TSG-RAN Meeting #9 **TSGRP#9(00)0401**
Hawaii, US, 20 - 22 September 2000

Title: **Agreed CRs to TS 25.141**

Source: **TSG-RAN WG4**

Agenda item: **5.4.3**

Tdoc Num	TS	CR number	Title	TYPE	Status	Cur_Ver	New_Ver
R4-000628	25.141	38	Corrections to spectrum mask	F	agreed	3.2.0	3.3.0
R4-000631	25.141	39	Editorial corrections for TS 25.141	F	agreed	3.2.0	3.3.0
R4-000666	25.141	47	Clarification of applicability of environmental range spec in section 4	F	agreed	3.2.0	3.3.0
R4-000670	25.141	48	Clarification of “confidence level of 95%” in section 4.1	D	agreed	3.2.0	3.3.0
R4-000692	25.141	40	Global In-Channel TX-Test for use as annex in 25.141	F	agreed	3.2.0	3.3.0
R4-000704	25.141	41	Reference measurement channels	F	agreed	3.2.0	3.3.0
R4-000705	25.141	44	Corrections to spectrum mask measurement method	F	agreed	3.2.0	3.3.0
R4-000725	25.141	43	Clarifications of modulation accuracy and code domain error tests for TD operation	F	agreed	3.2.0	3.3.0
R4-000725	25.141	46	Clarifications of modulation accuracy and code domain error tests for TD operation	F	agreed	3.2.0	3.3.0
R4-000742	25.141	45	Test model clarifications	F	agreed	3.2.0	3.3.0
R4-000760	25.141	49	Corrections to test models in TS 25.141	F	agreed	3.2.0	3.3.0
R4-000774	25.141	42	Handling of measurement uncertainties in Base station conformance testing (FDD)	F	agreed	3.2.0	3.3.0
R4-000693	25.141	50	Tap magnitudes and phases for Birth-Death propagation conditions	F	agreed	3.2.0	3.3.0

3GPP TSG RAN WG4 Meeting #13
Torino, Italy, 4 – 8 Sep, 2000

Document R4-000628

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.141	**CR**	**38**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN #9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-04

Subject: Corrections to spectrum mask

Work item:

Category:				**Release:**	
	F	Correction	X	Phase 2	
(only one category	A	Corresponds to a correction in an earlier release		Release 96	
shall be marked	B	Addition of feature		Release 97	
with an X)	C	Functional modification of feature		Release 98	
	D	Editorial modification		Release 99	X
				Release 00	

Reason for change: The level of the spectrum mask for the frequency range [3.515, 4.0MHz[is incorrect for low power base station (discontinuity with the previous frequency range)

Clauses affected: 6.5.2

Other specs affected:		
Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

6.5.2 Out of band emission

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

6.5.2.1 Spectrum emission mask

NOTE: This subclause may be mandatory in certain regions. In other regions this mask may not be applied.

6.5.2.1.1 Test conditions and measurement method

F_offset is the separation between the carrier frequency and the centre of the measuring filter.

<Editor's note: Test conditions to be specified.>

6.5.2.1.2 Minimum requirement

<Editor's note: The text below is just cut and pasted from 25.104 to keep coincidence. Better description may be applied.>

For regions where this clause applies, the requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 6.11 to 6.14 for the appropriate BS maximum output power, in the frequency range from Δf =2.5 MHz to f_offset_{max} from the carrier frequency, where:m

- Δf is the separation between the carrier frequency and the nominal –3dB point of the measuring filter closest to the carrier frequency.
- f_offset is the separation between the carrier frequency and the centre of the measurement filter;
- f_offset_{max} is either 12,5 MHz or the offset to the UMTS Tx band edge as defined in subclause 3.4.1, whichever is the greater.

Table 6.11: Spectrum emission mask values, BS maximum output power P ≥ 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515MHz ≤ f_offset < 2.715MHz	-14 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715MHz ≤ f_offset < 3.515MHz	- 14 – 15·(f_offset- 2.715) dBm	30 kHz
	3.515MHz ≤ f_offset < 4.0MHz	-26 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0MHz	-13 dBm	1 MHz
7.5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offset_{max}	-13 dBm	1 MHz

Table 6.12: Spectrum emission mask values, BS maximum output power 39 ≤ P < 43 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515MHz ≤ f_offset < 2.715MHz	-14 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715MHz ≤ f_offset < 3.515MHz	-14 – 15·(f_offset - 2.715) dBm	30 kHz
	3.515MHz ≤ f_offset < 4.0MHz	-26 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0MHz	-13 dBm	1 MHz
7.5 ≤ Δf MHz	8.0MHz ≤ f_offset < f_offset_{max}	P - 56 dBm	1 MHz

Table 6.13: Spectrum emission mask values, BS maximum output power 31 ≤ P < 39 dBm

Frequency offset of measurement filter – 3dB point,Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515MHz ≤ f_offset < 2.715MHz	P - 53 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715MHz ≤ f_offset < 3.515MHz	P – 53 – 15·(f_offset – 2.715) dBm	30 kHz
	3.515MHz ≤ f_offset < 4.0MHz	~~-26~~P-65 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0MHz	P - 52 dBm	1 MHz
7.5 ≤ Δf MHz	8.0MHz ≤ f_offset < f_offset$_{max}$	P - 56 dBm	1 MHz

Table 6.14: Spectrum emission mask values, BS maximum output power P < 31 dBm

Frequency offset of measurement filter – 3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515MHz ≤ f_offset < 2.715MHz	-22 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715MHz ≤ f_offset < 3.515MHz	-22 – 15·(f_offset - 2.715) dBm	30 kHz
	3.515MHz ≤ f_offset < 4.0MHz	~~-26~~-34 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0MHz	-21 dBm	1 MHz
7.5 ≤ Δf MHz	8.0MHz ≤ f_offset < f_offset$_{max}$	-25 dBm	1 MHz

6.5.2.1.3 Test purpose

The purpose of this test is to verify that the BS meet the spectrum emission requirements as specified in TS 25.104, subclause 6.6.2.1.

CHANGE REQUEST

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25.141	**CR**	**39**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ ↑ *CR number as allocated by MCC support team*

For submission to:	RAN#9	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network

Source: RAN WG4 **Date:** 2000-08-28

Subject: Editorial corrections for TS 25.141

Work item:

Category:				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change: Some editorial corrections are needed for TS 25.141.

Clauses affected: 3.1, 3.3, 6.2, 6.2.1, 6.5.2.1, 6.5.2.2.4.1, 6.5.3, 7.3, 7.4, 7.7

Other specs affected:				
	Other 3G core specifications		→ List of CRs:	
	Other GSM core specifications		→ List of CRs:	
	MS test specifications		→ List of CRs:	
	BSS test specifications		→ List of CRs:	
	O&M specifications		→ List of CRs:	

Other comments:

<--------- double-click here for help and instructions on how to create a CR.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 25.104: "UTRA(BS) FDD; Radio transmission and Reception".

[2] 3GPP TS25.942: "RF system scenarios".

[3] 3GPP TS25.113: "Base station EMC".

[4] ITU-R recommendation SM.329-7: "Spurious emissions".

[5] ITU-T recommendation O.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[6] IEC 60721-3-3 (1994) "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather protected locations".

[7] IEC 60721-3-4 (1995): "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 4: Stationary use at non-weather protected locations".

[8] IEC 60068-2-1 (1990): "Environmental testing - Part 2: Tests. Tests A: Cold".

[9] IEC 60068-2-2 (1974): "Environmental testing - Part 2: Tests. Tests B: Dry heat".

[10] IEC 60068-2-6 (1995): "Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)".

3 Definitions and abbreviations

3.1 Definitions

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

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.
Rated output power	Rated output power of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.
Maximum output Power	The mean power level per carrier of the base station measured at the antenna connector in a specified reference condition.
Power control dynamic range	The difference between the maximum and the minimum transmit output power of a code channel for a specified reference condition.
Total power dynamic range	The difference between the maximum and the minimum total transmit output power for a specified reference condition.

~~**Power Setting:** value of the control signal, which determines the desired transmitter, output Power. Typically, the power setting would be altered in response to power control commands.~~

Maximum Power Setting: highest value of the Power control setting which can be used.

Maximum output Power: this refers to the measure of power when averaged over the transmit timeslot at the maximum power setting.

Peak Power: instantaneous power of the RF envelope which is not expected to be exceeded for [99,9 %] of the time.

Maximum peak power: peak power observed when operating at a given maximum output power.

Average transmit power: average transmitter output power obtained over any specified time interval, including periods with no transmission.

Maximum average power: average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting.

3.2 Void

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 Ratio
BLER	Block Error Ratio
BS	Base Station
Chip Rate	Chip rate of W-CDMA system, equals to 3,84 M chips per second
CW	Continuous Wave (unmodulated signal)
DCH	Dedicated Channel, which is mapped into Dedicated Physical Channel. DCH contains the data
DL	Down Link (forward link)
DPCH	Dedicated Physical Channel
E_b	Average energy per information bit for the PCCPCH, SCCPCH and DPCH, at the antenna connector
E_c	Average energy per PN chip
EVM	Error Vector Magnitude
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
F_{uw}	Frequency of unwanted signal
Information Data Rate	Rate of the user information, which must be transmitted over the Air Interface. For example, output rate of the voice codec
MER	Message Error Rate
MS	Mobile Station
PCCPCH	Primary Common Control Physical Channel
PCDE	Peak Code Domain Error
PCH	Paging Channel
PPM	Parts Per Million
RSCP	Given only signal power is received, the average power of the received signal after despreading and combining
RSSI	Received Signal Strength Indicator
SCCPCH	Secondary Common Control Physical Channel
SCCPCH_E_c	Average energy per PN chip for SCCPCH.
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

6.2 Base station output power

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

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

~~The physical channels for the following test(s) shall be set-up according to the test model specified in subclause 6.1.1.~~

6.2.1 Base station maximum output power

6.2.1.1 Definition and applicability

~~Maximum output power, Pmax, of the base station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector.~~

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

6.2.1.2 Conformance requirement

In normal conditions, the Base station maximum output power shall remain within +2 dB and -2 dB of the manufacturer's rated output power.

In extreme conditions, the Base station maximum output power shall remain within +2.5 dB and –2.5 dB of the manufacturer's rated output power.

In certain regions, the minimum requirement for normal conditions may apply also for some conditions outside the ranges defined for the Normal test environment in subclause 4.4.1.

6.2.1.3 Method of test

~~6.2.1.1 Test Conditions and measurement method~~

6.2.1.3.1 Initial conditions

1. Connect the power measuring equipment to the base station RF output port.

6.2.1.3.2 Procedure

~~2.~~1. Set the base station to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels specified as test model1 in subclause 6.1.1.1.

~~3.~~2. Measure the mean power at the RF output port over a certain slots.

~~6.2.1.2 Minimum requirement~~

~~In normal conditions, the Base station maximum output power shall remain within +2 dB and -2 dB of the manufacturer's rated power.~~

~~In extreme conditions, the Base station maximum output power shall remain within +2,5 dB and -2,5 dB of the manufacturer's rated power.~~

~~In certain regions, the minimum requirement for normal conditions may apply also for some conditions outside the ranges defined for the Normal test environment in subclause 4.4.1.~~

6.2.1.4 Test requirements

Maximum output power requirement shall be met as specified in subclause 6.2.1.2.

6.5.2 Out of band emission

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

6.5.2.1 Spectrum emission mask

NOTE: This subclause may be mandatory in certain regions. In other regions this mask may not be applied.

6.5.2.1.1 ~~Test conditions and measurement method~~ Definition and applicability

~~F_offset is the separation between the carrier frequency and the centre of the measuring filter~~.

The mask defined in Tables 6.3 to 6.6 below may be mandatory in certain regions. In other regions this mask may not be applied.

