TS S4.11 V1.0.0 (1999-03)

Technical Specification

3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) Radio Access Network (RAN); Working Group 4 (WG4); Base station conformance and testing

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[Editor's note: Structure of this document is based on GSM 11.21.]

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Contents

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project, Technical Specification Group Radio Access Network, Working Group 4 (3GPP TSG RAN WG4).

The contents of this TS may be subject to continuing work within the 3GPP and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e

where:

m indicates [major version number]

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

y the third digit is incremented when editorial only changes have been incorporated into the specification.

1 Scope

This specification describes the documents being produced by the 3GPP TSG RAN WG4and first complete versions expected to be available by end of 1999. This specification gives also general description of the physical layer of the UTRA air interface,

[Editor's note: The following clause shall be revised.]

The S4 series specifies.

For each test, two conformance requirements are specified:

- essential conformance requirements;
- complete conformance requirements.

Essential conformance requirements are those which are required:

a) to ensure compatibility between the radio channels in the same cell;

b) to ensure compatibility between cells, both co-ordinated and unco-ordinated;

c) to ensure compatibility with existing systems in the same or adjacent frequency bands;

d) to verify the important aspects of the transmission quality of the system.

Essential conformance requirements are sufficient to verify the performance of the equipment for radio type approval purposes, in countries where this is applicable.

Complete conformance requirements may be tested to verify all aspects of the performance of a BSS. These requirements are intended to be used by manufacturers and operators to allow conformance and acceptance testing to be performed in a consistent manner; the tests to be performed should be agreed between the parties.

In some tests there are separate requirements for micro-BTS and BTS. If there is no separate requirement for a micro-BTS, the requirements for the BTS apply to a micro-BTS.

In the present document, the reference point for RF connections (except for the measurement of mean transmitted RF carrier power) is the antenna connector, as defined by the manufacturer. This EN does not apply to repeaters or RF devices which may be connected to an antenna connector of a BSS, except as specified in subclause 4.10.

2 References

[Editor's note: Shall be revised later.]

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

3 Definitions and abbreviations

3.1 Definitions

[Editor's note: To be filled in later.]

3.2 Abbreviations

[Editor's note: The following are tentatively taken from ARIB vol.5.]

ARQ	Automatic Repeat Request
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BLER	Block Error Rate
BS	Base Station
CCPCH	Common Control Physical Channel
DCH	Dedicated Channel
DL	Downlink (Forward link)
DPCH	Dedicated Physical Channel
DPCCH	Dedicated Physical Control Channel
DPDCH	Dedicated Physical Data Channel
DS-CDMA	Direct-Sequence Code Division Multiple Access
FACH	Forward Access Channel
FDD	Frequency Division Duplex
FER	Frame Error Rate
Mcps	Mega Chip Per Second
MS	Mobile Station
ODMA	Opportunity Driven Multiple Access
OVSF	Orthogonal Variable Spreading Factor (codes)
PCH	Paging Channel
PG	Processing Gain

PRACH	Physical Random Access Channel
PUF	Power Up Function
RACH	Random Access Channel
RX	Receive
SCH	Synchronisation Channel
SF	Spreading Factor
SIR	Signal-to-Interference Ratio
TDD	Time Division Duplex
TFCI	Transport Format Combination Indicator
TFI	Transport-Format Indicator
TPC	Transmit Power Control
TX	Transmit
UL	Uplink (Reverse link)
VA	Voice Activity

3.2 Radio Frequency bands

3.2.1 Frequency bands

The radio frequency band of IMT-2000 is recommended by ITU as shown in Fig. 2.1-1.

The range of IMT-2000 frequency band is 1885 ~ 2025MHz and 2110 ~ 2200MHz. Some part of this frequency range is designated for MSS (Region 1/3: 1980 ~ 2010MHz and 2170 ~ 2200MHz, Region 2: 1980 ~ 2025MHz and 2160 ~ 2200MHz).

