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Technical Specification

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Contents

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Foreword

This Technical Specification has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 Indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the specification;

1. Scope

The present document specifies the Radio Frequency (RF) test methods and conformance requirements for UTRA Base Stations (BS) operating in the FDD mode. These have been derived from, and are consistent with the UTRA base station (BS) specifications defined in [1].

This document establishes the minimum RF characteristics of the FDD mode of UTRA for the Base Station(BS .

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, subsequent revisions do apply.

A non-specific reference to a TS shall also be taken to refer to later versions published as an EN with the same number.

[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 (1994-12) 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 (1995-01) 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 (1990-05) Environmental testing - Part 2: Tests. Tests A: Cold

[9] IEC 60068-2-2 (1974-01) Environmental testing - Part 2: Tests. Tests B: Dry heat

[10] IEC 60068-2-6 (1995-03) 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 definitions apply:

Power Setting	The 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	The 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	The instantaneous power of the RF envelope which is not expected to be exceeded for [99.9%] of the time
Maximum peak power	The peak power observed when operating at a given maximum output power.
Average transmit power	The average transmitter output power obtained over any specified time interval, including periods with no transmission.
Maximum average power	The 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 Symbols

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

<symbol> <Explanation>

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
BS	Base Station
BER	Bit Error Ratio
BLER	Block Error Ratio
CW	Continuous Wave (unmodulated signal)
DL	Down Link (forward link)
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
MER	Message Error Rate
PPM	Parts Per Million
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up Link (reverse link)
UTRA	UMTS Terrestrial Radio Access

Chip Rate	Chip rate of W-CDMA system, equals to 3.84 M chips per second.
SCCPCH	Secondary Common Control Physical Channel.
$SCCPCH\_E_c$	Average energy per PN chip for SCCPCH.
DPCH	Dedicated Physical Channel
DCH	Dedicated Channel, which is mapped into Dedicated Physical Channel. DCH contains the data.
E_b	Average energy per information bit for the PCCPCH, SCCPCH and DPCH, at the antenna connector.
E_c	Average energy per PN chip.

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.
PCCPCH	Primary Common Control Physical Channel
PCH	Paging Channel
RSCP	Given only signal power is received, the average power of the received signal after despreading and combining

3.4 Radio Frequency bands

3.4.1 Frequency bands

UTRA/FDD is designed to operate in either of the following paired bands;

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

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

* Used in Region 2

Additional allocations in ITU region 2 are FFS.

Deployment in other frequency bands is not precluded.

3.4.2 TX–RX frequency separation

(a) The minimum transmit to receive frequency separation is 134.8 MHz and the maximum value is 245.2 MHz and all UE(s) shall support a TX –RX frequency separation of 190 MHz when operating in the paired band defined in sub-clause 3.4.1(a).

(b) UTRA/FDD can support both fixed and variable transmit to receive frequency separation.

(c) When operating in the paired band defined in sub-clause 3.4.1(b), all UE(s) shall support a TX – RX frequency separation of 80 MHz.

(d) The use of other transmit to receive frequency separations in existing or other frequency bands shall not be precluded.

3.5 Channel arrangement

3.5.1 Channel spacing

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

3.5.2 Channel raster

The channel raster is 200 kHz, which means that the center frequency must be an integer multiple of 200 kHz.

3.5.3 Channel number

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

Table 3.1: UTRA Absolute Radio Frequency Channel Number

Uplink	$N_u = 5 * (F_{uplink}$ MHz)	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where F_{uplink} is the uplink frequency in MHz
Downlink	$N_d = 5 * (F_{downlink}$ MHz)	0.0 MHz ≤ $F_{downlink}$ ≤3276.6 MHz where $F_{downlink}$ is the downlink frequency in MHz

4. General test conditions and declarations

The requirements of this clause apply to all tests in this TS, when applicable.

Many of the tests in this TS measure a parameter relative to a value which is not fully specified in the UTRA specifications. For these tests, the conformance requirement is determined relative to a nominal value specified by the manufacturer.

Certain functions of a BS are optional in the UTRA specifications.

When specified in a test, the manufacturer shall declare the nominal value of a parameter, or whether an option is supported.

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.

4.1.1 Test environments

Subclause 4.4, Test environments:

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 controlled and the specification for the control of the test environment specifies the uncertainty for the parameter.

4.1.2 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: 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: 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: 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
$2.5 \leq \Delta f < 2.7$ MHz		±[1.5] dB
$2.7 \leq \Delta f < 3.5$ MHz		±[1.5] dB
$3.5 \leq \Delta f < 7.5$ MHz		±[1.5] dB
$7.5 \leq \Delta f \leq \Delta f_{max}$ 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 ±[2.0] dB

Conformance requirements outside BS and coexistence receive bands:

Emission power:

f ≤ 2.2 GHz	± 1.5 dB
2.2 GHz < f ≤ 4 GHz	± 2.0 dB
f > 4 GHz	±4.0 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

4.1.3 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

4.1.4 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 Interpretation of measurement results

Compliance with the requirement is determined by comparing the measured value (or derived value from the measured one) with the specified limit, without making allowance for measurement uncertainty.

The measurement uncertainty for the measurement of each parameter shall be included in the test report.

The recorded value for the measurement uncertainty shall be, for each measurement, equal to or lower than the appropriate figure in subclause 4.1 of this TS.

If the measurement apparatus 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 adjustment is made by subtracting the modulus of the specified measurement uncertainty in subclause 4.1 from the measurement uncertainty of the apparatus. The measured value is then increased or decreased by the result of the subtraction, whichever is most unfavourable in relation to the limit.

4.3 Output power and determination of power class

The requirements in this specification apply to base station intended for general-purpose applications.

In the future further classes of base stations may be defined; the requirements for these may be different than for general-purpose applications.

4.4 Test environments

For each test in the present document, the environmental conditions under which the BS is to be tested are defined:

4.4.1 Normal test environment

When a normal test environment is specified for a test, the test should be performed within the minimum and maximum limits of the conditions stated in table below:

Table 4.2: Limits of conditions for Normal Test Environment

Condition	Minimum	Maximum
Barometric pressure	86 kPa	106 kPa
Temperature	15°C	30°C
Relative Humidity	20%	85%
Power supply	Nominal, as declared by the manufacturer	
Vibration	Negligible	

The ranges of barometric pressure, temperature and humidity represent the maximum variation expected in the uncontrolled environment of a test laboratory. If it is not possible to maintain these parameters within the specified limits, the actual values shall be recorded in the test report.

Note: This may, for instance, be the case for measurements of radiated emissions performed on an open field test site.

4.4.2 Extreme test environment

The manufacturer shall declare one of the following:

1) The equipment class for the equipment under test, as defined in the IEC 60 721-3-3[6].

2) The equipment class for the equipment under test, as defined in the IEC 60 721-3-4[7].

3) The equipment that dose not comply to the mentioned classes, the relevant classes from

IEC 60 721 documentation for Temperature, Humidity and Vibration shall be declared.

Note: Reduced functionality for conditions that fall out side of the standard operational conditions are not tested in the present document. These may be stated and tested separately.

4.4.2.1 Extreme temperature

When an extreme temperature test environment is specified for a test, the test shall be performed at the standard minimum and maximum operating temperatures defined by the manufacturer´s declaration for the equipment under test.

Minimum temperature:

The test shall be performed with the environment test equipment and methods including the required environmental phenomena into the equipment, conforming to the test procedure of IEC 60 068-2-1[8].

Maximum temperature:

The test shall be performed with the environmental test equipment and methods including the required environmental phenomena into the equipment, conforming to the test procedure of IEC 60 068-2-2[9].

Note: It is recommended that the equipment is made fully operational prior to the equipment being taken to its lower operating temperature.

4.4.3 Vibration

When vibration conditions are specified for a test, the test shall be performed while the equipment is subjected to a vibration sequence as defined by the manufacturer`s declaration for the equipment under test. This shall use the environmental test equipment and methods of inducing the required environmental phenomena in to the equipment, conforming to the test procedure of IEC 60 068-2-6[10]. Other environmental conditions shall be within the ranges specified in subclause 4.4.1.

Note: The higher levels of vibration may induce undue physical stress in to equipment after a prolonged series of tests. The testing body should only vibrate the equipment during the RF measurement process.

4.4.4 Power supply

When extreme power supply conditions are specified for a test, the test shall be performed at the standard upper and lower limits of operating voltage defined by manufacturer's declaration for the equipment under test

Upper voltage limit

The equipment shall be supplied with a voltage equal to the upper limit declared by the manufacturer (as measured at the input terminals to the equipment). The tests shall be carried out at the steady state minimum and maximum temperature limits declared by the manufacturer for the equipment, to the methods described in IEC 60 068-2-1[8] Test Ab/Ad and IEC 60 068-2-2[9] Test Bb/Bd: Dry Heat.

Lower voltage limit

The equipment shall be supplied with a voltage equal to the lower limit declared by the manufacturer (as measured at the input terminals to the equipment). The tests shall be carried out at the steady state minimum and maximum temperature limits declared by the manufacturer for the equipment, to the methods described in IEC 60 068-2-1[8] Test Ab/Ad and IEC 60 068-2-2[9] Test Bb/Bd: Dry Heat.

4.5 Selection of configurations for testing

Most tests in this TS are only performed for a subset of the possible combinations of test conditions. For instance:

- Not all transceivers in the configuration may be specified to be tested.
- Only one RF channel may be specified to be tested.
- Only one timeslot may be specified to be tested.

When a test is performed by a test laboratory, the choice of which combinations are to be tested shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the choice of which combinations are to be tested may be specified by an operator.

4.6 BS Configurations

4.6.1 Receiver diversity

i) For the tests in clause 7 of this TS, the specified test signals may be applied to one receiver antenna connector, with the remaining receiver antenna connectors being terminated with 50 ohms.

or

ii) For the tests in clause 7 of this TS, the specified test signals may be simultaneously applied to each of the receiver antenna connectors.

4.6.2 Duplexers

The requirements of this TS shall be met with a duplexer fitted, if a duplexer is supplied as part of the BS. If the duplexer is supplied as an option by the manufacturer, sufficient tests should be repeated with and without the duplexer fitted to verify that the BS meets the requirements of this TS in both cases.

The following tests should be performed with the duplexer fitted, and without it fitted if this is an option:

1) Subclause 6.2.1 Base station maximum output power, for the highest static power step only, if this is measured at the antenna connector.

2) Subclause 6.5, Output RF spectrum emissions; outside the BS transmit band.

3) Subclause 6.5.3.7, Protection of the BS receiver.

4) Subclause 6.6, Transmit intermedulation; for the testing of conformance, the carrier frequencies should be selected to minimize intermodulation products from the transmitters falling in receive channels.

The remaining tests may be performed with or without the duplexer fitted.

NOTE 1: When performing receiver tests with a duplexer fitted, it is important to ensure that the output from the transmitters does not affect the test apparatus. This can be achieved using a combination of attenuators, isolators and filters.

NOTE 2: When duplexers are used, intermodulation products will be generated, not only in the duplexer but also in the antenna system. The intermodulation products generated in the antenna system are not controlled by 3GPP specifications, and may degrade during operation (e.g. due to moisture ingress). Therefore, to ensure continued satisfactory operation of a BS, an operator will normally select ARFCNs to minimize intermodulation products falling on receive channels. For testing of complete conformance, an operator may specify the ARFCNs to be used.

4.6.3 Power supply options

If the BS is supplied with a number of different power supply configurations, it may not be necessary to test RF parameters for each of the power supply options, provided that it can be demonstrated that the range of conditions over which the equipment is tested is at least as great as the range of conditions due to any of the power supply configurations.

This applies particularly if a BS contains a DC rail which can be supplied either externally or from an internal mains power supply. In this case, the conditions of extreme power supply for the mains power supply options can be tested by testing only the external DC supply option. The range of DC input voltages for the test should be sufficient to verify the performance with any of the power supplies, over its range of operating conditions within the BS, including variation of mains input voltage, temperature and output current.

4.6.4 Ancillary RF amplifiers

<Table from GSM11.21 will be here. Note on passive elements should be here.>

Ancillary RF amplifier: a piece of equipment, which when connected by RF coaxial cables to the BS, has the primary function to provide amplification between the transmit and/or receive antenna connector of a BS and an antenna without requiring any control signal to fulfil its amplifying function.

The requirements of this TS shall be met with the ancillary RF amplifier fitted. At tests according to clause 6 and 7 for TX and RX respectively, the ancillary amplifier is connected to the BS by a connecting network (including any cable(s), attenuator(s), etc.) with applicable loss to make sure the appropriate operating conditions of the ancillary amplifier and the BS. The applicable connecting network loss range is declared by the manufacturer. Other characteristics and the temperature dependence of the attenuation of the connecting network are neglected. The actual attenuation value of the connecting network is chosen for each test as one of the applicable extreme values. The lowest value is used unless otherwise stated.

Sufficient tests should be repeated with the ancillary amplifier fitted and, if it is optional, without the ancillary RF amplifier to verify that the BS meets the requirements of this TS in both cases.

When testing, the following tests should be repeated with the optional ancillary amplifier fitted according to the table below, where x denotes that the test is applicable:

Table 4.3

	Subclause	TX amplifier only	RX amplifier only	TX/RX amplifiers combined (Note)
Receiver Tests			x	X
			x	X
			x	X
			x	
Transmitter Tests		x		X
		x		X
		x		X
		x		X
		x		X

<Editor's note: To be filled in. >

NOTE: Combining can be by duplex filters or any other network. The amplifiers can either be in RX or TX branch or in both. Either one of these amplifiers could be a passive network.

In test according to subclause [6.2] and [7.2] highest applicable attenuation value is applied.

4.6.5 BS using antenna arrays

A BS may be configured with a multiple antenna port connection for some or all of its transceivers or with an antenna array related to one cell (not one array per transceiver). This section applies to a BS which meets at least one of the following conditions:

- The transmitter output signals from one or more transceiver appear at more than one antenna port, or
- there is more than one receiver antenna port for a transceiver or per cell and an input signal is required at more than one port for the correct operation of the receiver (NOTE: diverstity reception does not meet this requirement) thus the outputs from the transmitters aswell as the inputs to the receivers are directly connected to several antennas (known as „aircombining"), or
- transmitters and receivers are connected via duplexers to more than one antenna

If a BS is used, in normal operation, in conjunction with an antenna system which contains filters or active elements which are necessary to meet the UTRA requirements, the conformance tests may be performed on a system comprising the BS together with these elements, supplied separately for the purposes of testing. In this case, it must be demonstrated that the performance of the configuration under test is representative of the system in normal operation, and the conformance assessment is only applicable when the BS is used with the antenna system.