~~<Editor's note: Test conditions to be specified.>~~

6.5.2.1.2 ~~Minimum requirement~~ Conformance requirements

~~<Editor's note: The text below is just cut and pasted from 25.104 to keep coincidence. Better description may be applied.>~~

For regions where this clause applies, the requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 6.11 to 6.14 for the appropriate BS maximum output power, in the frequency range from Δf =2.5 MHz to f_offset_{max} from the carrier frequency, where:m

- Δf is the separation between the carrier frequency and the nominal –3dB point of the measuring filter closest to the carrier frequency.
- f_offset is the separation between the carrier frequency and the centre of the measurement filter;
- f_offset_{max} is either 12.~~,~~5 MHz or the offset to the UMTS Tx band edge as defined in subclause 3.4.1, whichever is the greater

F_offset is the separation between the carrier frequency and the centre of the measuring filter

Table 6.11: Spectrum emission mask values, BS maximum output power P ≥ 43 dBm

Frequency offset of measurement filter –3dB point, Δf	Frequency offset of measurement filter centre frequency, f_offset	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	2.515MHz ≤ f_offset < 2.715MHz	-14 dBm	30 kHz
2.7 ≤ Δf < 3.5 MHz	2.715MHz ≤ f_offset < 3.515MHz	- 14 – 15·(f_offset- 2.715) dBm	30 kHz
	3.515MHz ≤ f_offset < 4.0MHz	-26 dBm	30 kHz
3.5 ≤ Δf < 7.5 MHz	4.0 MHz ≤ f_offset < 8.0MHz	-13 dBm	1 MHz
7.5 ≤ Δf MHz	8.0 MHz ≤ f_offset < f_offset_{max}	-13 dBm	1 MHz

6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)

6.5.2.2.1 Definition and applicability

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent channel(s). Both the transmitted power and the received power are measured through a matched filter (Root Raised Cosine and roll-off 0.22) with a noise power bandwidth equal to the chip rate. The requirements shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

6.5.2.2.2 Conformance requirement

Table 6.15: BS ACLR

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

6.5.2.2.3 Test purpose

To verify that the adjacent channel leakage power ratio requirement shall be met as specified in subclause 6.5.2.2.2.

6.5.2.2.4 Method of test

6.5.2.2.4.1 Initial conditions

1) Connect measurement device to the base station RF output port as shown in annex B.

2) The measurement device characteristics shall be:

   - measurement filter bandwidth: defined in subclause ~~6.5.2.2~~6.5.2.2.1;

   - detection mode: true RMS voltage or true average power.

3) Set the base station to transmit a signal modulated in accordance with 6.1.1.1 Test model 1. Total power at the RF output port shall be the maximum output power as specified by the manufacturer.

4) Set carrier frequency within the frequency band supported by BS. Minimum carrier spacing shall be 5 MHz and maximum carrier spacing shall be specified by manufacturer.

6.5.2.2.4.2 Procedure

1) Measure Adjacent channel leakage power ratio for 5 MHz and 10 MHz offsets both side of channel frequency. In multiple carrier case only offset frequencies below the lowest and above the highest carrier frequency used shall be measured.

2) All RF channel configurations supported by BS shall be verified.

6.5.2.2.5 Test requirement

Adjacent channel leakage power ratio requirement shall be met as specified in subclause 6.5.2.2.2.

6.5.3 Spurious emissions

6.5.3.1 Definition and applicability

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

The requirements of either subclause 6.5.3.5 6.5.3.4.1 or subclause 6.5.3.4.2 6.5.3.6 shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer's specification.

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

6.5.3.2 Test purpose

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

6.5.3.3 Test case

The BS shall be configured with transmitters active at their maximum output power for all transmission modes foreseen by the manufacturer's specification.

Set the base station to transmit a signal as stated in subclause 6.1.1.1. Total power at the RF Output port shall be the nominal power as specified by the manufacturer.

The transmitter antenna connector shall be connected to a measurement receiver with the same characteristic impedance, using an attenuator or directional coupler if necessary.

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

6.5.3.4 Conformance Requirements

6.5.3.4.1 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 [4], are applied.

6.5.3.4.1.1 Minimum Requirement

The power of any spurious emission shall be attenuated by at least the minimum requirement.

Table 6.16: BS Mandatory spurious emissions limits, Category A

Band	Maximum level	Measurement Bandwidth	Note
9 kHz to 150 kHz	-13 dBm	1 kHz	Bandwidth as in ITU-R SM.329-7, subclause 4.1
150 kHz to 30 MHz		10 kHz	Bandwidth as in ITU-R SM.329-7, subclause 4.1
30 MHz to 1 GHz		100 kHz	Bandwidth as in ITU-R SM.329-7, subclause 4.1
1 GHz to 12,75 GHz		1 MHz	Upper frequency as in ITU-R SM.329-7, subclause 2.6

6.5.3.4.2 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 [4], are applied.

6.5.3.4.2.1 Minimum Requirement

The power of any spurious emission shall not exceed.

7.3 Dynamic range

7.3.1 Definition and applicability

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.

Minimum bandwidth of AWGN interferer shall be 1,.5 times chip rate -5,.76 MHz for a chip rate of 3,.84 MHz.

7.3.2 Conformance requirement

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

Table 7.3: Dynamic range

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	-91	dBm
Interfering AWGN signal	-73	dBm/3,.84 MHz

7.3.3 Test purpose

The purpose of this test is to verify that the BS meet the dynamic range requirement as specified in TS 25.104, subclause 7.3.

7.3.4 Method of test

7.3.4.1 Initial conditions

1) Connect the test equipment as shown in annex B.

7.3.4.2 Procedure

1) Adjust the signal generator for the wanted signal to -91 dBm.

2) Adjust the AWGN generator level to -73 dBm/3,.84 MHz and set the frequency to the same frequency as the tested channel.

3) Measure the BER for the tested service and verify that it is below the specified level.

Repeat the measurement for the other RX port.

7.3.5 Test requirements

Dynamic range requirement shall be met as specified in subclause 7.3.2.

7.4 Adjacent Channel Selectivity (ACS)

7.4.1 Definition and applicability

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at is assigned channel frequency in the presence of an 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 receive filter attenuation on the adjacent channel(s).

The interference signal be detuned by F_{uw} MHz and modulated by a pseudo random binary sequence uncorrelated to the wanted signal.

7.4.1 Test conditions and measurement method

7.4.2 Conformance requirement

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

Table 7.3: Adjacent channel selectivity

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	-115	dBm
Interfering signal	-52	dBm
Fuw (Modulated)	±5	MHz

7.4.3 Test purpose

The purpose of this test is to verify that the BS meet the dynamic range requirement as specified in TS 25.104, subclause 7.4.

7.4.3 Method of test

7.4.4.1 Initial conditions

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

7.4.4.2 Procedure

2)1) Generate the reference channel and adjust the ATT1 to set the input level to the base station under test to the specified -115 dBm.

3)2) Set-up the interference signal at the adjacent channel frequency and adjust the ATT2 to obtain the specified level of interference signal at the base station input. Note that the interference signal shall have an ACLR of at least 63 dB in order to eliminate the impact of interference signal adjacent channel leakage power on the ACS measurement. The interference signal shall be wide band CDMA signal of single code.

4)3) Measure the BER and control that the measured value does not exceed the specified value (BER < 0,.001).

5)4) Repeat the test for the port, which was terminated.

7.4.4 Test requirements

Adjacent channel selectivity requirement shall be met as specified in subclause 7.4.2.

7.4.2 Minimum requirement

The BER shall not exceed 0,001 for the parameters specified in the table

Table 7.3: Adjacent channel selectivity

Parameter	Level	Unit
Data rate	12,2	kbps
Wanted signal	-115	dBm
Interfering signal	-52	dBm
Fuw (Modulated)	±5	MHz

7.7.2 Conformance requirements

~~The spurious emission shall be:~~

1) ~~less than -78 dBm/3,84 MHz at the BS antenna connector, for frequencies within the BS receive band;~~

2) ~~less than -57 dBm/100 kHz at the BS antenna connector, for frequencies band from 9 kHz to 1 GHz;~~

3) ~~less than -47 dBm/1 MHz at the BS antenna connector, for frequencies band from 1 GHz to 12,75 GHz with the exception of frequencies 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.~~

The power of any spurious emission shall not exceed:

Table 7.7: Spurious emission minimum requirement

Band	Maximum level	Measurement Bandwidth	Note
1900 – 1980 MHz and 2010 – 2025 MHz	-78 dBm	3.84 MHz	
9 kHz – 1 GHz	-57 dBm	100 kHz	
1 GHz – 12.75 GHz	-47 dBm	1 MHz	With the exception of frequencies between 12.5 MHz below the first carrier frequency and 12.5 MHz above the last carrier frequency used by the BS.

The reference for this requirement is TS 25.104 [1] subclause 7.7.1.

7.7.3 Test purpose

To verify that the BS spurious emission meets the specifications described in subclause 7.7.2.

7.7.4 Method of test

7.7.4.1 Initial conditions

1) Connect a measurement receiver to the BS antenna connector as shown in annex B.

2) Enable the BS receiver.

3) Start BS transmission with channel configuration as specified in the table 6.1 and 6.2 (Test model 1).

7.7.4.2 Procedure

1) Set measurement equipment parameters as specified in table 7.6.

2) Measure the spurious emissions over each frequency range described in subclause 7.7.2.

3) Repeat test using diversity antenna connector if available.

Table 7.6

Measurement Band width	3~~,~~.84 MHz (Root raised cosine,0~~,~~.22) / 100 kHz (note)
Sweep frequency range	9 kHz to 12~~,~~.75GHz
Detection	True RMS
NOTE: As defined in subclause 7.7.2.	

7.7.5 Test requirements

The all measured spurious emissions, derived in step (2), shall be within requirement limits as specified in subclause 7.7.2.

3GPP/RAN4 Meeting #13
Torino, Italy, 04-08 Sept 2000

***Document* R4-000692**

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.141 CR 40 Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: RAN # 9	for approval	X	Strategic		*(for SMG use only)*
list expected approval meeting # here ↑	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** August 31.2000

Subject: Global In-Channel TX-Test for use as annex in 25.141

Work item: TS 25.141

Category: *(only one category shall be marked with an X)*

F	Correction	X	Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Release: see table above

Reason for change: to provide for unambiguous In-Cannel TX-measurement results.

The possible interdependencies among the in-channel TX test-parameters are excluded by definition in annex NEW.

Clauses affected:

- Clauses 6.2.2, 6.3, 6.4.2, 6.4.3, 6.7 (EVM) and 6.8 (PCDE) of 25.141 are revised according to the newly introduced annex.
- Annex B (Measurement system set-up) is revised according to the newly introduced annex.
- Annex NEW contains the above mentioned Global In-Channel TX-Test

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

<---------- double-click here for help and instructions on how to create a CR.

6.2.2 CPICH power accuracy

6.2.2.1 Definition and applicability

CPICH power accuracy is defined as the maximum deviation between the ordered channel power and the power in that channel measured at the TX antenna interface. The requirement is applicable for all BS types.

6.2.2.2 Conformance Requirement

See subclause 6.2.2.5.

6.2.2.3 Test purpose

The purpose of the test is to verify, that the BS under test delivers CPICH power within margins, thereby allowing reliable cell planning and operation.

6.2.2.4 Method of test

6.2.2.4.1 Initial conditions

Establish applicable temperature and supply voltage, as specified in subclause 4.4.

Connect BS to code domain analyser as shown in annex B.

Disable inner loop power control.

Set-up BS transmission at maximum total power as specified by the supplier. Channel set-up shall be according to subclause 6.1.1.2.

6.2.2.4.2 Procedure

~~With the Code Domain Analyser m~~Measure the power in the PCCPCH and PCPICH according to annex NEW.

Repeat the measurement for all other applicable temperatures and supply voltages.

6.2.2.5 Test requirement

The measured CPICH power shall be within ±2.1dB of the ordered absolute value.