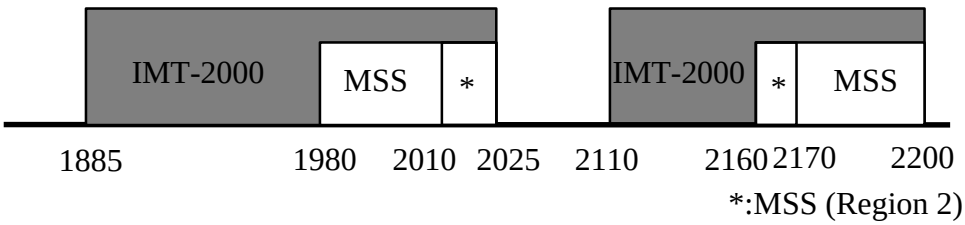

Fig. 2.1-1 Frequency band of IMT-2000

The range of ARIB-WCDMA frequency band is shown in Fig. 2.1-2. (FDD mode Reverse Link: 1920 ~ 1980MHz, FDD mode Forward Link: 2110 ~ 2170MHz, FDD mode Duplex distance: 190MHz, TDD mode: 2010 ~ 2025MHz.)

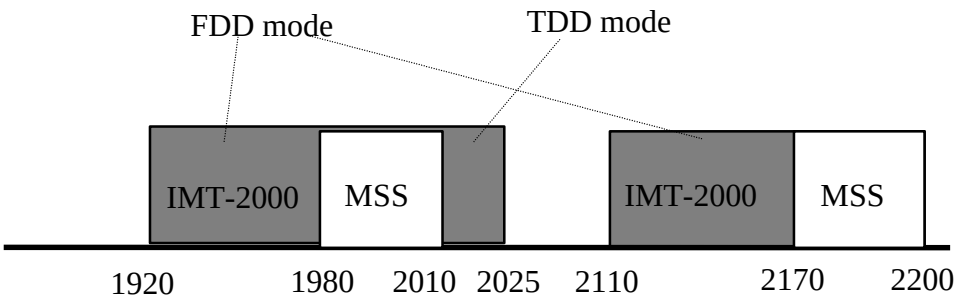

Fig. 2.1-2 Frequency band of the System

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 BTS 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 Output power and determination of power class

The manufacturer shall declare the rated maximum power per TRX. For a micro-BTS, this shall be specified at the antenna connector. For a normal BTS, it shall be stated whether this is specified at the input to the combiner or at the antenna connector of the BSS.

For a micro-BTS, the class of the micro-BTS shall be determined from the declared maximum power, according to table 3.

Table 3: Definition of micro-BTS Power Classes

TRX power class	Maximum output power

NOTE: For a normal BTS, the TRX power class can be determined from the manufacturers declared output power per TRX measured at the input to the combiner, according to the tables of TRX power classes . The test requirements for a normal BTS do not vary in this TS with TRX power classes. The definition of TRX power class only relates to the declared power per TRX and does not impose any requirement on the measured output power of the BTS.

4.2 RF power control

Both SIR based closed loop RF power control and open loop power control functions shall be implemented in Base Station Systems according to xxx.

[Editor's note: Reference shall be properly selected.]

4.3 Discontinuous transmission (DTX)

Discontinuous transmission (DTX), as defined in the specifications , shall be implemented in BSS (transmitter).

4.4 Transmission diversity

Transmission diversity may optionally be implemented in BSS as an operator choice according to S.11[x]. All requirements in this specification, unless otherwise stated, apply whether Transmission diversity is used or not.

4.5 Short Reverse Link Scrambling Code

Short Reverse Link Scrambling Code may optionally be implemented in BSS as an operator choice according to S1.xx[x]. All requirements in this specification, unless otherwise stated, apply whether this scheme is used or not.

4.6 Reverse Link Synchronous Transmission

Reverse Link Synchronous Transmission may optionally be implemented in BSS as an operator choice according to S1.[x]. All requirements in this specification, unless otherwise stated, apply whether this scheme is used or not.

4.7 Site Selection Diversity transmission power control(SSDT)

Site Selection Diversity Transmission power control may optionally be implemented in BSS as an operator choice according to S1.[x]. All requirements in this specification, unless otherwise stated, apply whether this scheme is used or not.

4.8 Inter-BS synchronous operation

[Editor's note: Inter-BS sync/async operation seems to have nothing to do with BS test.]

