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.1
Fc1 - 16 MHz or Fl –3.2 MHz *whichever is the higher* ↔ Fc2 + 16 MHz or Fu +3.2 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.1
Fc2 + 16 MHz or Fu + 3.2MHz *whichever is the lower* ↔ Fc2 +19.2 MHz or Fu + 3.2MHz *whichever is the lower*	-25 dBm	1 MHz	Specification in accordance with ITU-R SM.329-8, s4.1
Fc2 + 19.2 MHz or Fu +3.2 MHz *whichever is the lower* ↔ 12,5 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-8, s4.1. Upper frequency as in ITU-R SM.329-8, s2.5 table 1

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

6.6.3.2 Co-existence with GSM 900

6.6.3.2.1 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.

6.6.3.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.12: 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	100 kHz	

6.6.3.2.2 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.

6.6.3.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.13: 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	

6.6.3.3 Co-existence with DCS 1800

6.6.3.3.1 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.

6.6.3.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.14: 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	

6.6.3.3.2 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.

6.6.3.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.15: 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	

6.6.3.4 Co-existence with UTRA-FDD

6.6.3.4.1 Operation in the same geographic area

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

6.6.3.4.1.1 Minimum Requirement

For TDD base stations which use carrier frequencies within the band 2010 – 2025 MHz the requirements applies at all frequencies within the specified frequency bands in table 6.16. For 3.84 Mcps TDD option base stations which use a carrier frequency within the band 1900-1920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 12,5 MHz above the last carrier used in the frequency band 1900-1920 MHz. For 1.28 Mcps TDD option base stations which use carrier frequencies within the band 1900-1920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 4 MHz above the last carrier used in the frequency band 1900-1920 MHz.

The power of any spurious emission shall not exceed:

Table 6.16: BS Spurious emissions limits for BS in geographic coverage area of UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-43~~32~~ dBm (*)	~~1~~3,84 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

(*) For 3.84 Mcps TDD option base stations, the requirement shall be measured with the lowest center frequency of measurement at 1922.6 MHz or 15 MHz above the last TDD carrier used, whichever is higher. For 1.28 Mcps TDD option base stations, the requirement shall be measured with the lowest center frequency of measurement at 1922.6 MHz or 6.6 MHz above the last TDD carrier used, whichever is higher.

NOTE: The requirements in Table 6.16 are based on a coupling loss of 67dB between the TDD and FDD base stations. The scenarios leading to these requirements are addressed in TR 25.942 [4].

6.6.3.4.2 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.

6.6.3.4.2.1 Minimum Requirement

For TDD base stations which use carrier frequencies within the band 2010 – 2025 MHz the requirements applies at all frequencies within the specified frequency bands in table 6.17. For 3.84 Mcps TDD option base stations which use a carrier frequency within the band 1900-1920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 12,5 MHz above the last carrier used in the frequency band 1900-1920 MHz. For 1.28 Mcps TDD option base stations which use carrier frequencies within the band 1900-1920 MHz, the requirement applies at frequencies within the specified frequency range which are more than 4 MHz above the last carrier used in the frequency band 1900-1920 MHz.

The power of any spurious emission shall not exceed:

Table 6.17: BS Spurious emissions limits for BS co-located with UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-80~~6~~ dBm (*)	~~1~~3,84 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

(*) For 3.84 Mcps TDD option base stations, the requirement shall be measured with the lowest center frequency of measurement at 1922.6 MHz or 15 MHz above the last TDD carrier used, whichever is higher. For 1.28 Mcps TDD option base stations, the requirement shall be measured with the lowest center frequency of measurement at 1922.6 MHz or 6.6 MHz above the last TDD carrier used, whichever is higher.

NOTE: The requirements in Table 6.17 are based on a minimum coupling loss of 30 dB between base stations.