6.3 Frequency error

6.3.1. Definition and applicability

Frequency error is the measure of the difference between the actual BTS transmit frequency and the assigned frequency. The same source shall be used for RF frequency and data clock generation.

It is not possible to verify by testing that the data clock is derived from the same frequency source as used for RF generation. This may be confirmed by a manufacturers declaration

~~Frequency error shall be measured as part of the transmit modulation measurements specified in 6.7.~~

6.3.2. Conformance Requirement

The Frequency Error shall be within ± 0.05 PPM.

6.3.3 Test Purpose

To verify that the Frequency Error is within the limit specified in 6.3.2

6.3.4 Method of Test

6.3.4.1. Initial Conditions

1) Connect the base station RF output port to the test equipment. Refer to annex B.1.2 for a functional block diagram of the test set-up.

2) Set the base station to transmit a signal modulated with PCCPCH. Total power at the RF output port shall be Pmax-3dB and Pmax-18dB.

6.3.4.2. Procedure

Measure the Frequency Error according to annex NEW

6.3.5 Test Requirement

The Frequency Error shall meet the limit specified in 6.3.2

6.4 Output power dynamics

Power control is used to limit the interference level. The BS transmitter uses a quality-based power control on the downlink. The physical channels for the following test(s) shall be set-up according to subclause 6.1.1.2.

6.4.1 Inner loop power control

Inner loop power control in the downlink is the ability of the BS transmitter to adjust the transmitter output power of a code channel in accordance with the corresponding TPC symbols received in the uplink.

6.4.2 Power control steps

The power control step is the required step change in the DL transmitter output power of a code channel in response to the corresponding power control command. The combined output power change is the required total change in the DL transmitter output power of a code channel in response to multiple consecutive power control commands corresponding to that code channel.

6.4.2.1 Definition and applicability

Inner loop power control in the downlink is the ability of the BS transmitter to adjust the transmitter output power of a code channel in accordance with the corresponding TPC symbols received in the uplink.

The power control step is the required step change in the DL transmitter output power of a code channel in response to the corresponding power control command. The combined output power change is the required total change in the DL transmitter output power of a code channel in response to multiple consecutive power control commands corresponding to that code channel.

6.4.2.2 Conformance requirement

The BS transmitter shall have the capability of setting the inner loop output power with a step sizes of 1 dB mandatory and 0,5 dB optional.

(a) The tolerance of the power control step due to inner loop power control shall be within the range shown in table 6.9.

(b) The tolerance of the combined output power change due to inner loop power control shall be within the range shown in table 6.10a.

Table 6.9: Transmitter power control step tolerance

Power control commands in the down link	Transmitter power control step tolerance			
	1 dB step size		0,5 dB step size	
	Lower	Upper	Lower	Upper
Up(TPC command "1")	+0,5 dB	+1,5 dB	+0,25 dB	+0,75 dB
Down(TPC command "0")	-0,5 dB	-1,5 dB	-0,25 dB	-0,75 dB

Table 6.10a: Transmitter combined output power tolerance

Power control commands in the down link	Transmitter combined output power change tolerance after 10 consecutive equal commands (up or down)			
	1 dB step size		0.5dB step size	
	Lower	Upper	Lower	Upper
Up(TPC command "1")	+8 dB	+12 dB	+4 dB	+6 dB
Down(TPC command "0")	-8 dB	-12 dB	-4 dB	-6 dB

The reference for this requirement is TS 25.104 [1] subclause 6.4.1.1.1

6.4.2.3 Test purpose

To verify those requirements for the power control step size and response are met as specified in subclause 6.4.2.2.

6.4.2.4 Method of test

6.4.2.4.1 Initial conditions

(1) Connect the suitable measurement equipment to the BS antenna connector as shown in annex B.

(2) Start BS transmission with channel configuration as specified in table 6.3 Test model 2.

(3) Establish downlink power control with parameters as specified in table 6.10b.

Table 6.10b

Parameter	Level/status	Unit
UL signal level	Ref.sens + 10 dB	DBm/3,84 MHz
Data sequence	PN9	

6.4.2.4.2 Procedure

1) Set and send alternating TPC bits from the UE simulator or UL signal generator.

2) Measure mean power level of the code under the test each time TPC command is transmitted. All steps within power control dynamic range declared by manufacturer shall be measured. Use the code power measurement method defined in annex NEW

3) Measure the 10 highest and the 10 lowest power step levels within the power control dynamic range declared by manufacturer by sending 10 consecutive equal commands as described table 6.10a.

4) Check that average step size tolerance requirement shall be met.

6.4.2.5 Test requirement

(a) BS shall fulfil step size requirement for all power control steps declared by manufacture as specified in subclause 6.4.2.2.

(b) For all measured Up/Down cycles, the difference of transmission power between before and after 10 equal commands (Up and Down), derived in step (3), shall not exceed the prescribed range in subclause 6.4.2.2.

6.4.3 Power control dynamic range

6.4.3.1 Definition and applicability

The power control dynamic range is difference between the maximum and the minimum transmit output power of a code channel for a specified reference condition. Transmit modulation shall be maintained within whole dynamic range as specified in the TS 25.104 subclause 6.8.

6.4.3.2 Conformance requirement

Down link (DL) power control dynamic range:

- maximum power: BS maximum output power -3 dB or greater;
- minimum power: BS maximum output power -28 dB or less.

The reference for this requirement is TS 25.104 [1] subclause 6.4.2.1.

6.4.3.3 Test purpose

To verify that the minimum power control dynamic range is met as specified in subclause 6.4.3.2.

6.4.3.4 Method of test

6.4.3.4.1 Initial conditions

1) Connect the measurement equipment to the BS antenna connector as shown in annex B.
2) Channel configuration defined in table 6.3 Test model 2 shall be used.
3) Set BS frequency.
4) Star BS transmission.

6.4.3.4.2 Procedure

Pmax shall be defined as described in subclause 6.2.1 Base station maximum output power.

1) Set power of the DPCH under test to the Pmax-3 dB level. Power levels for other code channels shall be adjusted as necessary.
2) Measure mean power level of the code channel under test. Use the code power measurement method defined in annex NEW
3) Set power of the DPCH under test to the minimum value by means determined by the manufacturer. Power levels for other code channels shall remain unchanged.
4) Measure mean power level of the code channel under test.

6.4.3.5 Test requirement

Power control dynamic range requirement shall be met as specified in subclause 6.4.3.2.

6.7 Transmit modulation

~~Transmit modulation is measured in three parts, Frequency Error, Error Vector Magnitude and Peak Code Domain Error. These measurements are made with reference to a theoretical modulated waveform.~~

~~The physical channels for the following test(s) shall be set-up according to subclause 6.1.1.1.~~

~~The theoretical modulated waveform is created by modulating a carrier at the assigned carrier frequency using the same data as was used to generate the measured waveform. The chip modulation rate for the theoretical waveform shall be exactly 3.84 Mcps. The code powers of the theoretical waveform shall be the same as the measured waveform, rather than the nominal code powers defined in the test models.~~

~~6.7.1 Frequency Error~~

~~6.7.1.1 Definition and applicability~~

~~The frequency error is a measure of the difference between the assigned frequency and the frequency selected to modify the measured waveform when measuring EVM in 6.7.2.4 step 4. This relationship is necessary since Frequency Error and EVM are related, and so need to be measured on the same power control group (timeslot).~~

~~6.7.1.2 Conformance Requirement~~

~~The Frequency Error shall be within ± 0.05 PPM.~~

~~6.7.1.3 Test Purpose~~

~~To verify that the Frequency Error is within the limit specified in 6.7.1.2~~

~~6.7.1.4 Method of test~~

~~Frequency Error is measured as part of EVM, see 6.7.2.4~~

~~6.7.1.5 Test Requirement~~

~~The Frequency Error shall meet the limit specified in 6.7.1.2~~

6.7.1~~2~~ Error Vector Magnitude

6.7.1~~2~~.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the theoretical waveform and a modified version of the measured waveform. The modification is done according to annex NEW. This difference is called the error vector. ~~The measured waveform is modified by first passing it through a matched Root Raised Cosine filter with bandwidth 3.84 MHz and roll-off α =0.22. The waveform is then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector.~~ The EVM result is defined as the square root of the ratio of the mean error vector power to the modified mean reference signal power expressed as a %. The measurement interval is one power control group (timeslot).

6.7.1~~2~~.2 Conformance Requirement

The Error Vector Magnitude shall be less than 17.5%

6.7.1~~2~~.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.1~~2~~.2

6.7.1~~2~~.4 Method of Test

Refer to annex B for a functional block diagram of the test set-up.

1) Connect the base station RF output port to the measurement equipment. ~~modulation analyzer with root raised cosine filter function.~~

2) Set the base station to transmit a signal according to 6.2.1.3.1. (test model 4)~~modulated with PCCPCH~~. Total power at the RF output port shall be Pmax-3dB and Pmax-18dB.

3) Trigger the test equipment from the system time reference signal from the base station.

<Editor's note: Precise definition of "Triggering signal" shall be needed.>

4. Measure the Error Vector Magnitude as defined in annex NEW~~6.7.2.1.~~

6.7.1~~2~~.5 Test Requirement

The Error Vector Magnitude measured in 6.7.1~~2~~.4 step 4 shall meet the limit specified in 6.7.1~~2~~.2

6.7.2~~3~~ Peak Code Domain Error

6.7.2~~3~~.1 Definition and applicability

The Peak Code Domain Error is computed by projecting ~~the power of~~ the error vector (as defined in 6.7.1~~2~~) onto the code domain at a specific spreading factor. The Code Domain Error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The Peak Code Domain Error is defined as the maximum value for the Code Domain Error for all codes. The measurement interval is one power control group (timeslot).

6.7.2~~3~~.2 Conformance requirement

The peak code domain error shall not exceed -33 dB at spreading factor 256.

6.7.2~~3~~.3 Test Purpose

~~To verify that the Error Vector Magnitude is within the limit specified in 6.7.3.2~~

It is the purpose of this test to discover and limit inter-code cross-talk.

6.7.2~~3~~.4 Method of test

6.7.2~~3~~.4.1 Initial conditions

1) Connect the measurement equipment to the BS antenna connector as shown in annex B.

2) Channel configuration defined in subclause 6.1.1.3 Test model 3 shall be used.

3) Set BS frequency.

4) Start BS transmission

6.7.2~~3~~.4.2 Procedure

~~1) Set power as defined in subclause 6.1.1.3 Test model 3 for each code channel.~~

1~~2~~) Measure Peak code domain error according to annex NEW.

6.7.2~~3~~.5 Test requirement

Peak code domain error shall meet the requirement as specified in subclause 6.7.2~~3~~.2.

Annex B (informative): Measurement system set-up

Example of measurement system set-ups are attached below as an informative annex.