4.9 Test environments

[Editor's note: This section has been tentatively taken from Sec.4.6, ARIB. Vol.5.]

4.9.1 Temperature and power supply voltage

4.9.1.1 Definition

The temperature and voltage ranges denote the range of ambient temperature and power supply input voltages over which the base station will operate and meet the requirements of this standard. The ambient temperature is the average temperature of the air surrounding the base station equipment. The power supply voltage is the voltage applied at the input terminals of the base station equipment. The

manufacturer is to specify the temperature range and the power supply voltage over which the equipment is to operate.

4.9.1.2 Method of Measurement

The base station equipment shall be installed in its normal configuration (i.e., in its normal cabinet or rack mounting arrangement with all normally supplied cover installed) and placed in a temperature chamber. Optionally, the equipment containing the frequency determining element(s) may be placed in the temperature chamber if the frequency stability is to maintained over a different temperature from that specified for the rest of the base station equipment.

The temperature chamber shall be stabilized at the manufacturer's highest specified operating temperature and then shall be operated in accordance with the standard duty cycle test conditions specified in section that describes standard test conditions, and over the power supply input voltage range specified by the manufacturer. With the base station equipment operating, the temperature is to be maintained at the specified test temperature without forced circulation of air from the temperature chamber being directly applied to the base station equipment.

During the entire duty cycle, the transmitter frequency accuracy, timing reference, output power, and waveform quality shall be measured as specified in section 6.1.1 Transmitter requirement.

Turn the base station equipment off, stabilize the equipment in the chamber at room temperature, and repeat the above measurements after a [minute] standby warm up period.

Turn the base station equipment off, stabilize the equipment in the chamber at the coldest operating temperature specified by the manufacturer, and repeat the above measurements above after a [minute] standby warm up period.

For transmitter frequency stability measurements, the above procedure shall be repeated every [C°] over the operating temperature range specified by the manufacturer. The equipment shall be allowed to stabilize at each step before a frequency measurement is made.

4.9.1.3 [Minimum Standard]

4.9.2 High Humidity

4.9.2.1 Definition

The term 'high humidity' denotes the relative humidity at which the base station will operate with no more than a specified amount of degradation in performance.

4.9.2.2 Method of Measurement

The base station equipment, after having been adjusted for normal operation under standard test conditions, shall be placed, inoperative, in a humidity chamber with the humidity maintained at [0.024] gm H2O/gm Dry Air at [C°] ([%] relative humidity) for a period of not less than eight hours. While in the chamber and at the end of this period, the base station transmitting equipment shall be tested for frequency accuracy, timing reference, output power, and waveform quality. No readjustment of the base station equipment shall be allowed during this test.

4.10 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, unless otherwise stated.

[Editor's note: To be filled in later.]

4.11 Interpretation of measurement results

[Editor's note: To be revised later.]

The measurement value related to the corresponding limit shall be used to decide whether an equipment meets a requirement in this EN.

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 4.7 of this EN.

NOTE: This procedure is recommended in ETR 028 [15].

If the measurement apparatus for a test is known to have a measurement uncertainty greater than that specified in subclause 4.7, 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 4.7 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.

4.12 Selection of configurations for testing

[Editor's note: To be revised later.]

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

- Not all TRXs 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.

4.13 BTS Configurations

[Editor's note: The following subclause shall be described later.]

4.13.1 Receiver diversity

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

4.13.2 Duplexers

The requirements of this EN shall be met with a duplexer fitted, if a duplexer is supplied as part of the BSS. 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 BSS meets the requirements of this EN in both cases.

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

1) Subclause 6.3, Mean transmitted RF power, for the highest static power step only, if this is measured at the antenna connector.

2) Subclause 6.6.2, Conducted spurious emissions from the transmitter antenna connector; outside the BTS transmit band.

3) Subclause 6.8, Intra base station system intermodulation attenuation.

4) Subclause 7.4, Multipath reference sensitivity; for the testing of essential conformance, the ARFCNs 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 ETSI specifications, and may degrade during operation (e.g. due to moisture ingress). Therefore, to ensure continued satisfactory operation of a BSS, 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.

4.13.3 Power supply options

If the BSS 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 BSS 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 BTS, including variation of mains input voltage, temperature and output current.