For conformance testing of such a BS, the following procedure may be used:

4.6.5.1 Receiver tests

For each test, the test signals applied to the receiver antenna connectors shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) specified in the test.

An example of a suitable test configuration is shown in Fig. 4.1.

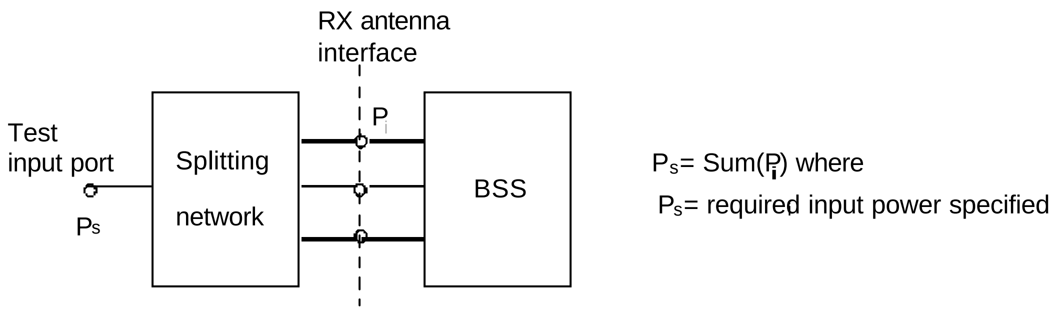

Fig. 4.1 Receiver test setup

For spurious emissions from the receiver antenna connector, the test may be performed separately for each receiver antenna connector.

4.6.5.2 Transmitter tests

For each test, the test signals applied to the transmitter antenna connectors **(P_i)** shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) **(P_s)** specified in the test. This may be assessed by separately measuring the signals emitted by each antenna connector and summing the results, or by combining the signals and performing a single measurement. The characteristics (e.g. amplitude and phase) of the combining network should be such that the power of the combined signal is maximised.

An example of a suitable test configuration is shown in Fig. 4.2.

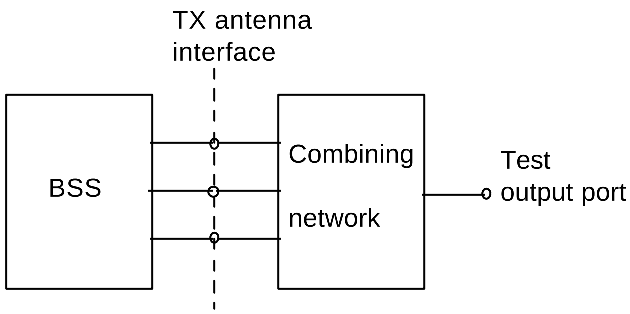

Fig. 4.2 Transmitter test setup

For Intermodulation attenuation, the test may be performed separately for each transmitter antenna connector.

5 Format and interpretation of tests

Each test in the following clauses has a standard format:

X Title

All tests are applicable to all equipment within the scope of this specification, unless otherwise stated.

X.1 Test conditions and measurement method

This sub-clause describes the steps necessary to perform the test.

X.2 Minimum requirement

This subclause describes the requirement which shall be met for the specified tests.

6 Transmitter

6.1 General

All tests in this Clause shall be conducted on Base Station fitted with a full complement of Transceivers for the configuration unless otherwise stated. Transmission power shall be at the maximum output power unless otherwise stated. Measurements shall be made at the BS Tx antenna connector, unless otherwise stated.Power levels are expressed in dBm.

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. The physical channels for the following test(s) shall be setup according to the test model specified in 6.2.1.1..

6.2.1 Base station maximum output power

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.

6.2.1.1 Test Conditions and measurement method

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

2. Set the base station to transmit a signal modulated with a combination of PCCPCH, SCCPCH and Dedicated Physical Channels as stated bellow.

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

The setup of physical channels for transmitter tests shall be according to one of the test models below. A reference to the applicable table is made with each test. The mean overall output power to be transmitted, is specified with each test.

6.2.1.1.1 Test Model 1

This model shall be used for tests on,

- spectrum emission mask
- ACLR
- spurious emissions
- transmit intermodulation
- modulation accuracy

Table 6.1. Test Model 1 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH (SF=128)	16/32/64	76.8 in total	See Table 6.2	See Table 6.2	See Table 6.2

Table 6.2. DPCH Spreading Code, Toffset and Power for Test Model 1

Code	Toffset	Code Power (dB) (16 codes)	Code Power (dB) (32 codes)	Code Power (dB) (64 codes)
2	2	-10.4	-13.0	-15.6
11	0	-11.1	-13.3	-15.7
17	2	-12.0	-13.9	-16.1
23	1	-14.2	-14.9	-16.8
31	6	-11.4	-16.8	-18.0
38	1	-13.0	-14.1	-20.0
47	7	-16.5	-15.6	-15.9
55	6	-15.6	-18.0	-16.5
62	1	-12.5	-16.2	-17.4
69	9	-15.3	-19.4	-19.0
78	1	-13.7	-17.1	-21.7
85	0	-17.6	-14.6	-20.3
94	0	-18.8	-16.5	-16.3
102	0	-16.9	-20.3	-17.2
113	5	-15.0	-20.6	-18.6
119	2	-9.4	-23.6	-20.8
7	3		-19.8	-18.5
13	4		-17.6	-20.5
20	2		-13.7	-17.9
27	5		-14.4	-19.7
35	9		-15.9	-24.3
41	1		-18.8	-24.0
51	7		-18.2	-22.4
58	2		-16.7	-21.0
64	5		-21.5	-18.2
74	5		-19.1	-20.2
82	8		-18.6	-16.7
88	1		-15.8	-17.7
97	9		-18.4	-19.4
108	4		-15.4	-23.0
117	9		-17.4	-22.1
125	3		-12.4	-20.5
4	6			-17.0
9	5			-18.3
12	2			-20.4
14	7			-17.3
19	8			-18.8
22	4			-21.3
26	4			-19.3
28	3			-22.6
34	5			-21.6

36	8	-19.5
40	0	-23.8
44	0	-22.8
49	2	-21.4
53	7	-19.1
56	1	-21.9
61	8	-20.7
63	2	-17.6
66	3	-19.2
71	6	-22.2
76	9	-21.2
80	3	-18.7
84	2	-21.1
87	5	-18.9
91	0	-21.5
95	9	-19.8
99	2	-25.0
105	9	-25.0
110	3	-24.8
116	3	-23.5
118	6	-21.8
122	2	-20.1
126	8	-15.3

6.2.1.1.2 Test Model 2

This model shall be used for tests on,

- output power dynamics

Table 6.3. Test Model 2 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH (SF=128)	7	7 x 10.97	7 x -9.6	24,40,56,72, 88,104,120	1,3,5,7, 6,4,2

6.2.1.1.3 Test Model 3

This model shall be used for tests on,

- peak code domain error

Table 6.4. Test Model 3 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH	16/32	76.8 in total	See Table 6.5	See Table 6.5	See Table

(SF=256)					6.5

Table 6.5. DPCH Spreading Code, Toffset and Power for Test Model 3

Code	T_{offset}	Code Power (dB) (16 codes)	Code Power (dB) (32 codes)
64	2	-13.2	-16.2
69	0	-13.2	-16.2
74	2	-13.2	-16.2
78	1	-13.2	-16.2
83	6	-13.2	-16.2
89	1	-13.2	-16.2
93	7	-13.2	-16.2
96	6	-13.2	-16.2
100	1	-13.2	-16.2
105	9	-13.2	-16.2
109	1	-13.2	-16.2
111	0	-13.2	-16.2
115	0	-13.2	-16.2
118	0	-13.2	-16.2
122	5	-13.2	-16.2
125	2	-13.2	-16.2
67	3		-16.2
71	4		-16.2
76	2		-16.2
81	5		-16.2
86	9		-16.2
90	1		-16.2
95	7		-16.2
98	2		-16.2
103	5		-16.2
108	5		-16.2
110	8		-16.2
112	1		-16.2
117	9		-16.2
119	4		-16.2
123	9		-16.2
126	3		-16.2

6.2.1.1.4 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 25.211-300 section 5.3.2 Table 11-slot format 10 that is reproduced in Table 6.6 below.

Table 6.6 DPCH structure of the downlink test models

Slot Format	Channel Bit	Channel Symbol	SF	Bits/Frame			Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot		
#I	Rate (kbps)	Rate (ksps)		DPDCH	DPCCH	TOT		NData 1	Ndata 2	NTFCI	NTPC	NPilot

10	60	30	128	450	150	600	40	6	24	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 25.211-300 section 5.3.2 Table 12, which are reproduced in Table 6.7 below.

Table 6.7 Frame structure of DPCH

	N_{pilot} = 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.

6.2.1.2 Minimum requirement

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

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

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 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 chapter 4.4.

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

Disable inner loop power control

Setup BS transmission at maximum total power as specified by the supplier. Channel setup shall be according to 6.2.1.1.2.

6.2.2.4.2 Procedure

With the Code Domain Analyser measure the power in the PCCPCH and PCPICH.

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 absolut value.

6.3 Frequency stability

Frequency stability is ability of the BS to transmit at the assigned carrier frequency.

6.3.1 Test conditions and measurement method

Frequency stability shall be measured by sampling the transmitter RF output.

1. Connect the frequency measuring equipment to the base station RF output port.
2. Set the base station to transmit a modulated signal continuously with constant average power.
3. Measure the mean frequency at the RF output port.

6.3.2 Minimum requirement

The modulated carrier frequency of the BS shall be accurate to within ± 0.05 PPM for RF frequency generation.

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 setup according to 6.2.1.1.2.

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 1dB 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 Tabke 6,8.
(b) The tolerance of the combined output power change due to inner loop power control shall be within the range shown in Table 6.9.

Table 6.8: 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 6.9: 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 [1] TS25.104 clause 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 clause 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 6.10

Table 6.10

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. Power level for code channels, except the code channel under the test, shall be adjusted as necessary.

2) Measure mean power level of the code under the test each time TPC command is transmitted. All steps within power control dynamic range shall be measured.

3) Measure 10 highest and 10 lowest power step levels and 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 clause 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 clause 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 TS25.104 clause 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 [1] TS25.104 chapter 6.4.2.1

6.4.3.3 Test purpose

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

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 clause 6.4.3.2.

6.4.4 Total power dynamic range

6.4.4.1 Definition and applicability

The total power dynamic range is difference between the maximum and the minimum transmit output power for a specified reference condition.

6.4.4.2 Conformance requirement

The down link (DL) total power dynamic range shall be 18 dB or greater. The reference for this requirement is [1] TS25.104 chapter 6.4.3.1

6.4.4.3 Test purpose

To verify that the total power dynamic range as specified in TS25.104clause 6.4.3.1 The test is to ensure that the total output power can be reduced while still transmitting a single code. This is to ensure that the interference to neighbouring cells is reduced.

<Editor's note: The rationale of the requirement should be clarified. >

6.4.4.4 Method of test

6.4.4.4.1 Initial requirement

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 [but without traffic channel] shall be used

<Editor's note: The conditions should be clarified. >

3) Set BS frequency

4) Start BS transmission

6.4.4.4.2 Procedure

1) Pmax shall be defined as described in clause 6.2.1 Base station maximum output power

2) Set the power level of the code channels such that BS output power level is 18 dB lower than BS maximum output power. All code channels shall use same power level.

3) Measure the mean transmission power level

6.4.4.5 Test requirement

BS shall achieve total power dynamic range as specified in clause 6.4.3.2 .

6.5 Output RF spectrum emissions

The physical channels for the following test(s) shall be setup according to 6.2.1.1.1.

6.5.1 Occupied bandwidth

6.5.1.1 Definition and applicability

Occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated power for transmitted spectrum and is centered on the assigned channel frequency.

6.5.1.2 Conformance requirements

The occupied bandwidth shall be less than 5 MHz based on a chip rate of 3,84 Mcps.

The reference for this requirement is TS 25.104 subclause 6.6.1.

6.5.1.3 Test purpose

The occupied bandwidth, defined in the Radio Regulations of the International Telecommunication Union ITU, is a useful concept for specifying the spectral properties of a given emission in the simplest possible manner; see also Recommendation ITU-R SM.328-9 [7]. The test purpose is to verify that the emission of the BS does not occupy an excessive bandwidth for the service to be provided and is, therefore, not likely to create interference to other users of the spectrum beyond undue limits.

6.5.1.4 Method of test

6.5.1.4.1 Initial conditions

(1) Connect the Measurement device to the BS antenna connector.

(2) Start transmission on a single carrier according to test model defined in 6.2.1.1.1.

6.5.1.4.2 Procedure

(1) Measure the power of the transmitted signal with a measurement filter of bandwidth 30 kHz or less. The characteristic of the filter shall be approximately Gaussian (typical spectrum analyzer filter). The center frequency of the filter shall be stepped in contiguous 30 kHz steps from a minimum frequency, which shall be (7,5 – 0,015) MHz below the assigned channel frequency of the transmitted signal, up to a maximum frequency, which shall be (7,5 –

0,015) MHz above the assigned channel frequency of the transmitted signal.. The measured power shall be recorded for each step.

(2) Determine the total transmitted power by accumulating the recorded power measurements results of all steps.

(3) Determine the transmitted power within the assigned channel bandwidth by accumulating the recorded power measurements results of all steps with center frequencies from (2,5 – 0,015) MHz below the assigned channel frequency up to (2,5 – 0,015) MHz above the assigned channel frequency.

(4) Calculate the ratio

total transmitted power acc. to (2) / transmitted power within the assigned channel bandwidth acc. to (3).

6.5.1.5 Test requirements

The ratio calculated in step (4) of subclause 6.5.1.4.2 shall be 0,99 or greater.

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

6.5.2.1.1 Test conditions and measurement method

<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. >

The mask defined in Table 6.11 toTable 6.14below may be mandatory in certain regions. In other regions this mask may not be applied.

For regions where this clause applies, the requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified by the mask in the frequency range with offset Δf from 2.5 MHz to Δf_{max} from the carrier frequency. The maximum offset Δf_{max} is either 12.5 MHz or the offset to the UMTS Tx band edge as defined in section 3.4.1, whichever is the greatest.