B.1 Transmitter

B.1.1 Maximum output power, total power dynamic range

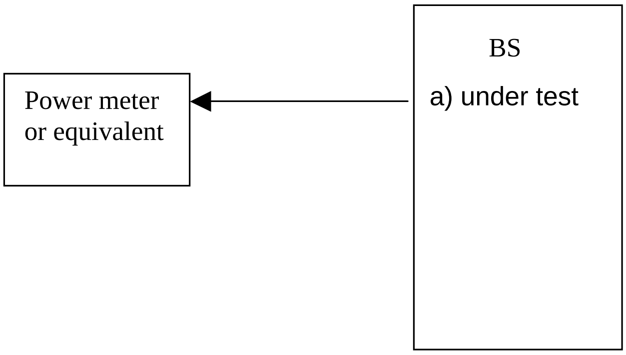
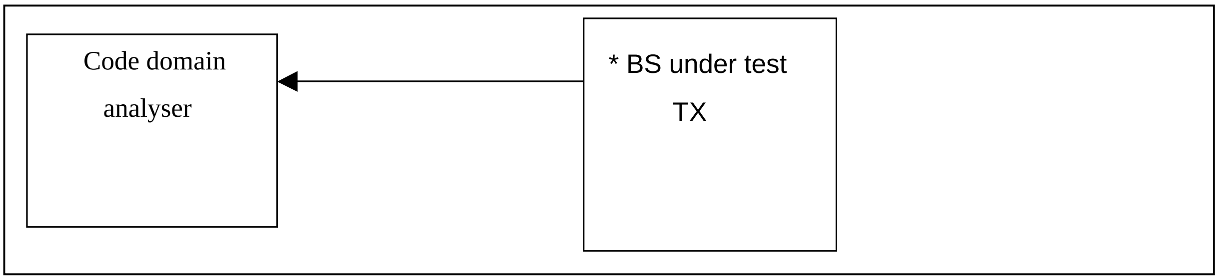


Figure B.1: Measuring system Set-up for maximum output power, total power dynamic range

~~B.1.2 CPICH power accuracy and Peak code domain error~~



~~**Figure B.2: Measuring system Set-up for CPICH power accuracy and peak code domain error measurements**~~

B.1.2 Frequency, Code Power and Transmit Modulation

Figure B.2: Measurement system setup for RF frequency, several code power tests and transmit modulation (EVM and PCDE)

B.1.6 EVM measurement

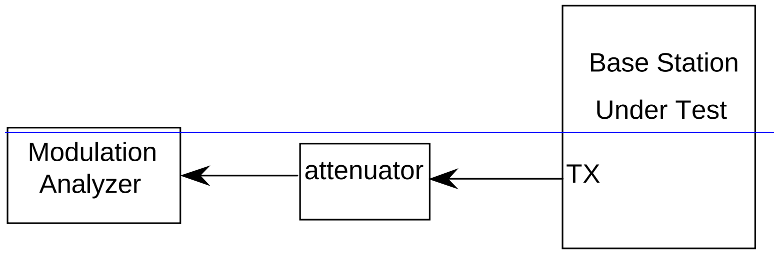


Figure B.6: Measuring system Set-up for EVM test

Annex NEW

Global In-Channel TX-Test

N.1 General

The global in-channel Tx test enables the measurement of all relevant parameters that describe the in-channel quality of the output signal of the Tx under test in a single measurement process. The parameters describing the in-channel quality of a transmitter, however, are not necessarily independent. The algorithm chosen for description inside this annex places particular emphasis on the exclusion of all interdependencies among the parameters. Any other algorithm (e.g. having better computational efficiency) may be applied, as long as the results are the same within the accuracy limits.

N.2 Definition of the process

N.2.1 Basic principle

The process is based on the comparison of the actual **output signal of the TX under test**, received by an ideal receiver, with a **reference signal**, that is generated by the measuring equipment and represents an ideal error free received signal. All signals are represented as equivalent (generally complex) baseband signals.

N.2.2 Output signal of the TX under test

The output signal of the TX under test is acquired by the measuring equipment, filtered by a matched filter (RRC 0.22, correct in shape and in position on the frequency axis) and stored at one sample per chip at the Inter-Symbol-Interference free instants.

The following form represents the physical signal in the entire measurement interval:

one vector **Z**, containing N = ns x sf + ma complex samples;

with

ns: number of symbols in the measurement interval;

sf: number of chips per symbol. (sf: spreading factor) (see Note: Symbol length)

ma: number of midamble chips (only in TDD)

N.2.3 Reference signal

The reference signal is constructed by the measuring equipment according to the relevant TX specifications.

It is filtered by the same matched filter, mentioned in N.2.2., and stored at the Inter-Symbol-Interference free instants. The following form represents the reference signal in the entire measurement interval:

one vector **R**, containing N = ns x sf + ma complex samples;

ns: number of symbols in the measurement interval;

sf: number of chips per symbol. (see Note: Symbol length)

ma: number of midamble chips (only in TDD)

N.2.4 Classification of measurement results

The measurement results achieved by the global in-channel TX test can be classified into two types:

- Results of type "deviation", where the error-free parameter has a non-zero magnitude. (These are the parameters that quantify the integral physical characteristic of the signal).These parameters are:

RF Frequency

Power (in case of single code)

Code Domain Power (in case of multi code)

Timing (only for UE)

(Additional parameters: see Note: Deviation)

- Results of type "residual", where the error-free parameter has value zero. (These are the parameters that quantify the error values of the measured signal, whose ideal magnitude is zero). These parameters are:

Error Vector Magnitude (EVM);

Peak Code Domain Error (PCDE).

(Additional parameters: see Note: residual)

N.2.5 Process definition to achieve results of type "deviation"

The reference signal (**R**; see subclause N.2.3) is varied with respect to the parameters mentioned in subclause N.2.4 under "results of type deviation" in order to achieve best fit with the recorded signal under test (**Z**; see subclause N.2.2). Best fit is achieved when the RMS difference value between the signal under test and the varied reference signal is an absolute minimum. The varied reference signal, after the best fit process, will be called **R'.**

The varying parameters, leading to **R'** represent directly the wanted results of type "deviation". These measurement parameters are expressed as deviation from the reference value with units same as the reference value.

In case of multi code, the type-"deviation"-parameters (frequency, timing and (RF-phase)) are varied commonly for all codes such that the process returns one frequency-deviation, one timing deviation, (one RF-phase –deviation).

(These parameters are not varied on the individual codes signals such that the process returns k frequency errors... . (k: number of codes)).

The only type-"deviation"-parameters varied individually are code powers such that the process returns k code power deviations (k: number of codes). (see Note: Code Domain Power Meter)

N.2.6 Process definition to achieve results of type "residual"

The difference between the varied reference signal (**R'**; see subclauseN.2.5.) and the TX signal under test (**Z**; see subclauseN.2.2) is the error vector **E** versus time:

E = **Z** – **R'**.

Depending on the parameter to be evaluated, it is appropriate to represent **E** in one of the following two different forms:

Form EVM (representing the physical error signal in the entire measurement interval)

One vector **E**, containing N = ns x sf + ma complex samples;

with

ns: number of symbols in the measurement interval

sf: number of chips per symbol (see Note: Symbol length)

ma: number of midamble chips (only in TDD)

Form PCDE (derived from Form EVM by separating the samples into symbol intervals)

ns time-sequential vectors **e** with sf complex samples comprising one symbol interval.

E and **e** give results of type "residual" applying the two algorithms defined in subclauses N 2.6.1 and N 2.6.2.

N.2.6.1 Error Vector Magnitude (EVM)

The Error Vector Magnitude EVM is calculated according to the following steps:

(1) Take the error vector **E** defined in subclause N.2.6 (Form EVM) and calculate the RMS value of **E**; the result will be called RMS(**E**).

(2) Take the varied reference vector **R'** defined in subclause N.2.5 and calculate the RMS value of **R'**; the result will be called RMS(**R'**).

(3) Calculate EVM according to:

$$EVM = \frac{RMS(\mathbf{E})}{RMS(\mathbf{R}')} \text{ x } 100\% -$$ (here, EVM is relative and expressed in %)

(see note TDD)

N.2.6.2 Peak Code Domain Error (PCDE)

The Peak Code Domain Error is calculated according to the following steps:

(1) Take the error vectors **e** defined in subclause N.2.6 (Form PCDE)

(2) To achieve meaningful results it is necessary to descramble **e**, leading to **e'** (see Note: Scrambling code)

(3) Take the orthogonal vectors of the channelisation code set **C** (all codes belonging to one spreading factor) as defined in TS 25.213 and TS 25.223 (range +1, -1). (see Note: Symbol length)

(4) Calculate the inner product of **e'** with **C**. Do this for all symbols of the measurement interval and for all codes in the code space.
This gives an array of format k x ns, each value representing an error-vector representing a specific symbol and a specific code, which can be exploited in a variety of ways.

k: number of codes

ns: number of symbols in the measurement interval

(5) Calculate k RMS values, each RMS value unifying ns symbols within one code.
(These values can be called "*Absolute CodeEVMs*" [Volt].)

(6) Find the peak value among the k "*Absolute CodeEVMs*".
(This value can be called "*Absolute PeakCodeEVM*" [Volt].)

(7) Calculate PCDE according to:

.

$$\text{PCDE} = 10 \cdot \lg \frac{(\text{"}\mathit{Absolute\ PeakCodeEVM}\text{"})^2}{(\text{RMS}(\mathbf{R'}))^2}\ \text{dB}$$

(a relative value in dB).

(see Note: Denominator)

(see Note IQ)

(see Note TDD)

(see Note Synch channel)

N.3 Notes

Note: Symbol length) A general code multiplexed signal is multicode and multirate. In order to avoid unnecessary complexity, the measurement applications use a unique symbol-length, corresponding to a spreading factor, regardless of the really intended spreading factor. Nevertheless the complexity with a multicode / multirate signal can be mastered by introducing appropriate definitions.

Note: Deviation) It is conceivable to regard more parameters as type „deviation" e.g. Chip frequency and RF-phase.

As chip-frequency and RF-frequency are linked together by a statement in the core specifications [1] it is sufficient to process RF frequency only.

A parameter RF-phase must be varied within the best fit process (N 2.5.). Although necessary, this parameter-variation doesn't describe any error, as the modulation schemes used in the system don't depend on an absolute RF-phase.

Note: residual) It is conceivable to regard more parameters as type „residual" e.g. IQ origin offset. As it is not the intention of the test to separate for different error sources, but to quantify the quality of the signal, all such parameters are not extracted by the best fit process, instead remain part of EVM and PCDE.

Note: Denominator) If the denominator stems from mutual time shifted signals of different code powers, (e.g. BS, FDD) the measurement result PCDE should be expressed absolutely instead.

Note: Scrambling Code) In general a TX signal under test can use more than one scrambling code. Note that PCDE is primarily processed to investigate the unused channelisation codes. In order to know which scrambling code shall be applied on unused channelisation codes, it is necessary to restrict the test conditions: TX signal under test shall use exactly one scrambling code.

Note IQ) As in FDD/uplink each channelisation code can be used twice, on the I and on the Q channel, the measurement result may indicate on which channel (I or Q) PCDE occurs.

Note TDD) EVM covers the midamble part as well as the data part; however PCDE disregards the midamble part.

Note: Synch Channel) A BS signal contains a physical synch channel, which is non orthogonal, related to the other channels. In this context note: The code channel bearing the result of PCDE is exactly one of the other physical channels (never the synch channel). The origin of PCDE (erroneous code power) can be any channel (including synch channel).

Note: Code Domain Power Meter) The minimum process described in N.2.5 returns k code-power-deviations each based on the relevant reference-code-power. (k = number of codes) In order to avoid unnecessary complexity it is necessary to select a measurement interval, where all reference-code-powers remain constant. In case code power steps are tested (e.g. subclause 6.4.2.4.2.), a suitable measurement interval shall be chosen by proper triggering or a search strategy inside a longer interval of the acquired data.

However the process is not dependent on this restriction. It stands non-constant power or code power as well.

TSG-RAN Working Group 4 (Radio) meeting #13
Turin, Italy, Sept 4th – 8th, 2000

TSG R4#13 (00)704

Agenda Item: **6.8**

Source: **Ericsson**

Title: **Correction of UL measurement channels for FDD-mode**

For: **Approval**

In the meeting in Turku Tdoc 486 was agreed that Tdoc contained 2 CRs, one for 25.104 and one for 25.141. This document was approved. Unfortunately the changes in 25.141 has not been implemented.

The editorial errors are:

1. Incorrect size of the DCCH fields. Changed to 100 bits plus 12 bits CRC as agreed in Tdocs R4-000269 and R4-000349 for the UE.

2. In A.6 the TTI specified in the picture is incorrectly indicated to be 4 (8N+3) and is changed to the be 8 (8N+7).

The corrections proposed in points 2 and 3 also apply to TS 25.141.

CRs for 25.141 is attached.