4.13.4 Ancillary RF amplifiers

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

4.13.5 BSS using antenna arrays

5 Format and interpretation of tests

[Editor's note: Title only. Rearrangement shall be needed.]

6 Transmitter

All tests in this Clause shall be conducted on Base Station Systems fitted with a full complement of Transceivers for the configuration unless otherwise stated. Measurements shall be made at the BTS Tx antenna connector, unless otherwise stated.

Power levels are expressed in dBm.

6.1 Static Layer 1 functions

[Editor's note: Almost title only. To be filled in later.]

6.1.1 Test purpose

To verify the following static Layer 1 transmitter functions:

1) The RF equipment
2) The multiplexing and multiple access functions
3) The interleaving and the channel encoding on the transmit side

6.2 Frequency stability

[Editor's note: Tentatively taken from Sec.6.1.1.1 of ARIB Vol.5. TBD parameters are remained.]

6.2.1 Definition

To verify the frequency stability which is the ability of the transmitter to maintain an assigned carrier frequency.

6.2.2 Test conditions and measurement method

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

6.2.3 Minimum requirement

For all operating temperatures specified by the manufacturer, the base station carrier frequency shall be maintained within ±**TBD** parts per million (ppm) of any assigned channel frequency.

6.3 Modulation accuracy

[Editor's note: Tentatively taken from Sec.6.1.1.6 of ARIB Vol.5.]

6.3.1 Definition

Modulation accuracy is the root-mean-square value of the error of the vector of the ideal signal point .

6.3.2 Test conditions and measurement method

Refer to Figure 6.1.1.6-1 for a functional block diagram of the test setup.

1. Connect the base station RF output port to the modulation analyzer with root-nyquist receive filter function.
2. Set the base station to transmit a signal modulated with BCCH. Total power at the RF output port shall be the nominal power as specified by the manufacturer.
3. Trigger the test equipment from the system time reference signal from the base station.
4. Measure the modulation accuracy factor.

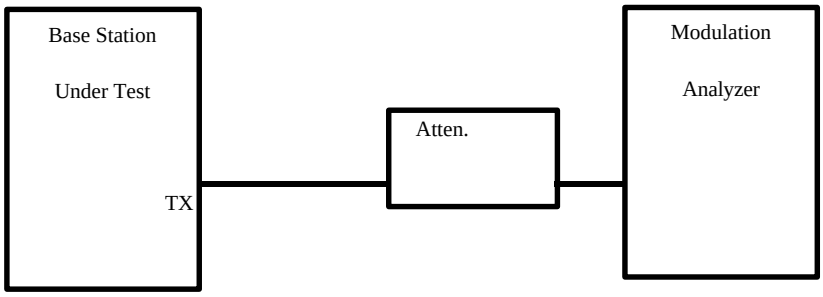

Figure 6.1.1.6-1 Functional Setup for Modulation Accuracy Test.

6.3.3 Minimum requirement

The Modulation accuracy shall not exceed [ ] %.

6.4 Mean transmitted RF carrier power

[Editor's note: This section is tentatively taken from Section 6.1.1.2 of ARIB Vol.5.]

6.4.1 Total power

6.4.1.1 Definition

Total power is the mean power delivered to a load with resistance equal to the nominal load impedance of the transmitter.

6.4.1.1.1 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 Perch

   Channel, Common Physical Channel, and Dedicated Physical Channels as stated bellow.
3. Measure the mean power at the RF output port.

For those base station equipment tests that require multiple code channels be active simultaneously, the configuration shown in Table 6.1.1-1 should be used.

If a different number of Traffic Channels is used unless otherwise specified the partitioning of power shall be as shown in Table 6.1.1-2.

For Tables 6.1.1-1 and 6.1.1-2, the fraction of power noted for each traffic channel shall be inclusive of power control bits.