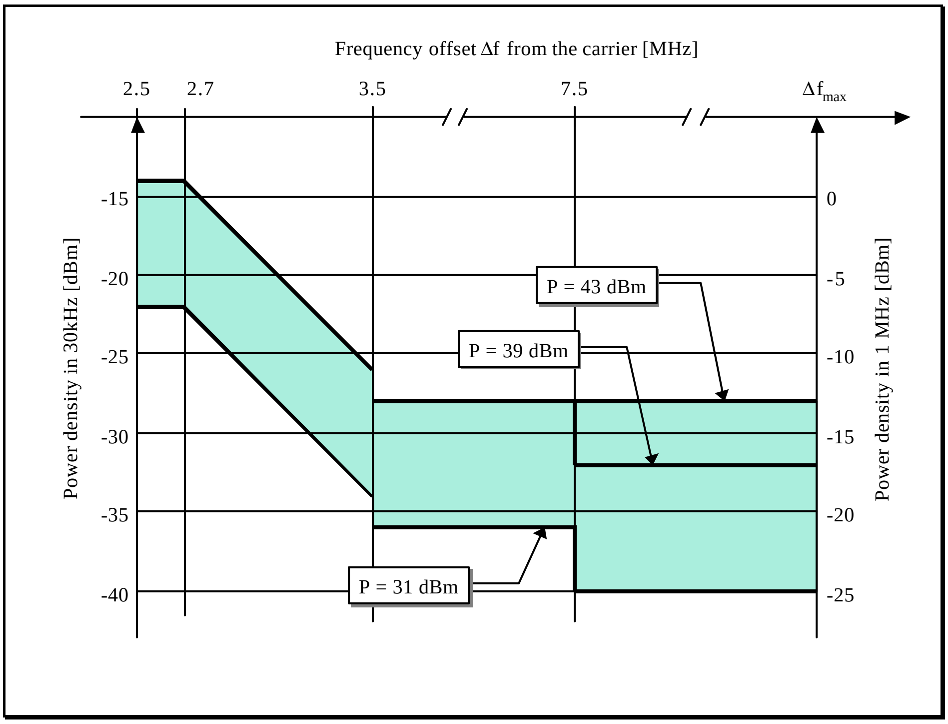

Fig. 6.1

Table 6.11: Spectrum emission mask values, BS maximum output power P ³ 43 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	-14 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	- 14 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf ≤ Δf_{max} MHz	-13 dBm	1 MHz [2]

Table6.12: Spectrum emission mask values, BS maximum output power 39 £ P < 43 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	-14 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	-14 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf < 7.5 MHz	-13 dBm	1 MHz [2]
7.5 ≤ Δf ≤ Δf_{max} MHz	P - 56 dBm	1 MHz [2]

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

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	P - 53 dBm	30 kHz [1]

$2.7 \le \Delta f < 3.5$ MHz	P - 53 - 15·(Δf - 2.7) dBm	30 kHz [1]
$3.5 \le \Delta f < 7.5$ MHz	P - 52 dBm	1 MHz [2]
$7.5 \le \Delta f \le \Delta f_{max}$ MHz	P - 56 dBm	1 MHz [2]

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

Frequency offset Δf	Maximum level	Measurement bandwidth
$2.5 \le \Delta f < 2.7$ MHz	-22 dBm	30 kHz [1]
$2.7 \le \Delta f < 3.5$ MHz	-22 - 15·(Δf - 2.7) dBm	30 kHz [1]
$3.5 \le \Delta f < 7.5$ MHz	-21 dBm	1 MHz [2]
$7.5 \le \Delta f \le \Delta f_{max}$ MHz	-25 dBm	1 MHz [2]

Notes:

1. The first and last measurement positions with a 30 kHz filter are 2.515 MHz and 3.485 MHz.
2. The first and last measurement positions with a 1 MHz filter are 4 MHz and (Δf_{max} – 500 kHz)

6.5.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receiver filter in the adjacent channel(s). Both the transmitted power and the received power are measured 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.

6.5.2.2.1 Test conditions and measurement method

1. Connect measurement receiver to the base station RF output port, using an attenuator or directional coupler if necessary.

2. The receiver characteristics shall be:

   Measurement filterbandwidth : Defined in section 6.5.2.2.
   Sufficient averaging time to ensure 0.2dB error at 95% confidence
   Detection mode : True RMS

3. Set the base station to transmit a signal modulated in accordance with 6.2.1.1.1 (Model 1).
   Total power at the RF output port shall be the nominal power as specified by the manufacturer.

4. Measure the power level at the carrier frequency.

6.5.2.2.2 Minimum 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

Note: In order to ensure that switching transients due to the slotted mode do not degrade the ACLR value the reference measurements conditions are an item for further study.

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 12.5MHz under the first carrier frequency used or more than 12.5MHz above the last carrier frequency used.

The requirements of either subclause 6.5.3.5 or subclause 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 6.2.1.1.1. 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

Chapters 6.6.3.4-6.6.3.9.1 as they are in 25.141 v.2.0.4

6.5.3.5 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.

6.5.3.5.1 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	Minimum attenuation	Measurement	Note

	requirement	Bandwidth	
9kHz – 150kHz	43 + 10logP (dB)	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz – 12.75GHz		1 MHz	Upper frequency as in ITU SM.329-7, s2.6

P = Mean power (W) where P < 500W

6.5.3.6 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.

6.5.3.6.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.17 BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz ↔ 150kHz	-36 dBm	1 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
150kHz ↔ 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
30MHz ↔ 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU-R SM.329-7, s4.1
1GHz ↔ Fc1 – 60 MHz or 2100 MHz *Whichever is the higher*	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1
Fc1 – 60 MHz or 2100 MHz *whichever is the higher* ↔ Fc1 – 50 MHz or 2100 MHz *whichever is the higher*	-25 dBm	1 MHz	Specification more stringent than ITU-R SM.329-7, s4.1
Fc1 – 50 MHz or 2100 MHz *whichever is the higher* ↔ Fc2 + 50 MHz or 2180 MHz *whichever is the lower*	-15 dBm	1 MHz	Specification more stringent than ITU-R SM.329-7, s4.1
Fc2 + 50 MHz or 2180 MHz *whichever is the lowe* ↔ Fc2 + 60 MHz or 2180 MHz *Whichever is the lower*	-25-13 dBm	1 MHz	Specification more stringent than ITU-R SM.329-7, s4.1
Fc2 + 60 MHz or 2180 MHz *Whichever is the lower* ↔ 12.75 GHz	-30 dBm	1 MHz	Bandwidth as in ITU-R SM.329-7, s4.1. Upper frequency as in ITU-R SM.329-7, s2.6

Fc1 : Center frequency of first carrier frequency used.

Fc2 : Center frequency of last carrier frequency used.

6.5.3.7 Protection of the BS receiver

This requirement may be applied in order to prevent the receiver of the BS being desensitised by emissions from the BS transmitter which are coupled between the antennas of the BS.

[This requirement assumes the scenario described in [2]. For different scenarios, the manufacturer may declare a different requirement.

This requirement is not applicable to antenna ports which are used for both transmission and reception (e.g. which have an internal duplexer).

NOTE: In this case, the measurement of Reference Sensitivity will directly show any desensitisation of the receiver.

6.5.3.7.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.18 BS Spurious emissions limits for protection of the BS receiver

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980MHz For operation in Frequency Bands defined in sub-clause 3.4.1(a)	-96 dBm	100 kHz	
1850-1910 MHz For operation in Frequency Bands defined in sub-clause 3.4.1(b)	-96 dBm	100kHz	

6.5.3.8 Co-existence with GSM 900

6.5.3.8.1 Operation in the same geographic area

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

[This requirement assumes the scenario described in [2].] For different scenarios, the manufacturer may declare a different requirement.

6.5.3.8.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.19 BS Spurious emissions limits for BS in geographic coverage area of GSM 900

Band	Maximum Level	Measurement Bandwidth	Note
921 – 960 MHz	-47 dBm	100 kHz	

6.5.3.8.2 Co-located base stations

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

6.5.3.8.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.20 BS Spurious emissions limits for protection of the BS receiver

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

6.5.3.9 Co-existence with DCS 1800

6.5.3.9.1 Operation in the same geographic area

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

[This requirement assumes the scenario described in [2].] For different scenarios, the manufacturer may declare a different requirement.

6.5.3.9.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.21 BS Spurious emissions limits for BS in geographic coverage area of DCS 1800

Band	Maximum Level	Measurement Bandwidth	Note
1805 – 1880 MHz	-57 dBm	100 kHz	

6.5.3.9.2 Co-located basestations

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

6.5.3.9.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.22 BS Spurious emissions limits for BS co-located with DCS 1800 BTS

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

6.5.3.10 Co-existence with PHS

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

6.5.3.10.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.23 BS Spurious emissions limits for BS in geographic coverage area of PHS

Band	Maximum Level	Measurement Bandwidth	Note
1893.5 – 1919.60 MHz	-41 dBm	300 kHz	

6.5.3.11 Co-existence with services in adjacent frequency bands

This requirement may be applied for the protection in bands adjacent to 2110-2170 MHz, as defined in sub-clause 3.4.1(a) and 1930-1990 MHz, as defined in sub-clause 3.4.1(b) in geographic areas in which both an adjacent band service and UTRA are deployed.

6.5.3.11.1 Minimum requirement

The power of any spurious emission shall not exceed:

Table 6.24: BS spurious emissions limits for protection of adjacent band services

Band (f)	Maximum Level	Measurement Bandwidth	Note
2100-2105 MHz For operation in frequency bands as defined in sub-clause 3.4.1(a)	-30 + 3.4 · (f - 2100 MHz) dBm	1 MHz	
2175-2180 MHz For operation in frequency bands as defined in sub-clause 3.4.1(a)	-30 + 3.4 · (2180 MHz - f) dBm	1 MHz	
1920-1925 MHz For operation in frequency bands as defined in sub-clause 3.4.1(b)	-30 + 3.4 · (f – 1930 MHz) dBm	1 MHz	
1995-2000 MHz For operation in frequency bands as defined in sub-clause 3.4.1(b)	-30 +3.4 · (2000 MHz – f) dBm	1 MHz	

6.5.3.12 Co-existence with UTRA-TDD

6.5.3.12.1 Operation in the same geographic area

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

6.5.3.12.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.25: BS Spurious emissions limits for BS in geographic coverage area of UTRA-TDD

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

6.5.3.12.2 Co-located base stations

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

6.5.3.12.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.26: BS Spurious emissions limits for BS co-located with UTRA-TDD

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

6.6 Transmit intermodulation

6.6.1 Definition and applicability

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

The transmit intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into an antenna connector at a level of 30 dB lower than that of the wanted signal. The frequency of the interference signal shall be 5 MHz, 10 MHz and 15 MHz offset below the first or above the last carrier frequency used.

The requirements are applicable for single carrier BS.

< Editor's note: Multi Carier case to be specified. >

6.6.2 Conformance requirement

The transmit intermodulation level shall not exceed the out of band emission or the spurious emission requirements of clause 6.6.2 and 6.6.3 in TS 25.141.

6.6.3 Test purpose

The purpose of this test is to verify that the BS meet the transmit intermodulation requirements as specified in TS25.104, clause 6.7.

6.6.4 Method of test

6.6.4 1 Initial conditions

1) Test set up in accordance to Appendix B.

6.6.4.2 Procedures

1) Generate the wanted signal in accordance to test model 1, clause 6.2.1.1.1 at specified maximum BS output power.
2) Generate the interference signal with frequency offset of 5 MHz relative to the wanted signal in accordance to test model 2, clause 6.2.1.1.2.
3) Adjust ATT1 so the level of the WCDMA modulated interference signal at BS is 30 dB below the wanted signal.
4) Perform the out of band emission test as specified in clause 6.5.2.
5) Perform the spurious emission test as specified in clause 6.5.3.
6) Verify that the emission level does not exceed the required level with the exception of interference signal frequencies.
7) Repeat the test for interference frequency off set of -5 MHz.
8) Repeat the test for interference frequency off set of +/- 10 MHz and +/-15 MHz.

6.7 Transmit modulation

6.7.1 Modulation Accuracy

The modulation accuracy is a measure of the difference between the measured waveform and the theoretical modulated waveform (the error vector). It is 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) . The requirement is valid over the total power dynamic range as specifed in 6.4.3. The physical channels for the following test(s) shall be setup according to 6.2.1.1.1.

6.7.1.1 Test conditions and measurement method

Refer to Annex B for a functional block diagram of the test setup.

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

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.

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 modulation accuracy factor.

6.7.1.2 Minimum requirement

The Modulation accuracy shall be lessthan 12.5 %.

6.7.2 Peak code Domain error

The code domain error is computed by projecting the error vector power onto the code domain at the maximum spreading factor. The error vector for each power code is defined as the ratio to the mean power of the reference waveform expressed in dB. The peak code domain error is defined as the maximum value for the code domain error. The measurement interval is one power control group (timeslot). The physical channels for the following test shall be setup according to 6.2.1.1.3.

6.7.2.1 Minimum requirement

The peak code domain error shall not exceed [ ] dB

<Editor's note: Shall be specified.. >

7 Receiver characteristics

7.1 General

All tests unless otherwise stated in this subclause shall be conducted on Base Station Systems fitted with a full complement of Transceivers for the configuration. Measurements shall include any RX multicoupler.

The tests in Section 7 assume that the receiver is not equipped with diversity. For receivers with diversity, unless otherwise stated, tests shall be performed by applying the specified signals to one of the receiver inputs, and terminating or disabling the other(s). The tests and requirements are otherwise unchanged.

In all the relevant subclauses in this clause all Bit Error Ratio (BER), Residual BER (RBER) and Block Error Ratio(BLER) measurements shall be carried out according to the general rules for statistical testing in annex A.

If external BER measurement is not used then the internal BER calculation shall be used instead. When internal BER calculation is used, the requirements of the verification test according to 7.8 shall be met in advance.

7.2 Reference sensitivity level

7.2.1 Definition and applicability

The reference sensitivity is the minimum receiver input power measured at the antenna connector at which the BER does not exceed the specific value indicated in section 7.2.2. This test is performed without interfering signal with power applied to the BS antenna connector according to Annex B. In the case duplex operation is supported, the measurement configuration principle is indicated for one duplex branch also in Annex B. In case of internal BER calculation is used example of test connection is as shown in Fig-0 The reference point for signal power is at the input of receiver (antenna connector).