3GPP TSG-RAN WG4 Meeting #12
Turku, Finland, May 22 - 26, 2000

Document R4-000704
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.141	**CR**	**41**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN #9	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME		UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-05

Subject: Reference measurement channels

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Correction of the size of some DCCH fields in the measurement channels and of the indicated TTI for the 2048 kbps channel. Corrections has already been implemented in TS25.104

Clauses affected: Appendix A.2, A.3, A.4, A.5, A.6

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments: Note: The changes are in figures inserted as embedded documents, so change bars are not visible. The changes are only visible in the figures.

A.2 UL reference measurement channel for 12,2 kbps

The parameters for the UL reference measurement channel for 12,2 kbps are specified in table A.2 and the channel coding is detailed in figure A.2.

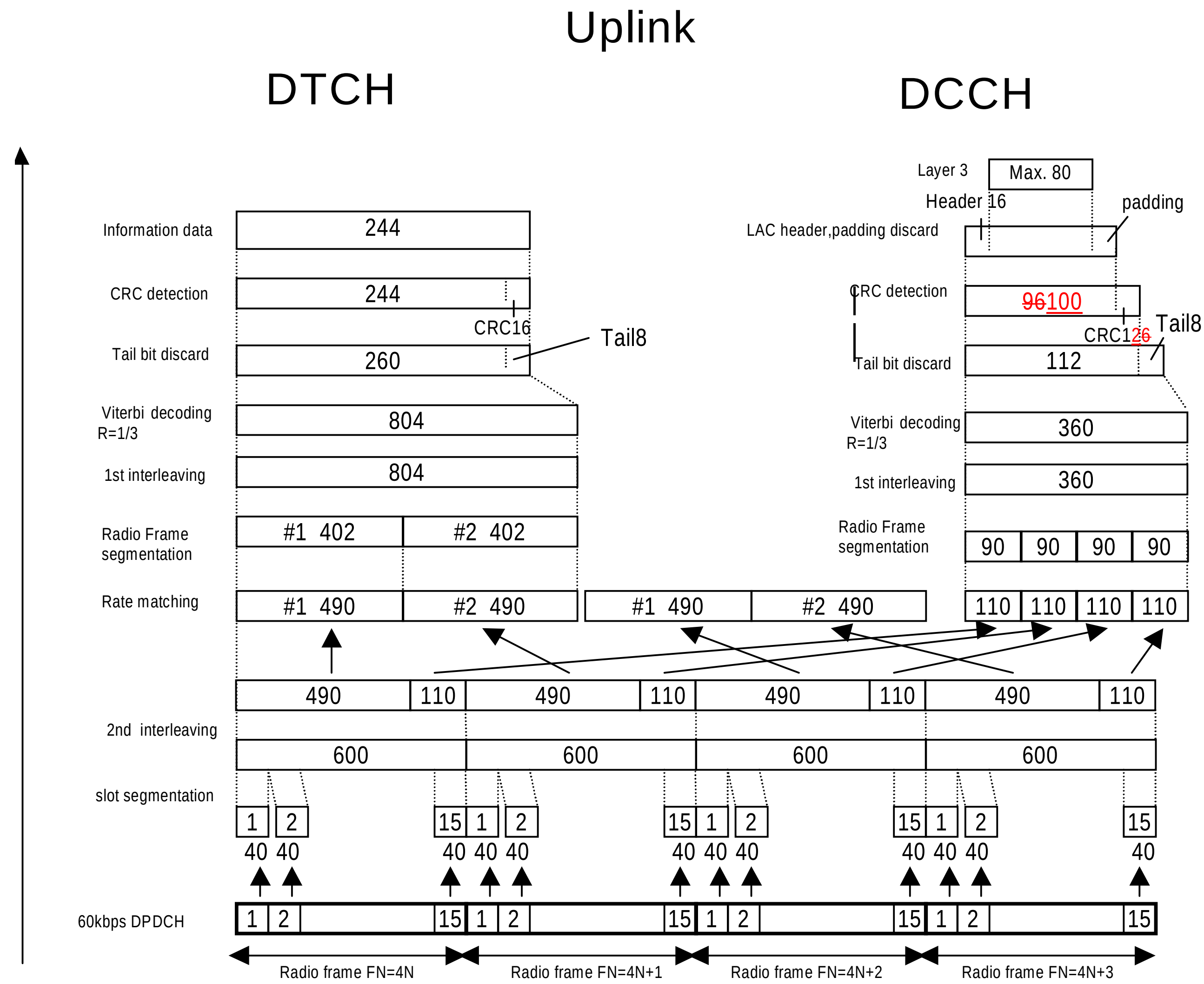


Figure A.2

Table A.2: UL reference measurement channel (12.2 kbps)

Parameter	Level	Unit
Information bit rate	12,2	kbps
DPCH	60	kbps
Power control	Off	
TFCI	On	
Repetition	22	%

A.3 UL reference measurement channel for 64 kbps

The parameters for the UL reference measurement channel for 64 kbps are specified in table A.3 and the channel coding is detailed in figure A.3.

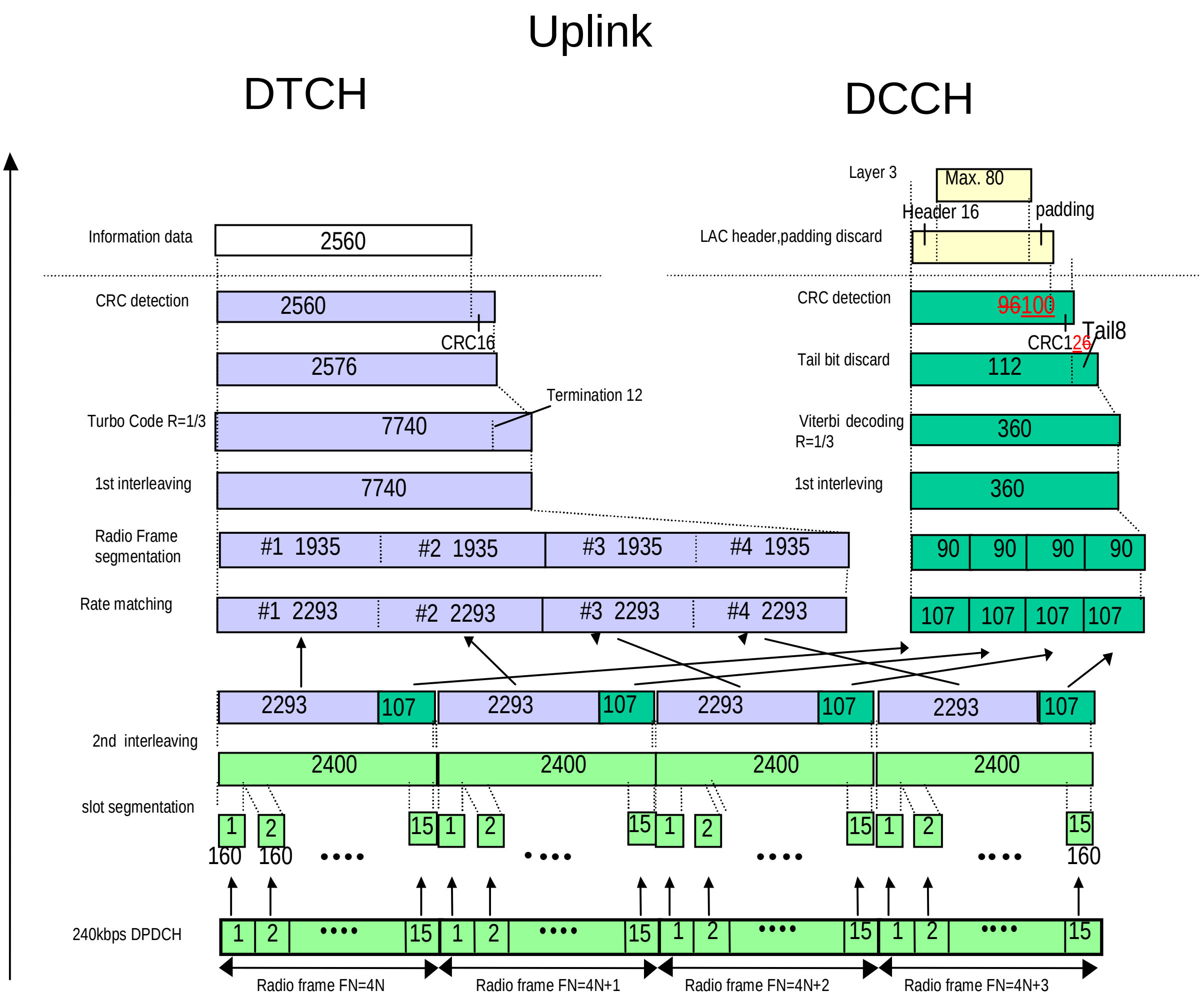


Figure A.3

Table A.3: UL reference measurement channel (64kbps)

Parameter	Level	Unit
Information bit rate	64	kbps
DPCH	240	kbps
Power control	Off	
TFCI	On	
Repetition	19	%

A.4 UL reference measurement channel for 144 kbps

The parameters for the UL reference measurement channel for 144 kbps are specified in table A.4 and the channel coding is detailed in figure A.4.

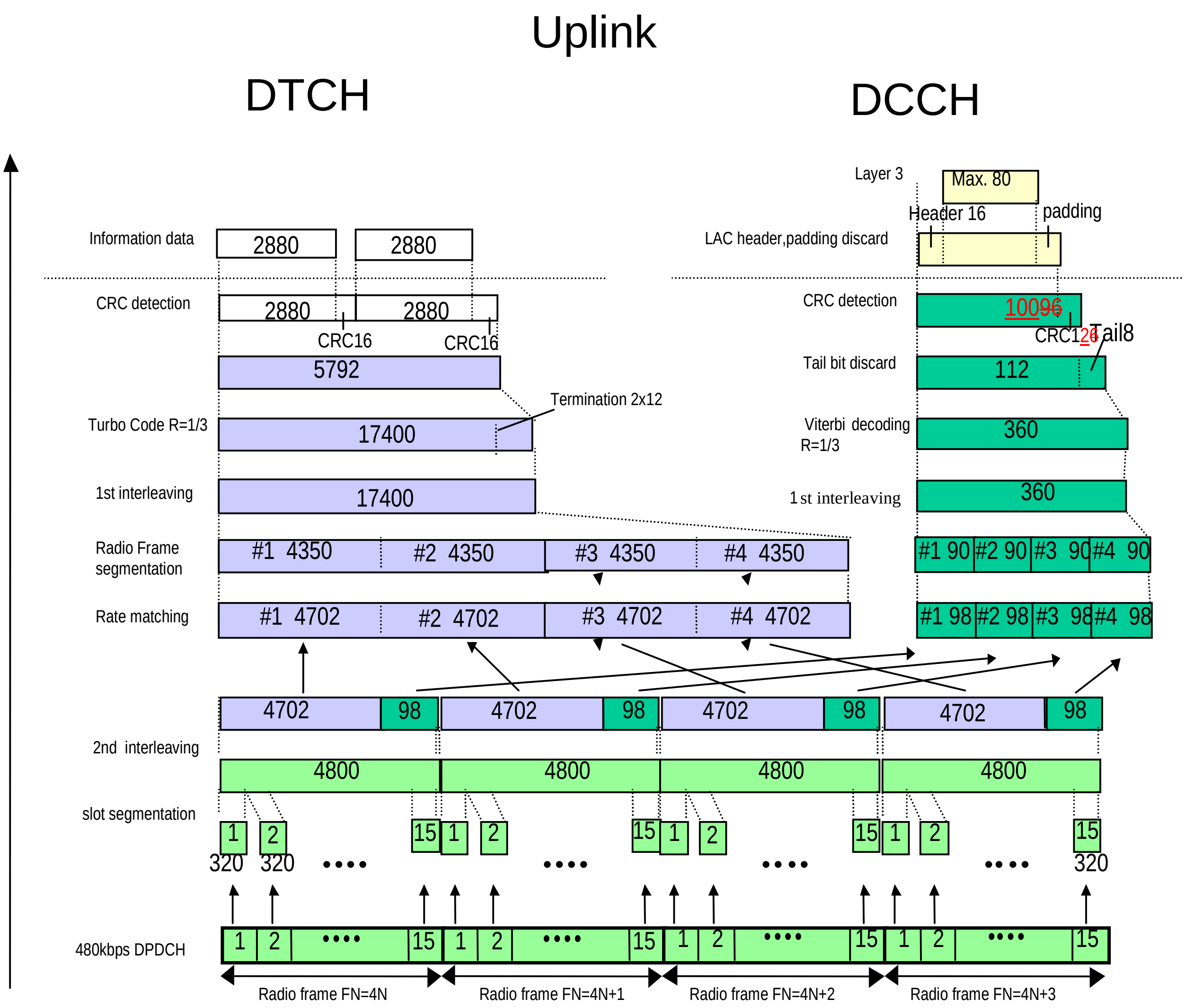


Figure A.4

Table A.4: UL reference measurement channel (144kbps)

Parameter	Level	Unit
Information bit rate	144	kbps
DPCH	480	kbps
Power control	Off	
TFCI	On	
Repetition	8	%

A.5 UL reference measurement channel for 384 kbps

The parameters for the UL reference measurement channel for 384 kbps are specified in table A.5 and the channel coding is detailed in figure A.5.

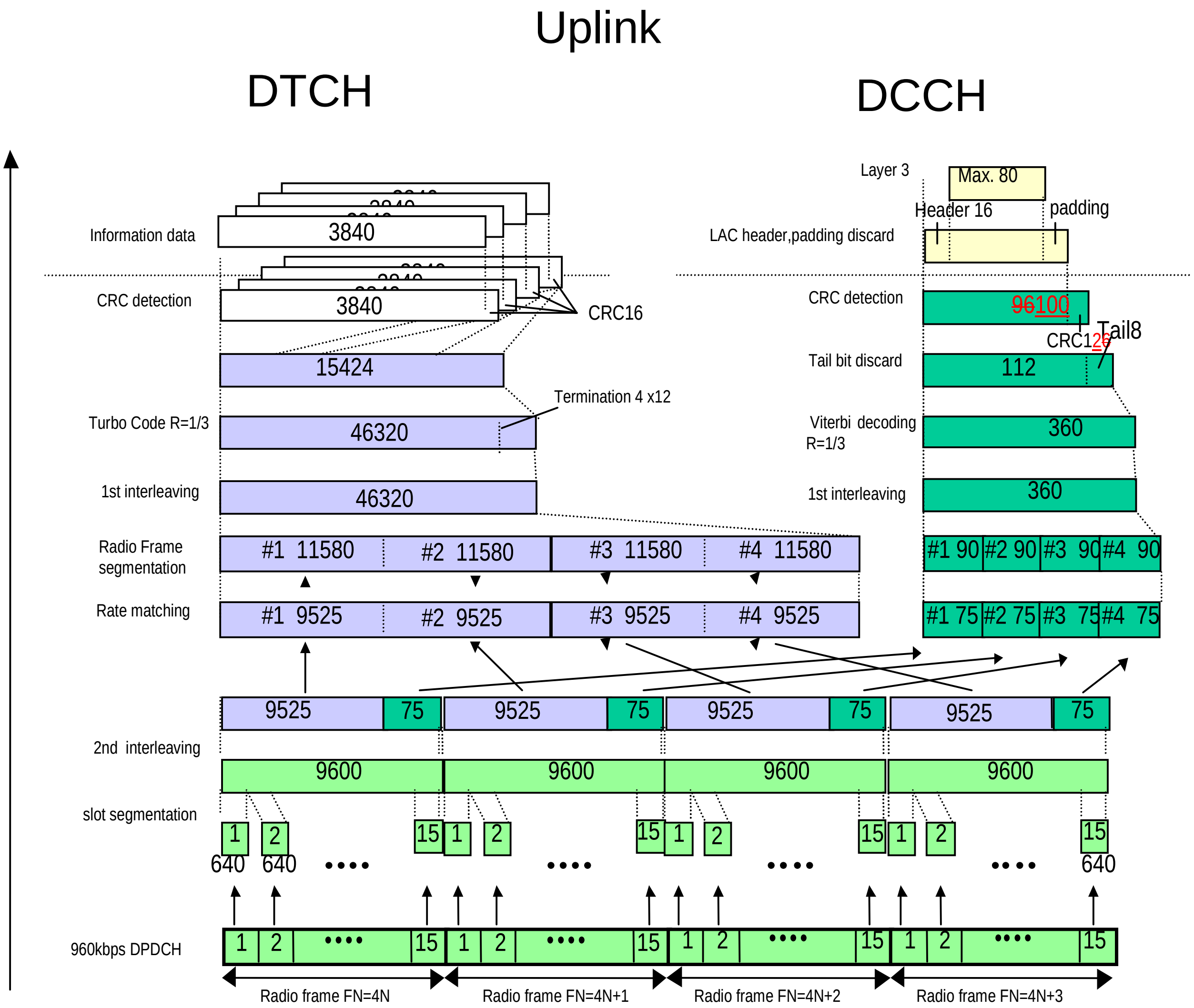


Figure A.5

Table A.5: UL reference measurement channel (384kbps)

Parameter	Level	Unit
Information bit rate	384	kbps
DPCH	960	kbps
Power control	Off	
TFCI	On	
Puncturing	18	%

A.6 UL reference measurement channel for 2048 kbps

The parameters for the UL reference measurement channel for 2 048 kbps are specified in table A.6 and the channel coding is detailed in figure A.6.

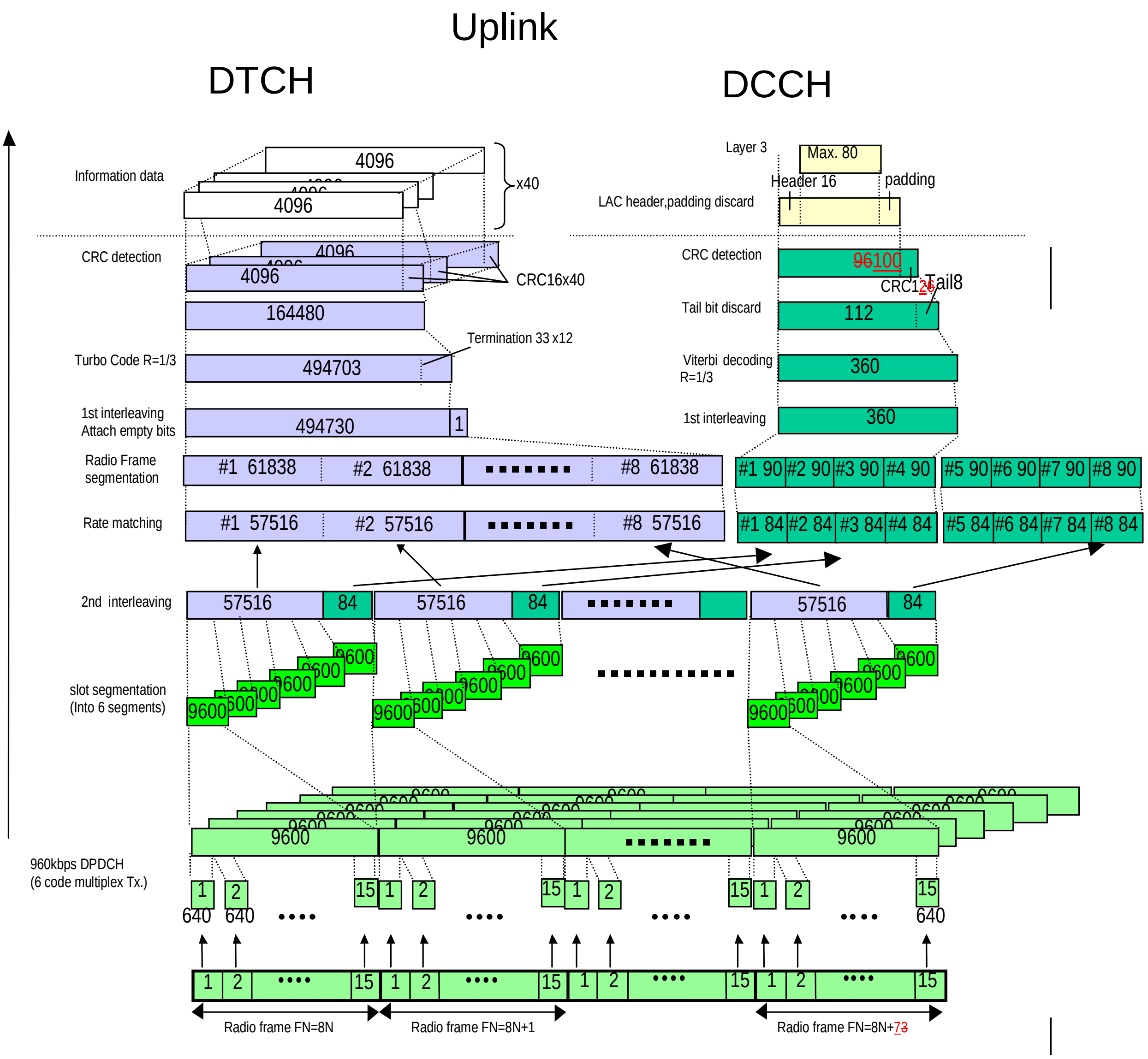


Figure A.6

Table A.6: UL reference measurement channel (2048kbps)

Parameter	Level	Unit
Information bit rate	2 048	kbps
DPCH	960	kbps
Power control	Off	
TFCI	On	
Puncturing	1	%

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25.141	**CR**	**42**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-05

Subject: Handling of measurement uncertainties in Base station conformance testing (FDD)

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Alignment with draft ITU/R recommendation on handling of measurement uncertainties for a global circulation of terminals

Clauses affected: 4

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications	X	→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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4.2 Test tolerances

The following values may be increased only on a test by test basis. The test tolerances should not be increased to take account of commonly known test system errors (such as mismatch, cable loss, etc.)

4.2.1 Transmitter

Subclause 6.2, Base station output power:

- base station maximum output power ±[0,5] dB.

Subclause 6.3, Frequency stability:

- carrier frequency ±[10] Hz.

Subclause 6.4.1, Inner loop power control in the downlink:

- transmitter power control step (relative 1 dB step) ±[0,3] dB;
- transmitter average power control step (relative 10 × 1 dB steps) ±[0,5] dB.

NOTE 1: Code domain power.

Subclause 6.4.3, Power control dynamic range:

- maximum and minimum power ±[0,8] dB;
- power control dynamic range (at 25 dB relative power) ±[0,5] dB.

NOTE 2: Code domain power.

Subclause 6.4.4, Total power dynamic range:

- total power ±[0,5] dB;
- total power dynamic range (at 18 dB relative power) ±[0,3] dB.

Subclause 6.2.2, CPICH power accuracy:

- CPICH power ±[0,8] dB.

NOTE 3: Code domain power.

Subclause 6.5.1, Occupied bandwidth:

- occupied channel bandwidth ±[] kHz.

Subclause 6.5.2.1, Spectrum emission mask:

- emission power:

Table 4.1: Uncertainty for Spectrum emission mask measurement

Frequency offset Δf		Uncertainty
2,5 ≤ Δf < 2,7 MHz		±[1.5] dB
2,7 ≤ Δf < 3,5 MHz		±[1,5] dB
3,5 ≤ Δf < 7,5 MHz		±[1,5] dB
7,5 ≤ Δf ≤ Δf_{max} MHz		±[1,5] dB

Subclause 6.5.2.2, Adjacent Channel Leakage power Ratio (ACLR):

- ACLR ± 5 MHz (Relative carrier power) ±[0,8] dB;
- ACLR ± 10 MHz (Relative carrier power) ±[0,8] dB.