7.2.2 Conformance requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.1. The reference for this requirement is in TS25.104 [1]clause 7.3.1

Table 7.1 BS reference sensitivity levels

Data rate	BS reference sensitivity level (dBm)	FER/BER
12.2 kbps	-121 dBm	BER shall not exceed 0.001

<Note: Should only be specified for a measurement channel.>

7.2.3 Test purpose

To verify that the BS shall meet receiver sensitivity requirement as specified TS25.104 clause 7.3.1

7.2.4 Method of testing

7.2.4.1 Initial conditions

(1) Connect BS to be tested to RF signal source.

(2) Set frequency.

(3) Start transmit 12.2kbps DPCH with reference measurement channel defined in Annex A to the BS under test (PN-9 data sequence or longer)

(4) Disable TPC function

7.2.4.2 Procedure

(1) Calculate BER from at least 30000 received data bits

(2) Set test signal power level transmitted for corresponding data rate as specified in Table 7.1.

(3) Measure BER.

7.2.5 Test requirement

Requirements for RX reference sensitivity specified in clause 7.2.2 shall be fulfilled.

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.

7.3.2 Conformance requirement

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

Table 7.2 : Dynamic range

Parameter	Level	Unit
Data rate	12.2	kbps
Wanted signal	<REFSENS> + 30 dB	dBm
Interfering AWGN signal	-73	dBm

7.3.3 Test purpose

The purpose of this test is to verify that the BS meet the dynamic range requirement as specified in TS25.104, clause 7.3.

7.3.4 Method of test

7.3.4.1 Initial conditions

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

2) Terminate the RX port that is not tested.

7.3.4.2 Procedure

1) Adjust the signal generator for the wanted signal to [–92 dBm]

2) [Adjust the AWGN generator level to –73 dBm 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

4) Repeat the measurement for the other RX port

7.4 Adjacent Channel Selectivity (ACS)

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

1. Set up the equipment as shown in Annex B.

2. Terminate the RX port, which is not tested.

3. Generate the reference channel and adjust the ATT1 to set the input level to the base station under test to the specified –115 dBm.

4. 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.

5. Measure the BER and control that the measured value does not exceed the specified value (BER< 0.001).

6. Repeat the test for the port, which was terminated.

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

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at is assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels; without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies as specified in the table below, using a 1MHz step size. Test conditions and measurement method

(1) Connect the BS to a mobile station simulator and a Signal generator.

(2) Disable Transmitter power control (TPC) function.

(3) Adjust the mobile station simulator to a level 6dB above the specified required reference sensitivity level.

(4) Adjust the Signal generator level to the appropriate level for the BS under test.

(5) The signal generator shall now be swept over the specified frequency band with a defined increment.

(6) The BS shall satisfy the $1x10^{-3}$ BER requirement for all signal generator frequencies above.

NOTE: The test procedure as defined in steps (5) and (6) requests to carry out more than [10000] BER measurements. To reduce the time needed for these measurements, it may be appropriate to conduct the test in two phases: During phase 1, BER measurements are made on all center frequencies of the interfering signal as requested but with a reduced confidence level, with the aim to identify those frequencies which require more detailed investigation. In phase 2, detailed measurements are made only at those critical frequencies identified before, applying the required confidence level.

<Editor’s note: The above NOTE is taken from proposal for TDD specification (R4-99789). Precise parameters for this 2-phase measurement shall be specified. >

7.5.1 Minimum requirement

The static reference performance as specified in clause 7.2.2 should be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

Table 7.4 (a) Blocking characteristics for operation in frequency bands in sub-clause 3.4.1(a)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1920 – 1980 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1900 – 1920 MHz 1980 – 2000 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1 MHz -1900 MHz, and 2000 MHz – 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.4(b) : Blocking performance requirement for operation in frequency bands in sub-clause 3.4.1(b)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1910 MHz	- 40 dBm	<REFSENS> + 6dB	10 MHz	WCDMA signal with one code
1830 – 1850 MHz 1910 – 1930 MHz	-40 dBm	<REFSENS> + 6dB	10 MHz	WCDMA signal with one code
1 MHz – 1830 MHz 1930 MHz – 12750 MHz	-15 dBm	<REFSENS> + 6dB	—	CW carrier

7.6 Intermodulation characteristics

7.6.1 Definition and applicability

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

7.6.2 Conformance requirement

The intermodulation performance should be met when the following signals are applied to the receiver.

Table 7.5: Interferer signals for intermodulation performance requirement

Type of Signal	Offset	Signal level
Wanted signal	-	-116 dBm <Note: Ref sens + 6dB >
CW signal	10 MHz	-48 dBm
WCDMA signal with one code	20 MHz	-48 dBm

The BER for wanted signal shall not exceed 0.001 for the parameters specified above.

7.6.3 Test purpose

The purpose of this test is to verify that the BS meet the intermodulation characteristics requirements as specified in TS25.104, clause 7.6.

7.6.4 Method of test

7.6.4.1 Initial conditions

1) Set up the equipment as shown in Annex B.

2) Terminate the RX port that is not tested.

7.6.4.2 Procedures

1) Generate the wanted signal (reference signal) and adjust ATT1 to set the signal level to the BS under test to the specified –116 dBm.
2) Adjust the signal generators to the frequency offset of +10 MHz (CW tone) and +20 MHz (WCDMA modulated) from the frequency of the wanted signal if possible.
3) Adjust the ATT2 and ATT3 to obtain the specified level of interference signal at the BS input.
4) Measure the BER and control that the measured value does not exceed the specified value.
5) Repeat the test for interference signal frequency offset of –10 MHz and -20 MHz for CW and WCDMA modulated respectively.
6) Repeat the whole test for the port which was terminated

7.7 Spurious Emissions

7.7.1 Definition and applicability

The spurious emission power is the power of the emissions generated or amplified in a receiver that appears at the BS antenna connector. The requirements apply to all BS with separate RX and TX antenna port. The test shall be performed when both TX and RX are on with the TX port terminated.

For all BS with common RX and TX antenna port the transmitter spurious emission as specified in section 6.6.3 is valid.

7.7.2 Conformance requirements

The spurious emission shall be:

(a) Less than –78 dBm/3.84 MHz at the BS antenna connector, for frequencies within the BS receive band.
(b) Less than –57 dBm/100 kHz at the BS antenna connector, for frequencies band from 9 kHz to 1 GHz.
(c) Less than –47 dBm/100 kHz at the BS antenna connector, for frequencies band from 1 GHz to 12.75 GHz with the exception of frequencies which are more than 12.5MHz under the first carrier frequency used or more than 12.5MHz above the last carrier frequency used.

<Editor's note: Tentative text. The text shall be revised according to the requirements in TS25.104.>

The reference for this requirement is TS 25.104[1] clause 7.8.1.

7.7.3 Test purpose

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

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 clause 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[1]
Sweep frequency range	9 kHz – 12.75GHz
Detection	True RMS

[1] As defined in section 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 clause 7.7.2.

7.8 Verification of the internal BER calculation

7.8.1 Definition and applicability

Base Station System with internal BER calculation can synchronize it's receiver to known pseudo-random data sequence and calculates bit error ratio from the received data. This test is performed only if Base Station System has this kind of feature. All data rate's which are used in RX conformance testing shall be used in verification test. This test is performed by feeding measurement signal with known BER to the input of the receiver. Locations of the errorneus bits shall be random. Erroneus bits shall be inserted to the data bit stream as shown in Fig. 7.1.

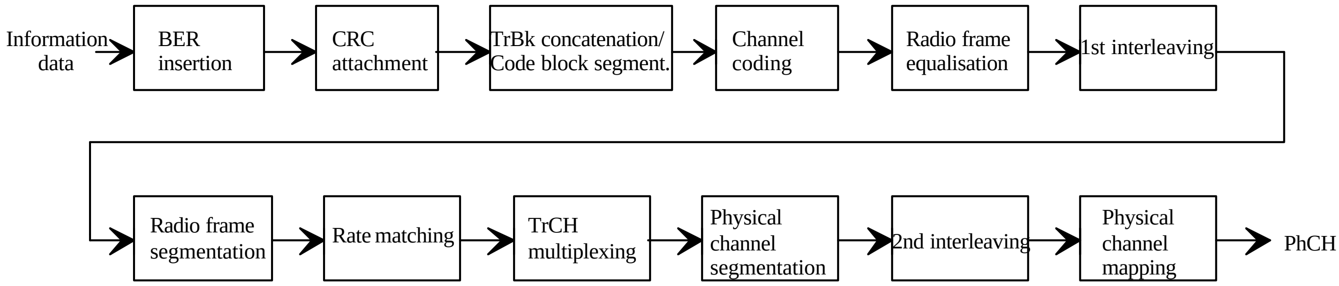

Fig. 7.1 BER insertion into the information data

7.8.2 Conformance requirement

BER indicated by the Base Station System shall be within ±[10%] of the BER generated by the RF signal source. Measurement shall be repeated for each measurement signal specified in Table 7.7.

Table 7.7

Transport channel combination	Data rate	BER
DPCH	12.2 kbps	BER 0.01
TBD	TBD	TBD
…	…	…

Note: 10 times larger BER generator is used to get a good confidence.

7.8.3 Test purpose

To verify that the internal BER calculation accuracy shall meet requirements for conformance testing.

7.8.4 Method of test

7.8.4.1 Initial conditions

(1) Connect BS RX antenna connector to the RF signal source or UE simulator as shown in Annex B.

(2) Set correct signal source parameters as specified in Table 7.9-2.

Table 7.8

Parameter	Level/status	Unit

UL signal level	Ref.sens + 10 dB	dBm/3.84 MHz
Data sequence	PN9 or longer	

7.8.4.2 Procedure

(1) Measure the BER of received signal from RF signal source or UE simulator to BS antenna connector

(2) BER calculation shall be done at least over 50000 bits

(3) Repeat test for all required data rates

7.8.5 Test requirement

BER indicated by the Base Station System shall be within requirement as specified in clause 7.8.2.

8 Performance requirement

8.1 General

All Bit Error Ratio (BER) and Block Error ratio (BLER) measurements shall be carried out according to the general rules for statistical testing defined in ITU-T O.153 [5].

If external BLER measurement is not used then the internal BLER calculation shall be used instead. When internal BLER calculation is used, the requirements of the verification test according to 8.6 shall be met in advance.

Performance requirements are specified for a number of test environments and multi-path channel classes.

<Editor's note: The following sections are taken from correspondent sections in TS25.104. Only requirements are specified at the moment. Test method to be specified. >

8.2 Demodulation in static propagation conditions

8.2.1 Demodulation of DCH

The performance requirement of DCH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.2.1.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.1.

Table 8.1: Performance requirements in AWGN channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}
12.2 kbps	n.a.	5.1 dB
64 kbps	1.5 dB	1.7 dB

144 kbps	0.8 dB	0.9 dB
384 kbps	0.9 dB	1.0 dB

8.3 Demodulation of DCH in multipath fading conditions

8.3.1 Multipath fading Case 1

The performance requirement of DCH in multipath fading Case 1 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.1.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.2.

Table 8.2: Performance requirements in multipath Case 1 channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}
12.2 kbps	n.a.	11.9 dB
64 kbps	6.2 dB	9.2 dB
144 kbps	5.4 dB	8.4 dB
384 kbps	5.8 dB	8.8 dB

8.3.2 Multipath fading Case 2

The performance requirement of DCH in multipath fading Case 2 is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.2.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.3.

Table 8.3: Performance requirements in multipath Case 2 channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}
12.2 kbps	n.a.	9.0 dB
64 kbps	4.3 dB	6.4 dB
144 kbps	3.7 dB	5.6 dB
384 kbps	4.1 dB	6.1 dB

8.3.3 Multipath fading Case 3

The performance requirement of DCH in multipath fading Case 3 is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.3.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.4.

Table 8.4: Performance requirements in multipath Case 3 channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}	Required E_b/N_0 BLER < 10^{-3}
12.2 kbps	n.a	6.7 dB	7.5 dB
64 kbps	2.7 dB	3.2 dB	3.4 dB
144 kbps	2.2 dB	2.5 dB	2.8 dB
384 kbps	2.6 dB	3.0 dB	3.5 dB

8.4 Demodulation of DCH in moving propagation conditions

The performance requirement of DCH in moving propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified Eb/N0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.4.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.5.

Table 8.5: Performance requirements in moving channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}
12.2 kbps	n.a.	
64 kbps		
144 kbps		
384 kbps		

8.5 Demodulation of DCH in birth/death propagation conditions

The performance requirement of DCH in birth/death propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.5.1 Minimum requirement

The BLER should not exceed the limit for the E_b/N_0 specified in Table 8.6.

Table 8.6: Performance requirements in birth/death channel.

Measurement channel	Required E_b/N_0 BLER < 10^{-1}	Required E_b/N_0 BLER < 10^{-2}
12.2 kbps	n.a.	
64 kbps		
144 kbps		
384 kbps		

8.6 Verification of the internal BLER calculation

8.6.1 Definition and applicability

Base Station System with internal BLER calculates block error rate from the CRC blocks of the received. This test is performed only if Base Station System has this kind of feature. All data rates which are used in Section 8 Performance requirement testing shall be used in verification testing. This test is performed by feeding measurement signal with known BLER to the input of the receiver. Locations of the errorneus blocks shall be random. Erroneus blocks shall be inserted into the UL signal as shown in Fig. 8.1.

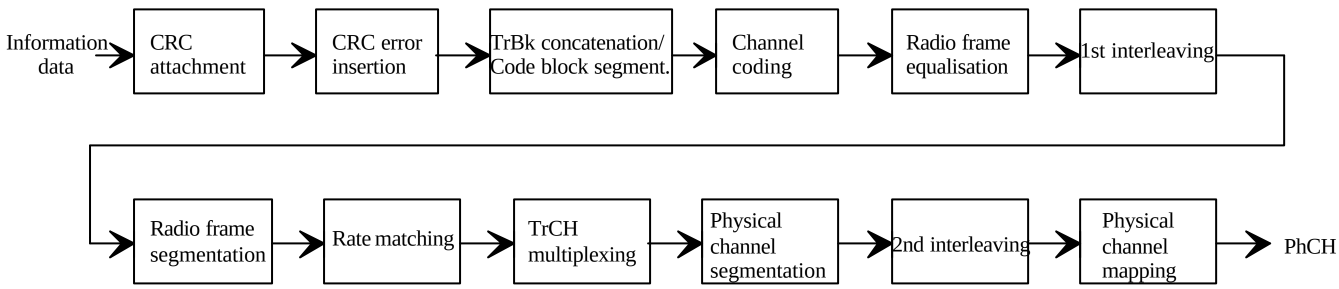

Figure 8.1 BLER insertion to the output data

8.6.2 Conformance requirement

BLER indicated by the Base Station System shall be within ±[10%] of the BLER generated by the RF signal source. Measurement shall be repeated for each signal rate as specified in Table 8.7.

Table 8.7

Transport channel combination	Data rate	BLER
DPCH	12.2 kbps	BLER 0.01
DPCH	64 kbps	BLER 0.01
DPCH	144 kbps	BLER 0.01
DPCH	384 kbps	BLER 0.01
DPCH	2048 kbps	BLER 0.01

Note: 10 times larger BLER generator is used to get a good confidence.

8.6.3 Test purpose

To verify that the internal BLER calculation accuracy shall met requirements for conformance testing.

8.6.4 Method of test

8.6.4.1 Initial conditions

(3) Connect BS RX antenna connector to the RF signal source or UE simulator as shown in Annex B

(4) Set correct signal source parameters as specified in Table 8.6.2.

Table 8.8

Parameter	Level/status	Unit
UL signal level	Ref.sens + 10 dB	dBm/3.84 MHz
Data sequence	PN9	

8.6.4.2 Procedure

(4) Measure the BLER of received signal from RF signal source or UE simulator to BS antenna connector

(5) BLER calculation shall be done at least over 50000 blocks

(6) Repeat test for all required data rates

8.6.5 Test requirement

BLER indicated by the Base Station System shall be within requirement as specified in clause 8.6.2.

Annex A (Normative): Measurement channels

A.1 Summary of UL reference measurement channels

The parameters for the UL reference measurement channels are specified in Table A.1 and the channel coding is detailed in figure A.1 through A.5 respectively. Note that for all cases, one DPCCH shall be attached to DPDCH(s).

Table A.1: Reference measuremet channels for UL DCH

Parameter		DCH for DTCH / DCH for DCCH					Unit
DPDCH	Information bit rate	12.2/2.4	64/2.4	144/2.4	384/2.4	2048/2.4	kbps
	Physical channel	60/15	240/15	480/15	960/15	960/15	kbps
	Spreading factor	64	16	8	4	4	
	Repetition rate	22/22	19/19	8/9	-18/-18	-1/-1	%
	Interleaving	20	40	40	40	80	ms
	Number of DPDCHs	1	1	1	1	6	
DPCCH	Dedicated pilot	6					bit/slot
	Power control	2					bit/slot
	TFCI	2					bit/slot
	Spreading factor	256					
Power ratio of DPCCH/DPDCH		-2.69	-5.46	-9.54	-9.54	-9.54	dB
Amplitude ratio of DPCCH/DPDCH		0.7333	0.5333	0.3333	0.3333	0.3333	

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.

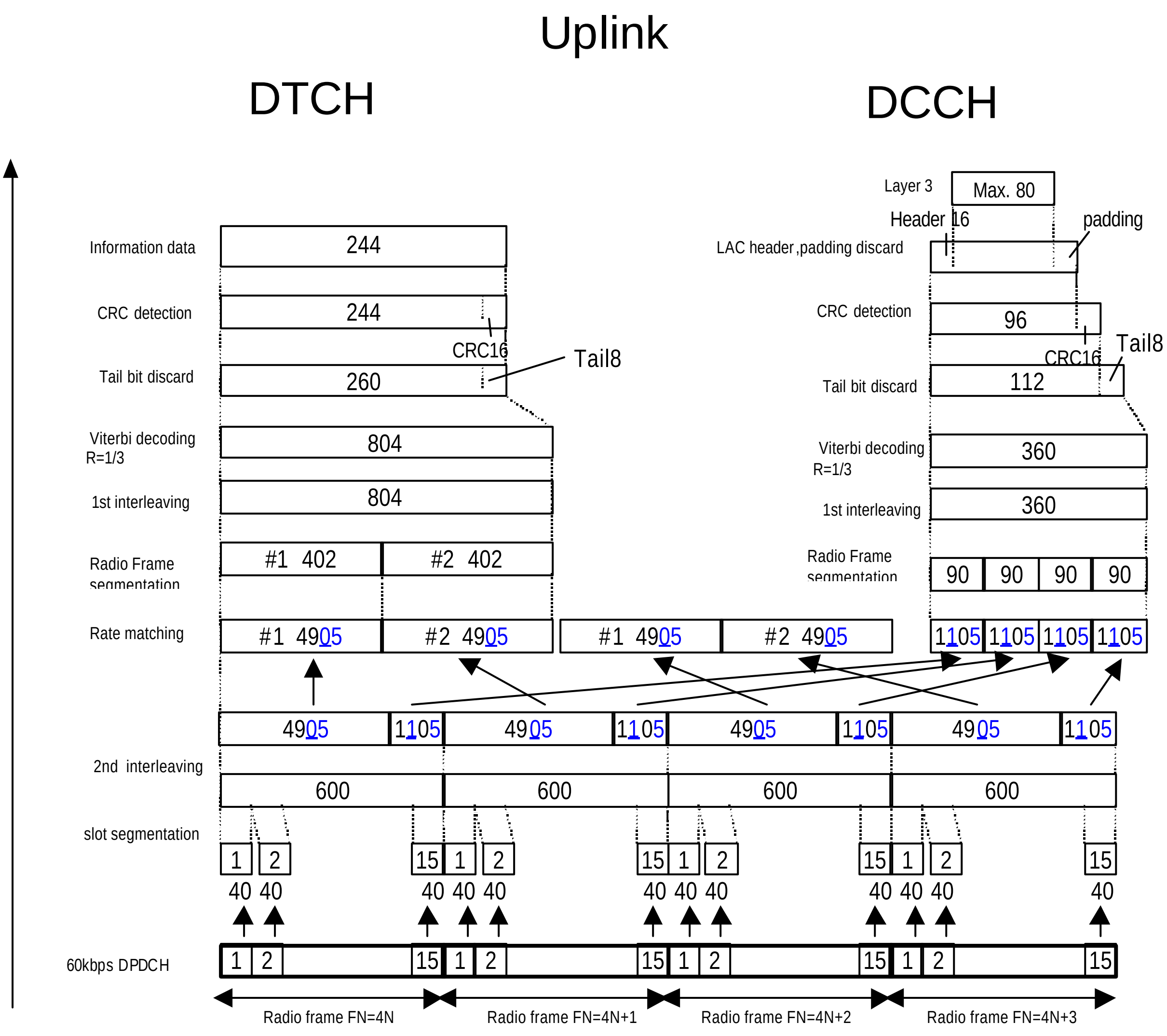

Table A.2: UL reference measurement channel (12.2 kbps)

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.

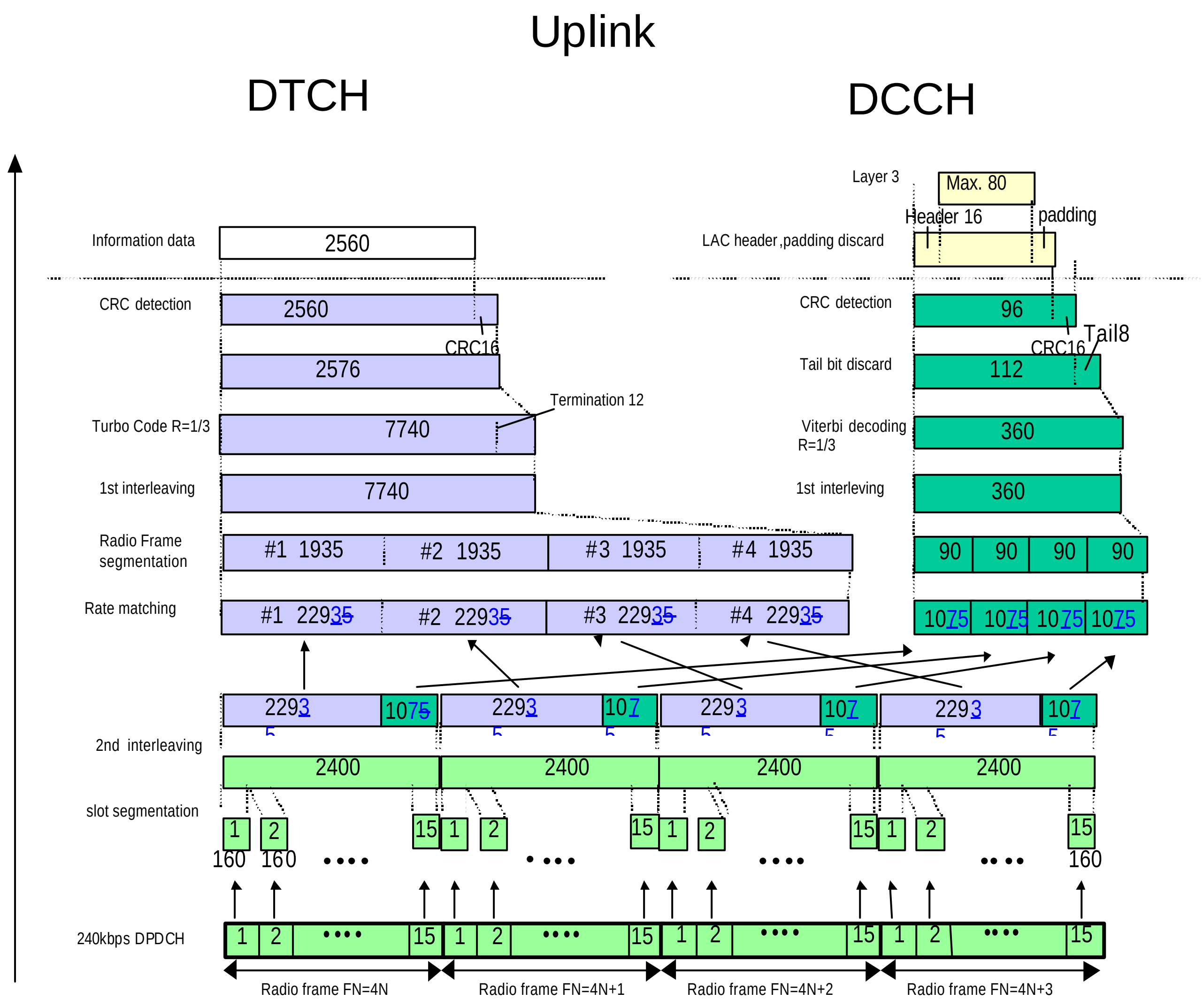

Table A.3: UL reference measurement channel (64kbps)

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.

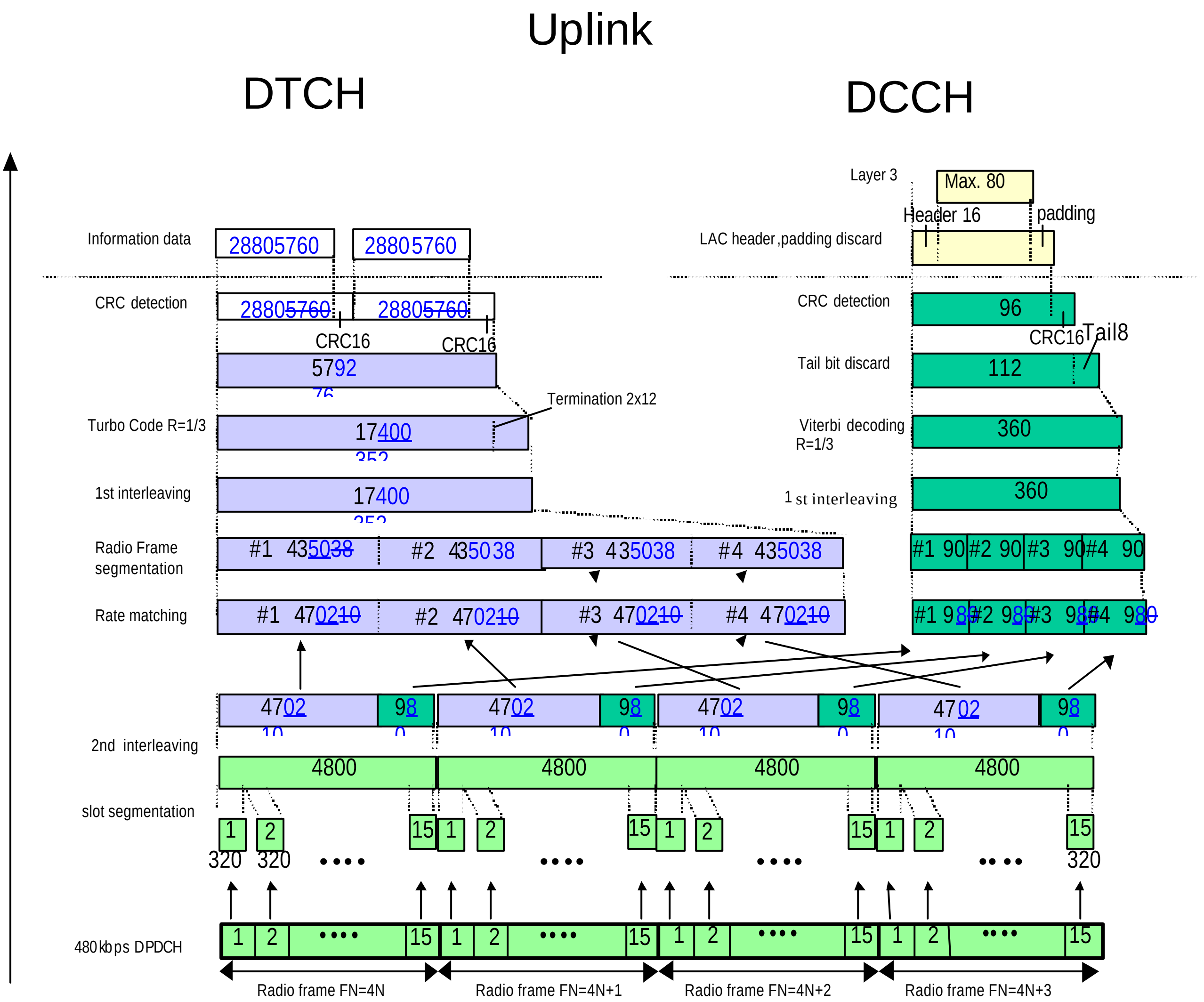

Table A.4: UL reference measurement channel (144kbps)

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.