Subclause 6.5.3.7, Protection of the BS receiver:

- emission power ±[1,5] dB.

Subclause 6.5.3, Spurious emissions:

- conformance requirement in BS and coexistence receive bands:
  - emission power ±[0] dB.
- conformance requirements outside BS and coexistence receive bands:
  - emission power:

    f ≤ 2.2 GHz ±[0] dB;

    2.2 GHz < f ≤ 4 GHz ±[0] dB;

    f > 4 GHz ±[0] dB.

Subclause 6.6, Transmit intermodulation:

- interference signal power relative the carrier power ±[1,0] dB;
- intermodulation power ±[1,5] dB.

Subclause 6.7.1, Modulation Accuracy:

- modulation accuracy (EVM) ±[2,5] % RMS.

Subclause 6.7.2, Peak code Domain error:

- peak code domain error ±[] dB.

4.2.2 Receiver

Subclause 7.2, Reference sensitivity level:

- test signal power ±[0,8] dB.

Subclause 7.3, Dynamic range:

- test signal power ±[0,8] dB;
- AWGN signal power ±[1,0] dB.

Subclause 7.4, Adjacent Channel Selectivity (ACS):

- test signal power ±[0,8] dB;
- interfering signal power (Relative to the test signal) ±[0,8] dB.

Subclause 7.5, Blocking characteristics:

- test signal power ±[0,8] dB:
  - interfering signal power:

    f ≤ 2,2 GHz ±0,7 dB;

    2,2 GHz < f ≤ 4 GHz ±1,5 dB;

    f > 4 GHz ±3,0 dB.

Subclause 7.6, Intermodulation characteristics:

- test signal power ±[0,8] dB;

- interfering signals power ±[0,7] dB.

Subclause 7.7, Spurious emissions:

- emission power:

  f ≤ 2,2 GHz ±[1,5] dB;

  2,2 GHz < f ≤ 4 GHz ±[2,0] dB;

  f > 4 GHz ±[4,0] dB.

4.2.3 Performance requirement

Subclause 8.2, Demodulation in static propagation condtion:

- test signal power ±[] dB;
- Eb/I0 (relative) ±[] dB.

Subclause 8.3, Demodulation of DCH in multiplath fading conditons:

- test signal power ±[] dB;
- Eb/I0 (relative) ±[] dB.

4.2.4 RRM measurements

The following tolerances refer to the requirements of 25.133.

tbd

4.~~2~~3 Interpretation of measurement results

Compliance with the requirement is determined by comparing the measured value (or derived value from the measured one) with the test limit. The test limit shall be ~~relaxed~~ calculated by adding ~~from~~ the specified limit in the core requirement using the test tolerance as specified in subclause 4.2. ~~maximum allowed uncertainty for the test equipment as specified in subclause 4.1.~~ The actual measurement uncertainty of the test equipment for the measurement of each parameter shall be included in the test report.

The recorded value for the test equipment uncertainty shall be, for each measurement, equal to or lower than the appropriate figure in subclause 4.1 of the present document.

If the test equipment for a test is known to have a measurement uncertainty greater than that specified in subclause 4.1, it is still permitted to use this apparatus provided that an adjustment is made to the measured value as follows.

The initial test limit is derived as above ~~by relaxing the specified core limit using the test tolerance maximum allowed test equipment uncertainty as specified in subclause 4.12~~. Any additional uncertainty in the test equipment over and above that specified in subclause 4.1 shall be used to tighten the test limit. This procedure will ensure that test equipment not compliant with subclause 4.1does not increase the chance of passing a device under test where that device would otherwise have failed the test if test equipment compliant with subclause 4.1 had been used.

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25.141 **CR** **43** Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-01

Subject: Clarifications of modulation accuracy and code domain error tests for TD operation

Work item:

Category:				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:

- Grammatical improvement
- CPCH power tolerances should be stated together with RACH.
- Editorial correction to diagrams to show averaging periods correctly

Clauses affected: 6.7, B.1

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	Other GSM core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments:

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6.7.2 Error Vector Magnitude

6.7.2.1 Definition and applicability

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

6.7.2.2 Conformance Requirement

The Error Vector Magnitude shall be less than 17.5%

6.7.2.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.2.2

6.7.2.4 Method of Test

Refer to annex B for a functional block diagram of the test set-up.

1) Connect the base station RF output port to the modulation analyzer with root raised cosine filter function.

2) Set the base station to transmit a signal modulated with PCCPCH on the main path only. Total power at the RF output port shall be Pmax-3dB and Pmax-18dB.

3) Trigger the test equipment from the system time reference signal from the base station.

<Editor's note: Precise definition of "Triggering signal" shall be needed.>

4. Measure the Error Vector Magnitude as defined in 6.7.2.1.

5. If the base station supports STTD or TxAA, repeat steps 1 through 4 with the diversity path (antenna connector 2) enabled instead of the main path.

6.7.2.5 Test Requirement

The Error Vector Magnitude measured in 6.7.2.4 step 4 shall meet the limit specified in 6.7.2.2

6.7.3 Peak Code Domain Error

6.7.3.1 Definition and applicability

The Peak Code Domain Error is computed by projecting the power of the error vector (as defined in 6.7.2) onto the code domain at a specific spreading factor. The Code Domain Error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The Peak Code Domain Error is defined as the maximum value for the Code Domain Error for all codes. The measurement interval is one power control group (timeslot).

6.7.3.2 Conformance requirement

The peak code domain error shall not exceed -33 dB at spreading factor 256.

6.7.3.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.3.2

6.7.3.4 Method of test

6.7.3.4.1 Initial conditions

1) Connect the measurement equipment to the BS antenna connector as shown in annex B. For non-transmit diversity modes, connect the antenna connector as shown in Figure B.2. If STTD or TxAA is supported by the BS, connect both antenna connectors as shown in Figure B.7.

2) Channel configuration defined in subclause 6.1.1.3 Test model 3 shall be used.

<Suggested Editor's Note: Changes to Test model 3 for TD tests are ffs>

3) Set BS frequency.

4) Start BS transmission

6.7.3.4.2 Procedure

1) Set power as defined in subclause 6.1.1.3 Test model 3 for each code channel.

2) Measure Peak code domain error.

6.7.3.5 Test requirement

Peak code domain error shall meet the requirement as specified in subclause 6.7.3.2.

[…]

B.1.6 EVM measurement

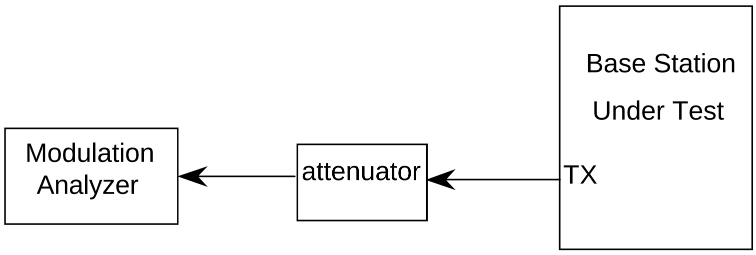

Figure B.6: Measuring system Set-up for EVM test

B.1.7 Peak code domain error for the transmit diversity modes

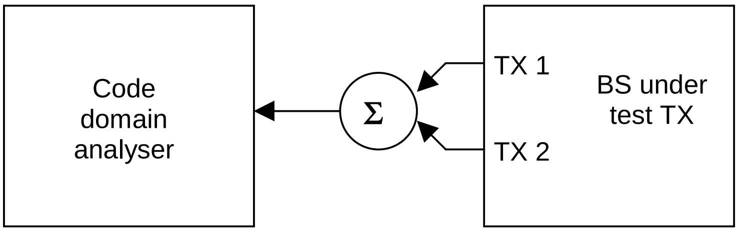

Figure B.7: Measuring system Set-up for peak code domain error measurements for transmit diversity modes

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25.141	**CR**	**44**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-05

Subject: Corrections to spectrum mask measurement method

Work item:

Category:				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change: To simply the spectrum mask measurement method.

Clauses affected: 6.5.2.1.4

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	Other GSM core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments:

6.5.2.1.4 Method of test

6.5.2.1.4.1 Initial conditions

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

2) Measurements with an offset from the carrier centre frequency between 2,515 MHz and 4.0 MHz shall use a 30 kHz measurement bandwidth. The first and last measurement positions with a 30 kHz filter shall be 2,515 MHz and 4.0 MHz.

3) Measurements with an offset from the carrier centre frequency between 4.0 MHz and (Δf_{max} – 500 kHz).shall use a 1 MHz measurement bandwidth. The 1MHz measurement bandwidth may be calculated by integrating multiple 50 kHz or narrower filter measurementsThe first and last measurement positions with 1 MHz measurement band, when 1MHz band is integrated with 50 kHz measurement filter or narrower, shall be 4.0 MHz and 8.0 MHz.

4) The first and last measurement positions with a 1 MHz filter shall be 8.0 MHz and (Δf_{max} – 500 kHz).

45) Detection mode: True RMS.

TSG-RAN Working Group 4, meeting #13
Turin, Italy, 04-08 September 2000

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25.141	**CR**	**45**	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
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Source: RAN WG4 **Date:**

Subject: Test model clarifications

Work item:

Category:				**Release:**	
	F	Correction	X	Phase 2	
	A	Corresponds to a correction in an earlier release		Release 96	
(only one category shall be marked with an X)	B	Addition of feature		Release 97	
	C	Functional modification of feature		Release 98	
	D	Editorial modification		Release 99	X
				Release 00	

Reason for change: Corrects the number of bits to be used as seed for PN generation and clarifies the order of the bits in the PICH test model.

Clauses affected: 6.1.1.4 & 6.1.1.5.2

Other specs affected:				
	Other 3G core specifications		→ List of CRs:	
	Other GSM core specifications		→ List of CRs:	
	MS test specifications		→ List of CRs:	
	BSS test specifications		→ List of CRs:	
	O&M specifications		→ List of CRs:	

Other comments:

6.1.1.4 DPCH Structure of the Downlink Test Models

For the above test models the following structure is adopted for the DPCH. The DPDCH and DPCCH have the same power level. The timeslot structure should be as described by TS 25.211-slot format 10 and 6 that are reproduced in table 6.7.

Table 6.7: DPCH structure of the downlink test models

Slot Format #I	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/Frame			Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot		
				DPDCH	DPCCH	TOT		NData1	Ndata2	NTFCI	NTPC	Npilot
10	60	30	128	450	150	600	40	6	24	0	2	8
6	30	15	256	150	150	300	20	2	8	0	2	8

The test DPCH has frame structure so that the pilot bits are defined over 15 timeslots according to the relevant columns of TS 25.211, which are reproduced in table 6.8.

Table 6.8: Frame structure of DPCH

	Npilot = 8			
Symbol #	**0**	**1**	**2**	**3**
Slot #0	11	11	11	10
1	11	00	11	10
2	11	01	11	01
3	11	00	11	00
4	11	10	11	01
5	11	11	11	10
6	11	11	11	00
7	11	10	11	00
8	11	01	11	10
9	11	11	11	11
10	11	01	11	01
11	11	10	11	11
12	11	10	11	00
13	11	00	11	11
14	11	00	11	11

The TPC bits alternate 00 / 11 starting with 00 in timeslot 0.

The aggregate 15 x 30 = 450 DPDCH bits per frame are filled with a PN9 sequence generated using the primitive trinomial $x^9 + x^4 + 1$. To ensure non-correlation of the PN9 sequences, each DPDCH shall use its channelisation code as the seed for the PN sequence at the start of each frame, according to its timing offset.

The sequence shall be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. The generator shall be seeded so that the sequence begins with the ~~7 bit~~ channelisation code starting from the LSB, and followed by 2 consecutive ONEs for SF=128 and 1 consecutive ONE for SF=256.

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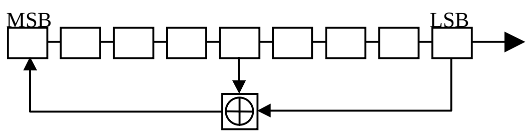

Figure 6.2

6.1.1.5 Common channel Structure of the Downlink Test Models

6.1.1.5.1 P-CCPCH

The aggregate 15 x 18 = 270 P-CCPCH bits per frame are filled with a PN9 sequence generated using the primitive trinomial $x^9 + x^4 + 1$. Channelisation code of the P-CCPCH is used as the seed for the PN sequence at the start of each frame.

The generator shall be seeded so that the sequence begins with the 8 bit channelisation code starting from the LSB, and followed by a ONE.

6.1.1.5.2 PICH

PICH carries 18 Paging Indicators (PI) sent in the following sequence from left to rightequals to [1 0 1 1 0 0 0 1 0 1 1 0 0 0 1 0 1 0]., This defines the 288 first symbols (= ± 1 ± j) of the PICH. No power is transmitted for the 12 remaining unused symbols (=0).

6.1.1.5.3 Primary scrambling code and SCH

The scrambling code should be 0.

Where multiple repetitions of the Test Model signals are being used to simulate a multi-carrier signal, the scrambling code for the central carrier should be 0, carriers added at successively lower frequencies should use codes 2, 4, ... and carriers added at successively higher frequencies should use codes 1, 3, ...

The scrambling code defines the SSC sequence of the secondary SCH. In their active part, primary and secondary SCH share equally the power level defined for "PCCPCH+SCH".

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Torino, Italy, 4 – 8 Sep, 2000

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25.141	**CR**	**46**	Current Version:	3.2.0

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Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-01

Subject: Clarifications of modulation accuracy and code domain error tests for TD operation

Work item:

Category: *(only one category shall be marked with an X)*				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
	B	Addition of feature			Release 97	
	C	Functional modification of feature			Release 98	
	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:

- Grammatical improvement
- CPCH power tolerances should be stated together with RACH.
- Editorial correction to diagrams to show averaging periods correctly

Clauses affected: 6.7, B.1

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	Other GSM core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.7.2 Error Vector Magnitude

6.7.2.1 Definition and applicability

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

6.7.2.2 Conformance Requirement

The Error Vector Magnitude shall be less than 17.5%

6.7.2.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.2.2

6.7.2.4 Method of Test

Refer to annex B for a functional block diagram of the test set-up.

1) Connect the base station RF output port to the modulation analyzer with root raised cosine filter function.

2) Set the base station to transmit a signal modulated with PCCPCH on the main path only. Total power at the RF output port shall be Pmax-3dB and Pmax-18dB.

3) Trigger the test equipment from the system time reference signal from the base station.

<Editor's note: Precise definition of "Triggering signal" shall be needed.>

4. Measure the Error Vector Magnitude as defined in 6.7.2.1.

5. If the base station supports STTD or TxAA, repeat steps 1 through 4 with the diversity path (antenna connector 2) enabled instead of the main path.

6.7.2.5 Test Requirement

The Error Vector Magnitude measured in 6.7.2.4 step 4 shall meet the limit specified in 6.7.2.2

6.7.3 Peak Code Domain Error

6.7.3.1 Definition and applicability

The Peak Code Domain Error is computed by projecting the power of the error vector (as defined in 6.7.2) onto the code domain at a specific spreading factor. The Code Domain Error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The Peak Code Domain Error is defined as the maximum value for the Code Domain Error for all codes. The measurement interval is one power control group (timeslot).

6.7.3.2 Conformance requirement

The peak code domain error shall not exceed -33 dB at spreading factor 256.

6.7.3.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.3.2

6.7.3.4 Method of test

6.7.3.4.1 Initial conditions

1) Connect the measurement equipment to the BS antenna connector as shown in annex B. For non-transmit diversity modes, connect the antenna connector as shown in Figure B.2. If STTD or TxAA is supported by the BS, connect both antenna connectors as shown in Figure B.7.

2) Channel configuration defined in subclause 6.1.1.3 Test model 3 shall be used.

<Suggested Editor's Note: Changes to Test model 3 for TD tests are ffs>

3) Set BS frequency.

4) Start BS transmission

6.7.3.4.2 Procedure

1) Set power as defined in subclause 6.1.1.3 Test model 3 for each code channel.

2) Measure Peak code domain error.

6.7.3.5 Test requirement

Peak code domain error shall meet the requirement as specified in subclause 6.7.3.2.

[…]

B.1.6 EVM measurement

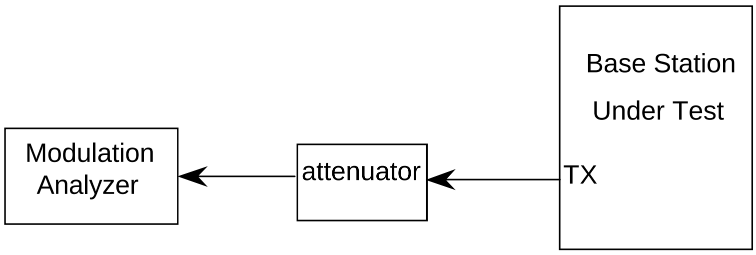

Figure B.6: Measuring system Set-up for EVM test

B.1.7 Peak code domain error for the transmit diversity modes

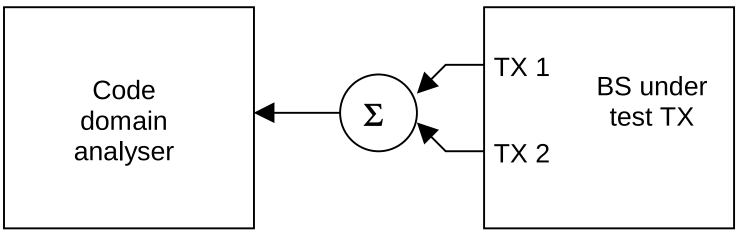

Figure B.7: Measuring system Set-up for peak code domain error measurements for transmit diversity modes

3GPP TSG RAN WG4 Meeting #13
Torino, Italy, 4 – 8 Sept 2000

Document R4-000666
e.g. for 3GPP use the format TP-99xxx
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CHANGE REQUEST

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25.141 CR 47 Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG RAN #9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-08

Subject: Clarification of applicability of environmental range spec in section 4

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: The original text taken fro GSM specifications excluded the context making this section somewhat ambiguous as to its application ot the DUT or the test equipment.

Clauses affected: 4.1.1

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

4.1.1 Measurement of Ttest environments

The measurement accuracy of the BS test environments defined in Subclause 4.4, Test environments shall be.

- Pressure ±5 kPa.
- Temperature ±2 degrees.
- Relative Humidity ±5 %.
- DC Voltage ±1,0 %.
- AC Voltage ±1,5 %.
- Vibration 10 %.
- Vibration frequency 0,1 Hz.

The above values shall apply unless the test environment is otherwise controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

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San Diego, USA, 29 Feb - 3 Mar 2000

***Document* R4-000670**
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25.141 CR 48 Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG RAN #9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-04

Subject: Clarification of "confidence level of 95%" in section 4.1

Work item:

Category:				**Release:**	
	F	Correction		Phase 2	
	A	Corresponds to a correction in an earlier release		Release 96	
(only one category	B	Addition of feature		Release 97	
shall be marked	C	Functional modification of feature		Release 98	
with an X)	D	Editorial modification	X	Release 99	X
				Release 00	

Reason for change: The current wording is vague and could lead to inconsistent interpretation

Clauses affected: 4.1

Other specs affected:			
Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments: Identical change needed for section 5.9.5 of 25.142

4.1 Acceptable uncertainty of measurement equipment

The maximum acceptable uncertainty of measurement equipment is specified separately for each test, where appropriate. The measurement equipment shall enable the stimulus signals in the test case to be adjusted to within the specified tolerance, and the conformance requirement to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

It should be noted that the stated uncertainties in subclause 4.1 apply to the test equipment only and do not include system effects due to mismatch between the DUT and the test equipment.

3GPP TSG RAN WG4 Meeting #13
Torino, Italy
4-8 September 2000

***Document* R4-00760**
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25.141 CR 49 Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG RAN#9
list expected approval meeting # here ↑

for approval	X	strategic		*(for SMG use only)*	
for information		non-strategic			

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-07

Subject: Corrections to test models in TS 25.141

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: The method of generating multi-carrier signals produces an unusually high peak to average ratio.

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.1.1.5.3 Primary scrambling code and SCH

The scrambling code should be 0.

Where multiple repetitions of the Test Model signals are being used to simulate a multi-carrier signal, the scrambling code for the lower frequency is 0. Carriers added at successively higher frequencies use codes 1, 2,... and their frame structures are time offset by 1/5, 2/5... of a time slot duration.

the scrambling code for the central carrier should be 0, carriers added at successively lower frequencies should use codes 2, 4, ... and carriers added at successively higher frequencies should use codes 1, 3, ...

The scrambling code defines the SSC sequence of the secondary SCH. In their active part, primary and secondary SCH share equally the power level defined for "PCCPCH+SCH".

3GPP TSG RAN WG4 Meeting #13
Torino, Italy, 4 - 8 Sep 2000

***Document* R4-000693**
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25.141 CR 50 Current Version: 3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: RAN#9	For approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	For information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: RAN WG4 **Date:** 2000-09-05

Subject: Tap magnitudes and phases for Birth-Death propagation conditions

Work item:

Category: *(only one category Shall be marked With an X)*

			Release:	
F	Correction	X	Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: Finalise propagation conditions for the FDD mode.

Clauses affected: Annex D.4

Other specs Affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

D.4 Birth-Death propagation conditions

The dynamic propagation conditions for the test of the baseband performance is a non fading propagation channel with two taps. The moving propagation condition has two taps, Path1 and Path2 which alternate between 'birth' and 'death'. The positions the paths appear are randomly selected with an equal probability rate and is shown in figure D.2.

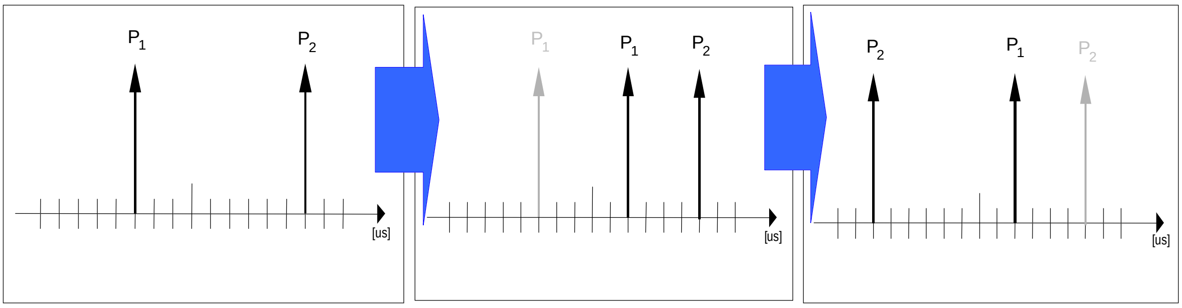

Figure D.2: Birth death propagation sequence

NOTE 1.: Two paths, Path1 and Path2 are randomly selected from the group [-5, -4, -3, -2, -1, 0 ,1, 2, 3, 4, 5] µs. The paths have equal magnitudesstrengths and equal phases.

NOTE 2.: After 191 ms, Path1 vanishes and reappears immediately at a new location randomly selected from the group [-5, -4, -3, -2, -1, 0 ,1, 2, 3, 4, 5] µs but excludes the point Path2. The magnitudes and the phases of the tap coefficients of Path 1 and Path 2 shall remain unaltered.

NOTE 3.: After an additional 191 ms, Path2 vanishes and reappears immediately at a new location randomly selected from the group [-5, -4, -3, -2, -1, 0 ,1, 2, 3, 4, 5] µs but excludes the point Path1. The magnitudes and the phases of the tap coefficients of Path 1 and Path 2 shall remain unaltered.

NOTE 4.: The sequence in 2) and 3) is repeated.