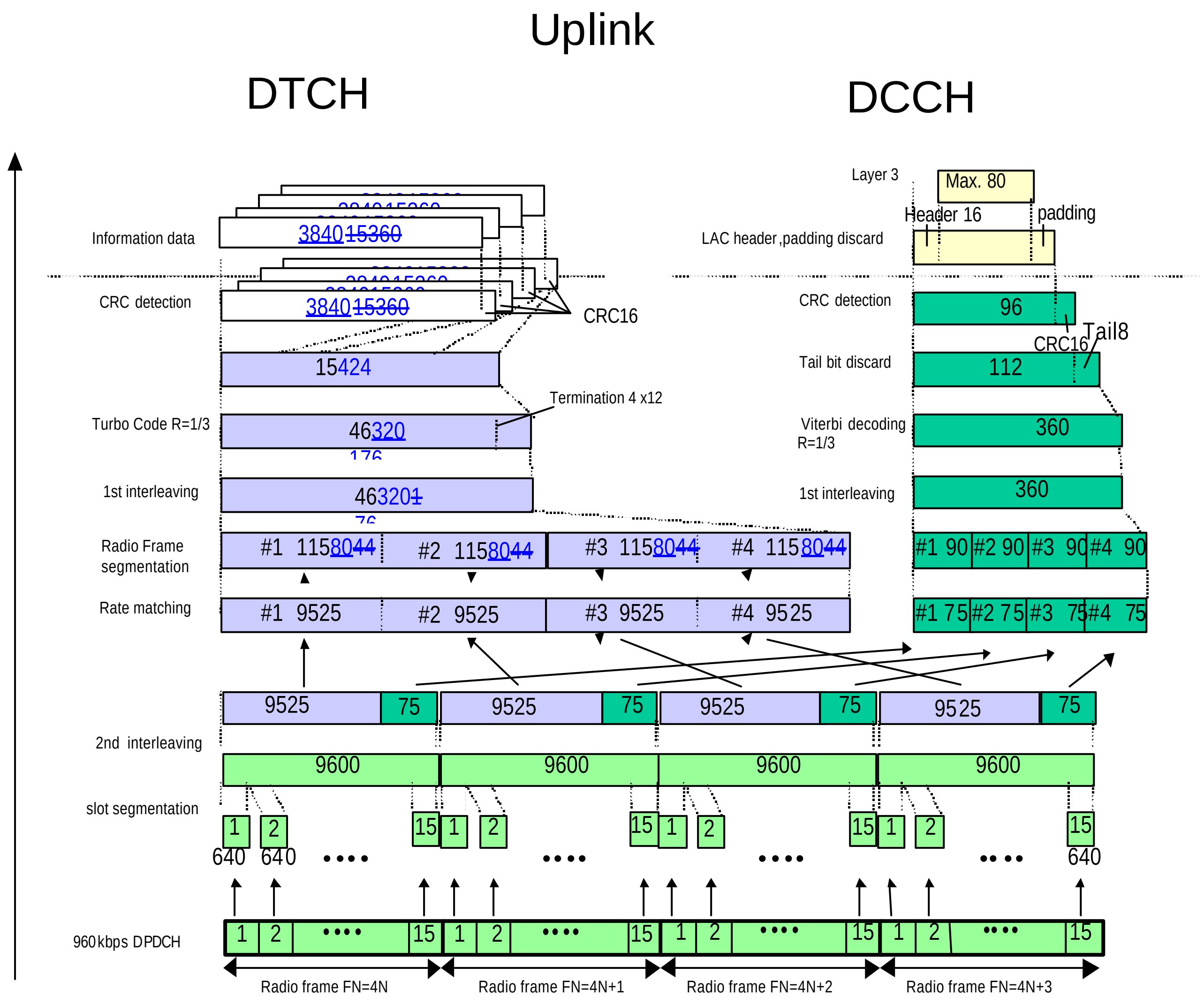

Table A.5: UL reference measurement channel (384kbps)

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 2048 kbps are specified in Table A.6 and the channel coding is detailed in Figure A.6.

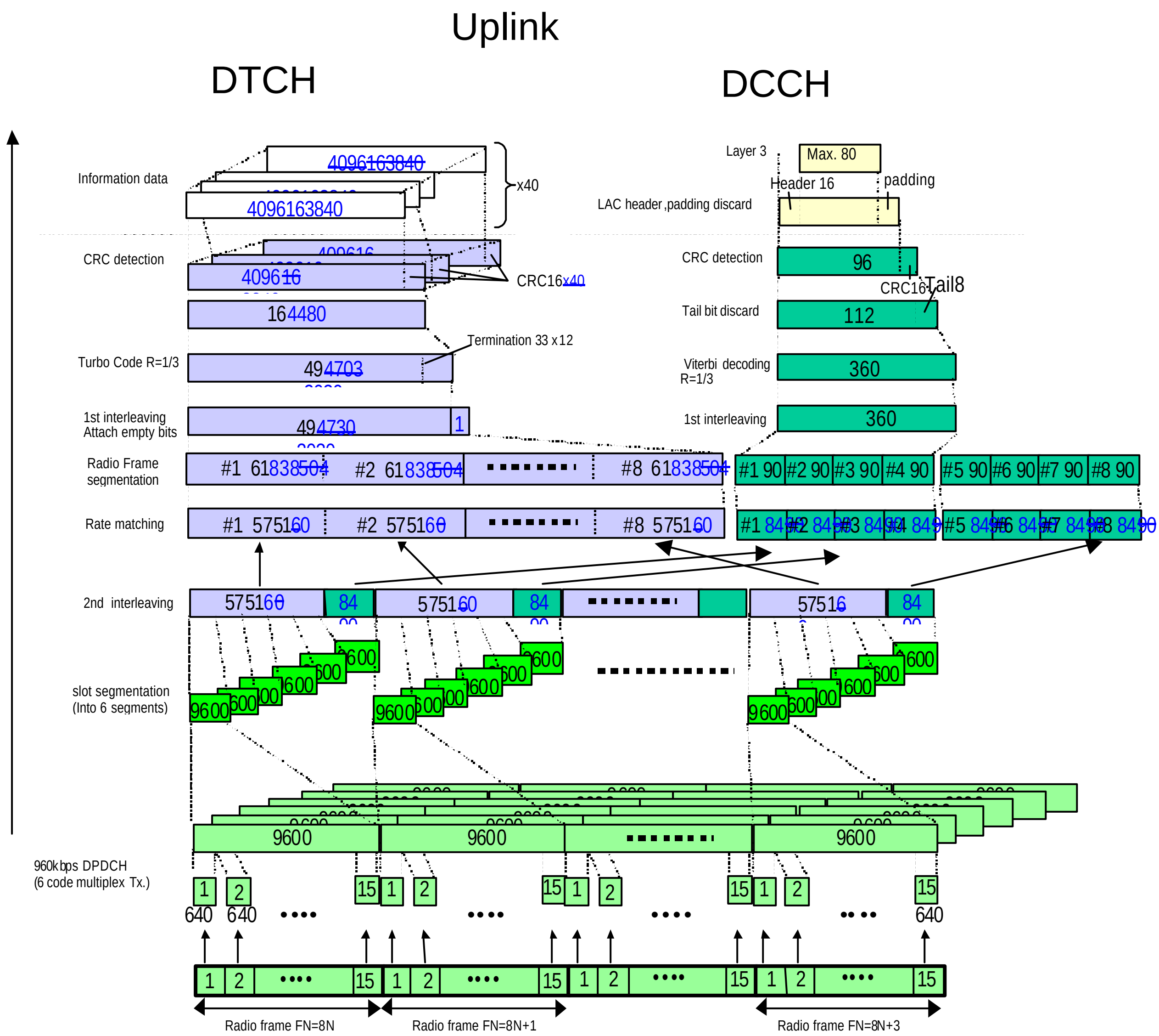

Table A.6: UL reference measurement channel (2048kbps)

Parameter	Level	Unit
Information bit rate	2048	kbps
DPCH	960	kbps
Power control	Off	
TFCI	On	
Puncturing	1	%

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 CPICH power accuracy

Fig.B.1 Configuration for power control steps measurement

B.1.2 Power control steps

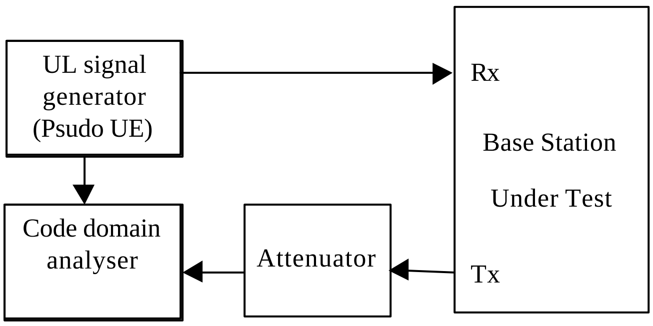

Fig. B.2 Configuration for power control steps measurement

B.1.3 Power control dynamic range

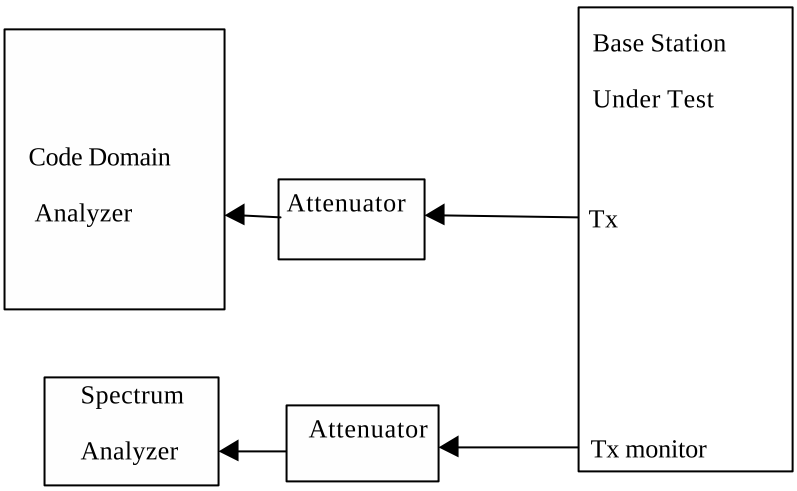

Fig. B.3 Configuration for measurement

B.1.4 Minimum transmit power

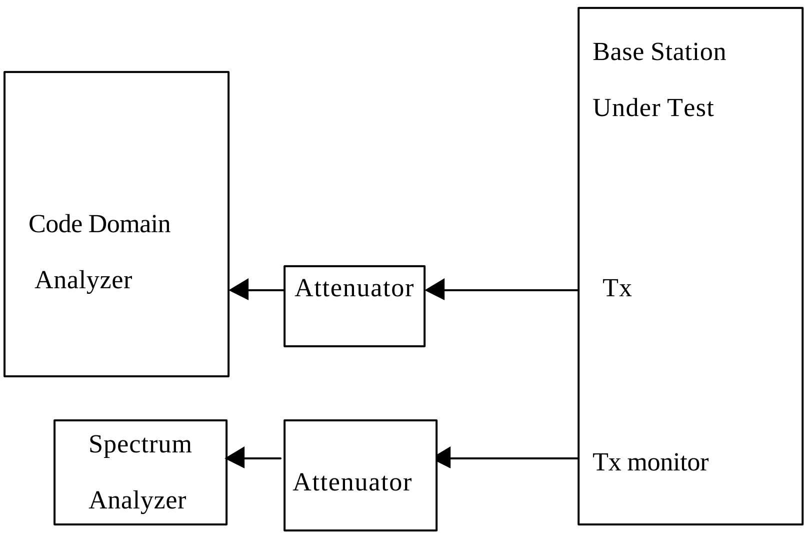

Fig. B.4 Configuration for measurement

B.1.5 Total power dynamic range

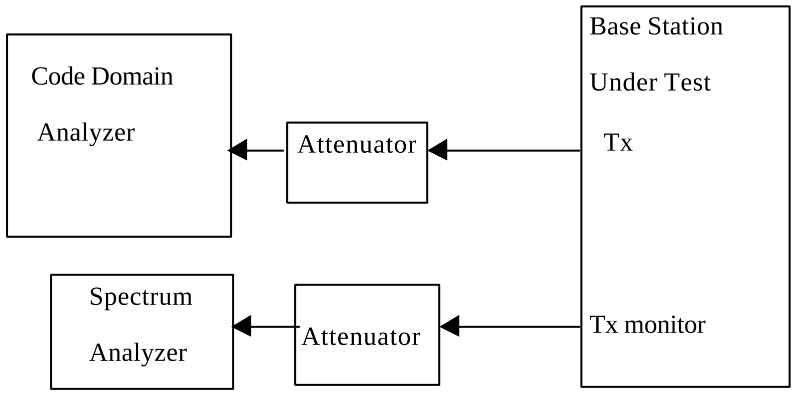

Fig.B.5 Configuration for measurement

B.1.6 Transmit intermodulation

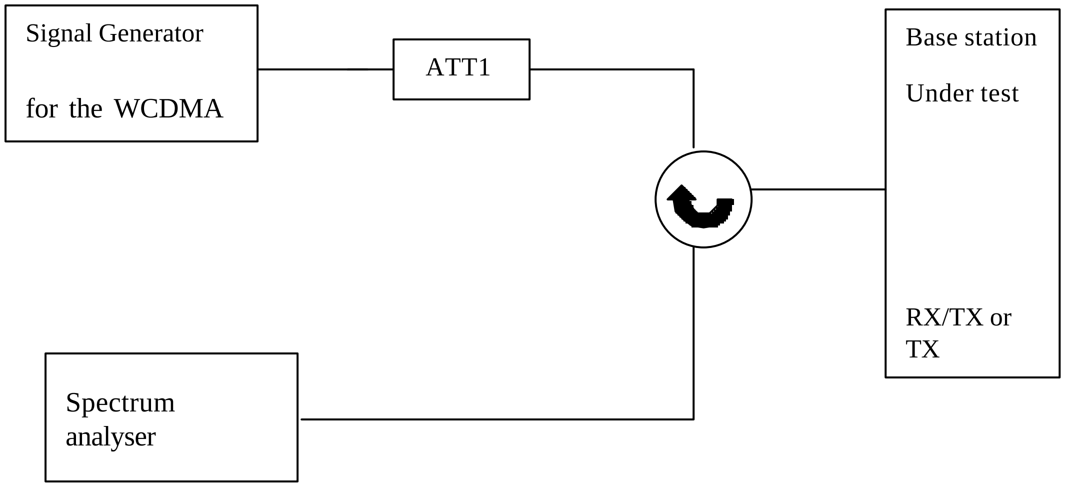

Fig.B.6 Functional Setup for Base Station Transmit Intermodulation Testes

B.1.7 Modulation Accuracy

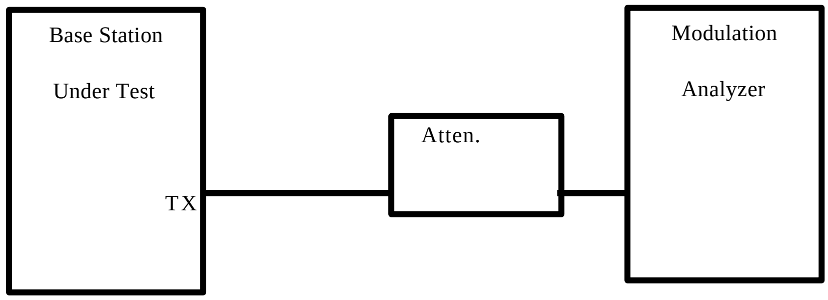

Fig. B.7 Functional Setup for Modulation Accuracy Test.

B.2 Receiver

B.2.1 Reference sensitivity level

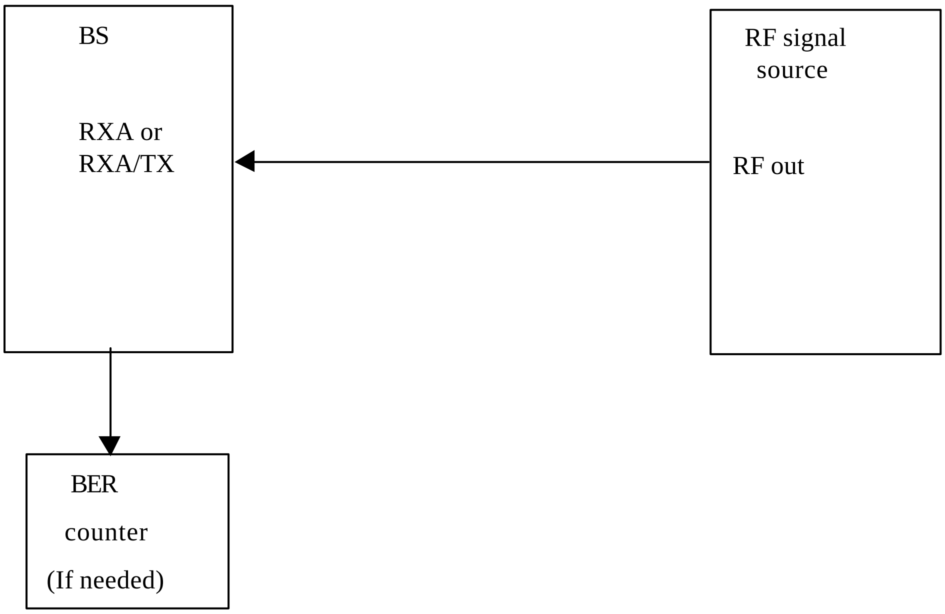

Fig. B.8 Functional Setup for Base Station Reference sensitivity level Testes

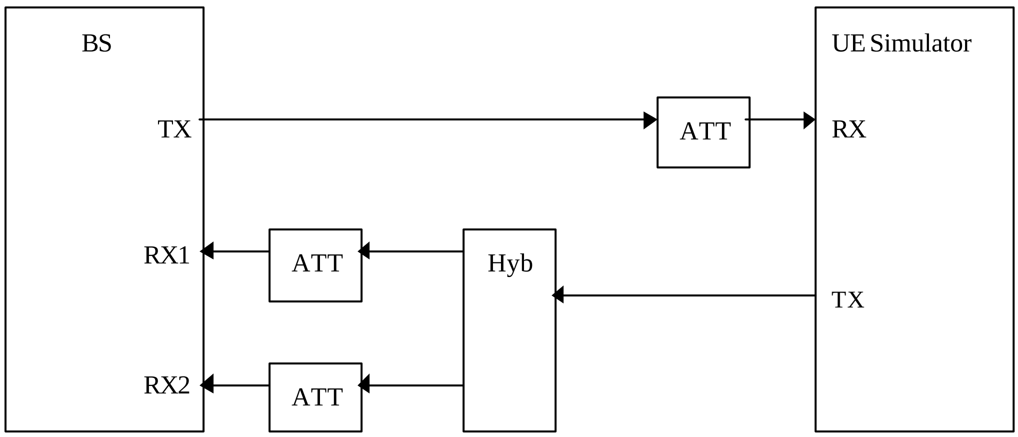

Fig. B.9 Functional Setup for Base Station Reference sensitivity level Testes (without duplex operation case)

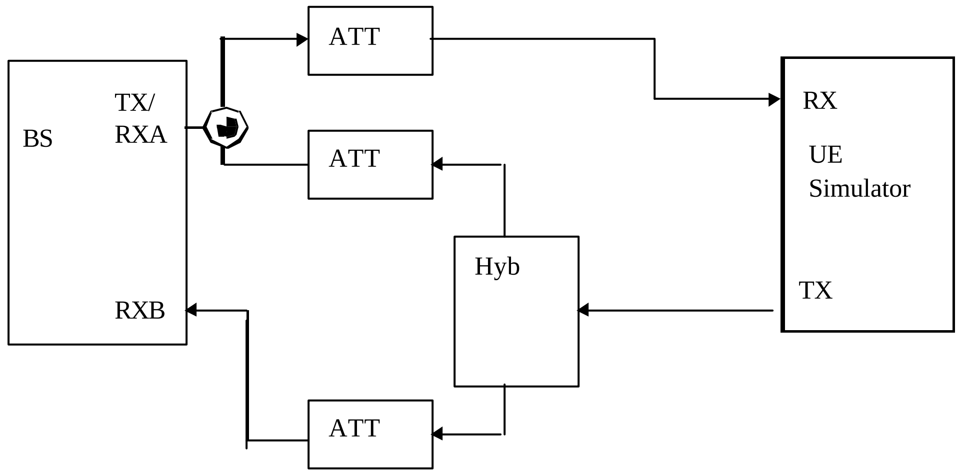

Fig.B.10 Functional Setup for Base Station Reference Sensitivity level Testes (with duplexing operation case)

B.2.2 Dynamic range

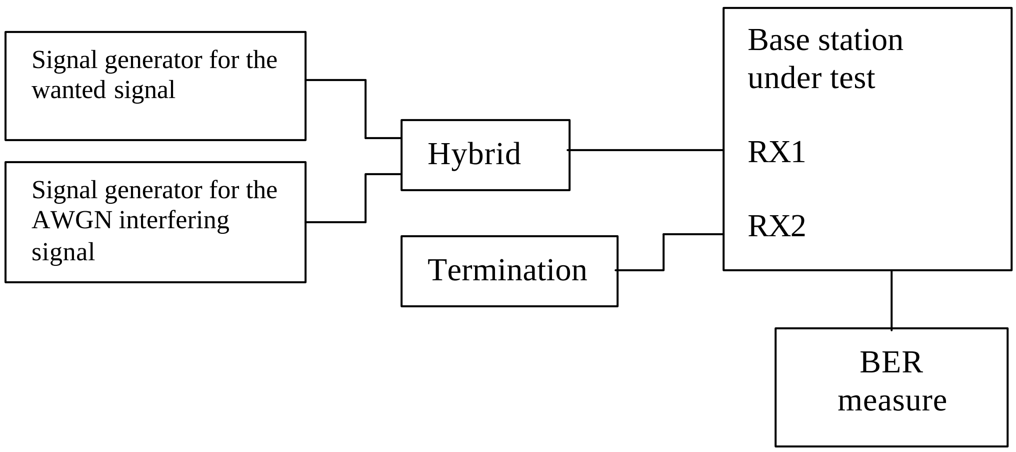

Fig. B.11 Measuring system Setup for Dynamic range

B.2.3 Adjacent Channel Selectivity (ACS)

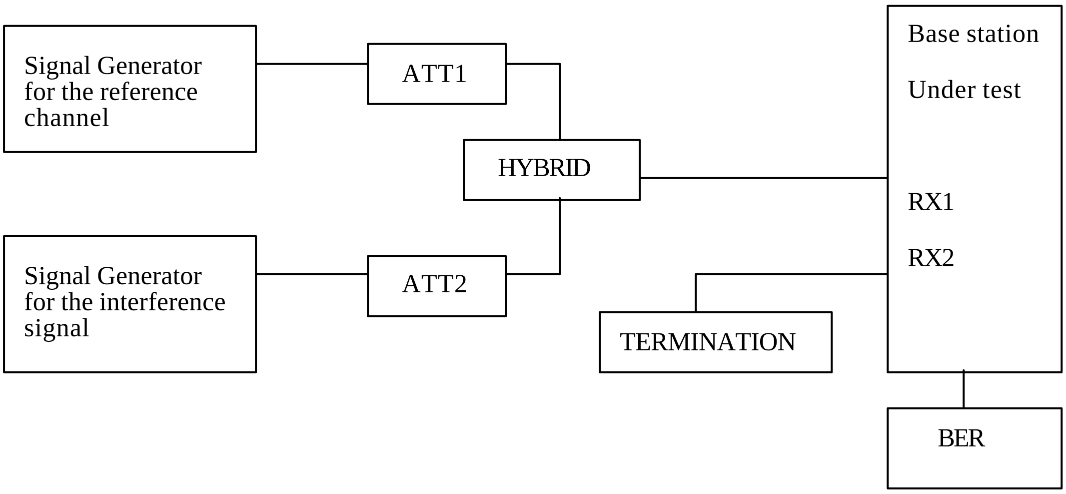

Fig. B.12 Measuring system Setup for Adjacent channel selectivity

B.2.4 Blocking characteristics

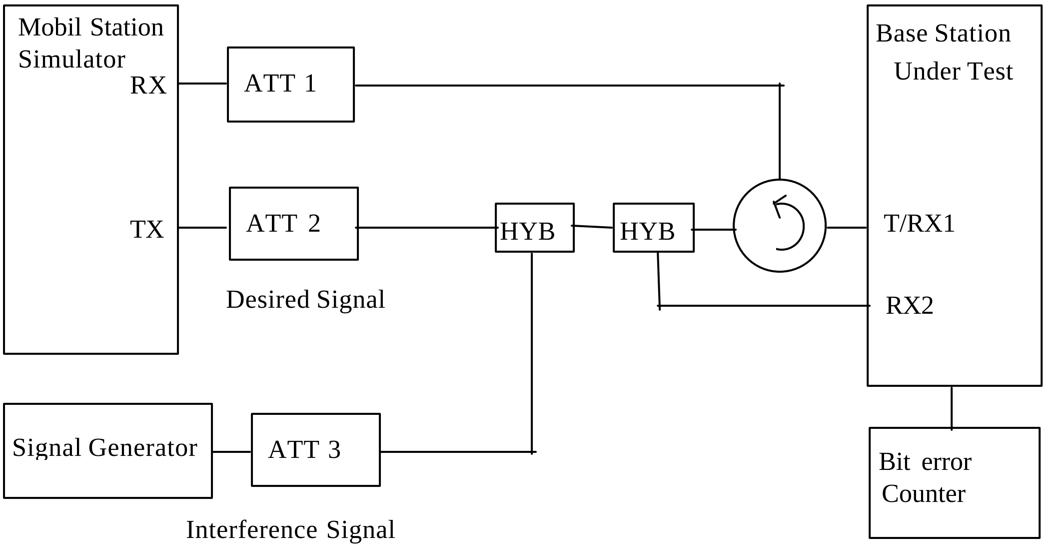

Fig. B.13 Measuring system Setup for Blocking characteristics

B.2.5 Intermodulation characteristics

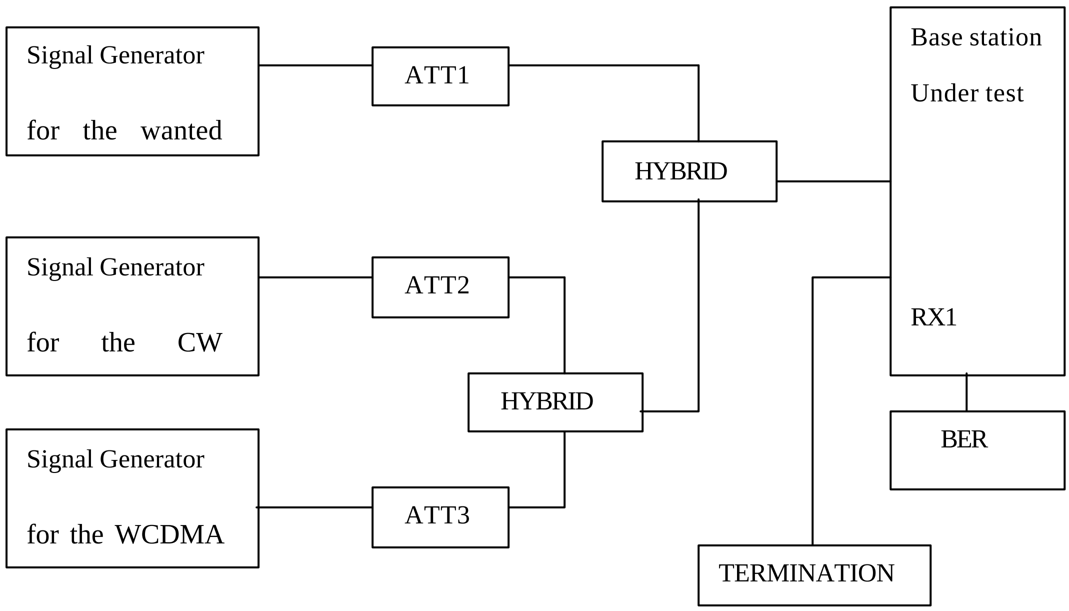

Fig. B.14 Measuring system Setup for Reception Intermodulation sensitivity

B.2.6 Receiver spurious emission

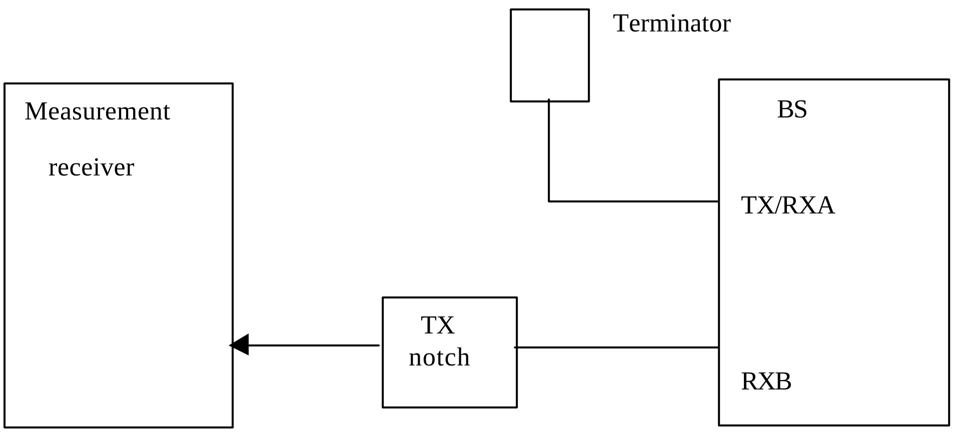

Fig. B.15 Measuring system Setup for Receiver spurious emission

Annex C Detailed definition of error events

1) Block Error Ratio (BLER):

The block is defined as erased if the error detection functions using Cyclic Redundancy Check (CRC) in layer 1.

<Editor's note: Tentative definition of BLER is given. >

2) Bit Error Ratio (BER):

The BER is the overall Bit Error Ratio (BER) independent of frame erasures or when erased frames are not defined.

Annex D (Informative): Downlink test model

D.1 Test Model 1

This model shall be used for tests on,

- spectrum emission mask
- ACLR
- spurious emissions
- transmit intermodulation
- modulation accuracy

For the above set of measurements it is appropriate for the test signal to have high PAR. This is achieved by including 64 DPCH at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random $T_{offsets}$ (simulating a realistic traffic scenario).

Considering that not every base station implementation will support 64 DPCH, variants of this test model containing 32 and 16 DPCH are also specified. The conformance test shall be performed using the largest of these three options that can be supported by the equipment under test.

"Fraction of power" relates to the mean output power on the TX antenna interface under test.

Table 1. Test Model 1 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH (SF=128)	16/32/64	76.8 in total	See Table 2	See Table 2	See Table 2

The power levels in Table 2 were based on the results from network simulations. Lists containing 16, 32 and 64 power levels were constructed to have approximately the same power distribution of the simulation results. These powers were then randomly assigned to the chosen codes. A set of 64 codes was chosen with a random but even distribution across the codespace. Subsets of the set of 64 were chosen for the 32 and 16 code cases. $T_{offsets}$ were chosen at random.

Table 2. DPCH Spreading Code, Toffset and Power for Test Model 1

Code	Toffset	Code Power (dB) (16 codes)	Code Power (dB) (32 codes)	Code Power (dB) (64 codes)
2	2	-10.4	-13.0	-15.6
11	0	-11.1	-13.3	-15.7
17	2	-12.0	-13.9	-16.1
23	1	-14.2	-14.9	-16.8
31	6	-11.4	-16.8	-18.0
38	1	-13.0	-14.1	-20.0
47	7	-16.5	-15.6	-15.9
55	6	-15.6	-18.0	-16.5
62	1	-12.5	-16.2	-17.4
69	9	-15.3	-19.4	-19.0
78	1	-13.7	-17.1	-21.7
85	0	-17.6	-14.6	-20.3
94	0	-18.8	-16.5	-16.3

102	0	-16.9	-20.3	-17.2
113	5	-15.0	-20.6	-18.6
119	2	-9.4	-23.6	-20.8
7	3		-19.8	-18.5
13	4		-17.6	-20.5
20	2		-13.7	-17.9
27	5		-14.4	-19.7
35	9		-15.9	-24.3
41	1		-18.8	-24.0
51	7		-18.2	-22.4
58	2		-16.7	-21.0
64	5		-21.5	-18.2
74	5		-19.1	-20.2
82	8		-18.6	-16.7
88	1		-15.8	-17.7
97	9		-18.4	-19.4
108	4		-15.4	-23.0
117	9		-17.4	-22.1
125	3		-12.4	-20.5
4	6			-17.0
9	5			-18.3
12	2			-20.4
14	7			-17.3
19	8			-18.8
22	4			-21.3
26	4			-19.3
28	3			-22.6
34	5			-21.6
36	8			-19.5
40	0			-23.8
44	0			-22.8
49	2			-21.4
53	7			-19.1
56	1			-21.9
61	8			-20.7
63	2			-17.6
66	3			-19.2
71	6			-22.2
76	9			-21.2
80	3			-18.7
84	2			-21.1
87	5			-18.9
91	0			-21.5
95	9			-19.8
99	2			-25.0
105	9			-25.0
110	3			-24.8
116	3			-23.5
118	6			-21.8
122	2			-20.1
126	8			-15.3

D.2 Test Model 2

This model shall be used for tests on,

- output power dynamics

A 10 code channel model is chosen because when testing total power dynamic range P_{max}-18 dB level (RF power) this is the maximum number of channels which we can get down to the required output power level without going under the P_{max}-28 dB level in the code domain base (when we assume that all code channels use same power).

This configuration is also suitable for power control test as we can test P_{max}-3 dB level (for one code channel in the code domain) by reducing power of the other code channels to P_{max}-13 dB.

Table 3. Test Model 2 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH (SF=128)	7	7 x 10.97	7 x -9.6	24,40,56,72, 88,104,120	1,3,5,7, 6,4,2

D.3 Test Model 3

This model shall be used for tests on,

peak code domain error.

The structure of this test model is chosen assuming that error power in the inactive codes will be primarily due to the following effects,

- random noise - which will cause an even growth of error power in all codes.
- non-linearity - which will cause code intermodulation (error growth in codes which are the bitwise product of active codes)
- phase jitter - which can cause "tails" of error growth in codes adjacent to active codes.

By putting all the DPCH in the upper half of the codespace, all the error due to code intermodulation lands in the bottom half of the code space, whereas that due to noise lands evenly across the whole space, and any "tails" due to, e.g. phase jitter will be visible on the few codes in the lower half of the code space (particularly PICH which is positioned in the lower half of the code space with this in mind). The intention is to make possible a qualitative assessment of the reason for a poor PCDE result by inspecting the code domain display.

Table 4. Test Model 3 Active Channels

Type	Number of Channels	Fraction of Power (%)	Fraction of Power (dB)	Channelisation Code	T_{offset}
PCCPCH+SCH	1	10	-10	1	
Primary CPICH	1	10	-10	0	
PICH	1	3.2	-15	16	
DPCH (SF=256)	16/32	76.8 in total	See Table 5	See Table 5	See Table 5

The channelisation codes and $T_{offsets}$ are randomly assigned. As with Test Model 1, not every base station implementation will support 32 DPCH, a variant of this test model containing 16 DPCH are also specified. The conformance test shall be performed using the larger of these two options that can be supported by the equipment under test.

Table 5. DPCH Spreading Code, Toffset and Power for Test Model 3

Code	T_{offset}	Code Power (dB) (16 codes)	Code Power (dB) (32 codes)

64	2	-13.2	-16.2
69	0	-13.2	-16.2
74	2	-13.2	-16.2
78	1	-13.2	-16.2
83	6	-13.2	-16.2
89	1	-13.2	-16.2
93	7	-13.2	-16.2
96	6	-13.2	-16.2
100	1	-13.2	-16.2
105	9	-13.2	-16.2
109	1	-13.2	-16.2
111	0	-13.2	-16.2
115	0	-13.2	-16.2
118	0	-13.2	-16.2
122	5	-13.2	-16.2
125	2	-13.2	-16.2
67	3		-16.2
71	4		-16.2
76	2		-16.2
81	5		-16.2
86	9		-16.2
90	1		-16.2
95	7		-16.2
98	2		-16.2
103	5		-16.2
108	5		-16.2
110	8		-16.2
112	1		-16.2
117	9		-16.2
119	4		-16.2
123	9		-16.2
126	3		-16.2

D.4 DPCH Structure of the Downlink Test Models

It is proposed that for the above test models the following structure is adopted for the DPCH.

It is proposed that the DPDCH and DPCCH have the same power level.

It is proposed that the timeslot structure should be as described by 25.211-300 section 5.3.2 Table 11-slot format 10 that is reproduced in Table 1 below.

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		NData 1	NData 2	NTFCI	NTPC	NPilot
10	60	30	128	450	150	600	40	6	24	0	2	8

It is proposed that the test DPCH has frame structure so that the pilot bits are defined over 15 timeslots according to the relevant columns of 25.211-300 section 5.3.2 Table 12, which are reproduced in Table 2 below.

	N_{pilot} = 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

It is proposed that the TPC bits alternate 00 / 11 starting with 00 in timeslot 0.

It is proposed that 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.

D.4 References

[1] Ericsson, " Downlink test model for 25.141", 3GPP RAN WG4 Tdoc (99) 704.

[2] Hewlett Packard, "Downlink Modulation Quality Measurement", SMG2 UMTS L1-EG Tdoc 622/98.

Annex E (Informative): Open items

#	Section	Section description	Current status	Remarks
52 *	6.5.2.1	Spectrum emission mask	Test conditions and measurement methods are FFS. Description of minimum requirement shall be simplified.	
57	6.4.4.3	Test purpose (Total power dynamic range)	Requirements defined in TS25.104 shall be clarified. Traffic channel shall be turned off, but does it mean test only with a single code or not?	
58	6.6	Transmit intermodulation	Only single carrier case is specified. Multi carrier case shall be specified or not is still open. "Test mode" shall be defined.	
59	6.7.1.1	Test conditions and measurement method (Transmit modulation)	"Triggering scheme" shall be specified precisely.	
62	7.5	Blocking characteristics	Precise parameters for this 2-phase measurement shall be specified.	
64	8	Performance requirement	Only requirements are specified at the moment. Test method to be specified.	
65	4.6.4	Ancillary RF amplifiers	Table 4.3 shall be filled in. Note on passive elements shall be added.	
66	6.4.5	Power control cycles per second		Section is removed. Latency check of TPC shall be needed.
67	6.7	Transmit modulation	Requirement shall be clarified on power range, single code/ Multi-code etc.	
68	4.1	Acceptable uncertainty of measurement equipment	Working assumption shall be fixed as agreed vales.	
69	6.5.2.2	Adjacent Channel Leakage power Ratio	In order to ensure that switching transients due to the slotted mode do not degrade the ACLR value the reference measurements conditions are an item for further study.	
70	7.8.2	Conformance requirement(Verification of the internal BER calculation)	Accuracy of BER measurement in BS shall be specified.	

History

Document history		
V0.0.0	28.Mar. 1999	1st draft
TS 25.141 V0.1.0	22 April 1999	Noted by TSG-RAN as TS 25.141 V0.1.0
V0.1.1	27 May 1999	Updated according to decision agreed at 3GPP TSG RAN WG4 meeting #4, Stockholm, May 10-12, with some small editorial changes.
V0.1.2	14 June 1999	Section title, order are rearranged to be in line with TS25.104
V0.1.3	16 June 1999	Section number is renumbered. Some editorial rearrangement, such as changing page boundaries, correction of style etc., are made.
V1.0.0	17 June 1999	Document status raised to revision V1.0.0 at TSG RAN#4. No technical or editorial content changes from previous version, only version is raised.
V1.0.1	28 June 1999	Further editorial changes, such as renumbering of figure and table numbers, are made. Section 4.1 is revised according to the proposed text in Tdoc.R4(99)348.
V1.0.2	2 July 1999	Section 6.5 through 6.7 are revised according to the proposed text in Tdoc.R4(99)335. Annex-A (Open issues) is subjoined, but it has no contents yet.
V1.0.3	19 July 1999	Removing "[ ]" from description in section 6.3.2, 6.4.2.2, 6.4.3.2, 6.4.4.2, 6.6.2.2.2, 6.6.2.3.1, 6.6.3.1, 6.8.1.2, Section 6.4.2, 6.6.1, are also revised . These changes are made in order to keep in line with TS25.104(v2.1.0).
V1.0.4	22 Aug. 1999	Section 4.1 is revised by proposed text in Tdoc.R4(99)375. Section 8.2.1 is revised by proposed text in Tdoc.R4(99)374 with modification of changing BER to BLER. Open issues presented in Tdoc.R4(99)411 are merged into Annex-A. Also, issues in 0 is added. Section for "Clock frequency accuracy" is inserted as section 4.6 to reflect proposal by Tdoc.R4(99)405. Conformance requirement for it is FFS and this status is reflected to Annex-A (Open issues). Editorial changes: Section 2.(References): List is added. Table and figure number s are re-numbered again. Add **Error! Reference source not found.**, since it is referred by the text body. In Section 0, TPC control step is corrected from 1.6kHz to 1.5kHz. In section **Error! Reference source not found.**, and 0, RBW is corrected as 3.84MHz. Duplicated part just after seciton 8.2.1.1 are removed. They appear just after seciton 8.2.2.3 again. Name of each channels are corrected. (such as BCCH1,2 to PCCPCH etc.)

V2.0.0	24 Sep. 1999	General discription part (Sec.1 – Sec. 5) are revised according to the proposed way in Tdoc. R4(99) 556. Section 6.2.1 and Section 6.5.2 are revised according to the proposed way in Tdoc. R4(99) 557. Section 5.3 is revised according to the proposed way in Tdoc. R4(99) 558. From sec. 7 to the last section are revised according to the proposed way in Tdoc. R4(99) 559. Section for "Spurious response" is removed since related section in TS25.104 was agreed to remove in RAN4#7 meeting. (Tdoc. R4(99)476). Editorial changes: Add "Remarks" column to Open item table in Annex-A.
V2.0.1	27 Sep.1999	Section 2.(References): TS25.113 is subjoined.
V2.0.2	2 Oct.1999	Scope is revised reflecting e-mail discussion.
V2.0.2	13 Oct.1999	Noted by TSG-RAN#5 as V2.0.2.
V2.0.3	24 Oct. 1999	Incorporate editorial correction and changes. Some of these were discussed in AH51 e-mail discussion.
V2.0.4	14 Nov. 1999	Updated according to decision agreed at 3GPP TSG RAN WG4 meeting #8, Sophia Antipolis, Oct.26-29.
V2.0.5	5 Dec. 1999	Updated according to decision agreed at 3GPP TSG RAN WG4 AH51 physical meeting, Heathrow, London UK, Dec. 2-3.
V2.1.0	10 Dec. 1999	Updated according to decision agreed at 3GPP TSG RAN WG4 meeting #9, Bath UK, Oct.7-10.(1st draft)
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V2.1.2	12 Dec. 1999	Editorial changes and corrections, such as renumbering of figure and table numbers, are made.
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