Table 6.1.1-1. Base Station Test Model, Nominal

Type	Number of Channels	Fraction of Power (Linear)	Fraction of Power (dB)	Comments
Perch	2	**TBD**	TBD	1st /2nd Perch Channel
Common Physical	**TBD**	**TBD**	**TBD**	
Dedicated Physical	**TBD**	**TBD**	**TBD**	

Table 6.1.1-2. Base Station Test Model, General

Type	**Relative Power**
Perch	**TBD** (linear)
Common Physical + Dedicated Physical	Remainder (**TBD**) of total power (linear)
Common Physical	**TBD** dB less than one Dedicated Physical Channel ; rate is **TBD**
Dedicated Physical	Equal Power in Each Traffic Channel ; full rate only

6.4.1.2 Minimum requirement

The total power shall remain within +**TBD** dB and **–TBD** dB of the manufacturer's rated power.

6.4.2 Perch channel power

6.4.2.1 Definition

The perch channel power, sum of the 1st and 2nd perch channel power, to total power ratio is the power attributed perch channel divided by the total power, and is expressed in dB. The 2nd perch channel power is the averaged power during one frame.

6.4.2.2 Test conditions and measurement method

1. Connect the RF output port of the BTS to the Code Domain Analyzer (the Code Domain Analyzer is the equipment that measure perch channel power) using an attenuator or directional coupler if necessary.
2. Configure the BTS to transmit the signal modurated with a combination of the 1st perch channel mapped BCCH (dummy), the 2nd perch channel and DPCH as described in 6.1.1.2.1.
3. Measure the perch channel power to total power ratio.

6.4.2.3 Minimum requirement

Each perch channel power to total power ratio is shall be within ±**TBD** dB of the configured value.

We feel it might not be necessary to define this section because of Forward Link.

6.4.3 Open loop power control

6.4.3.1 Definition

6.4.3.2 Test conditions and measurement method

6.4.3.3 Minimum requirement

6.4.4 Closed loop power control

6.4.4.1 Definition

For closed loop correction on the Forward Traffic Channel (with respect to the open loop estimate), the base station adjust its mean output power level in response to each valid power control bit received from MS on the Reverse Traffic Channel.

6.4.4.2 Test conditions and measurement method

(1) Configure both the base stations under test and a code domain analyzer as shown in the following figure.

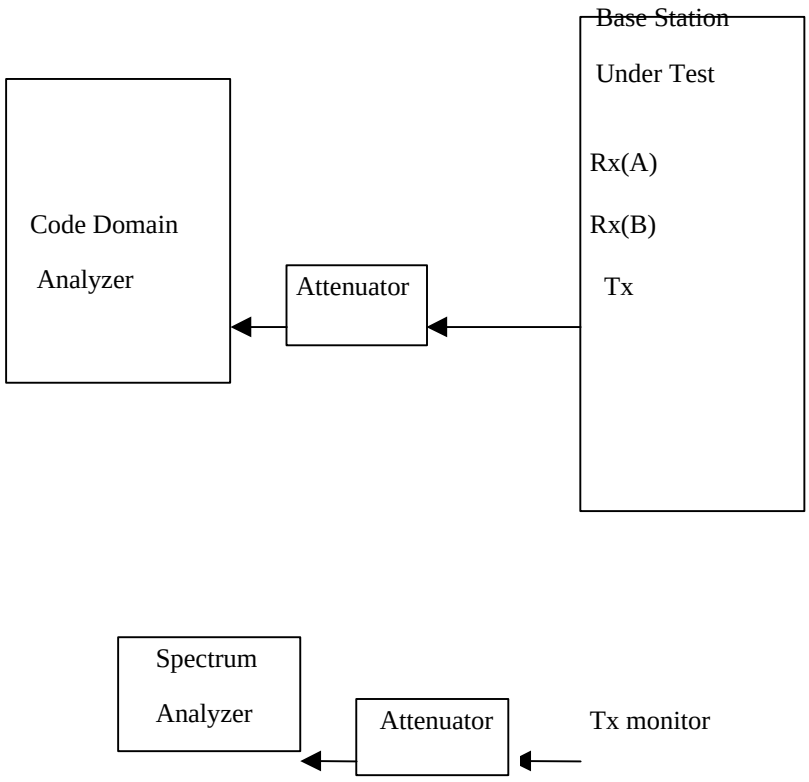

Figure 6.1.1.2.4.2 Configuration for measurement

(2) In the base station under test, set the frequency, disable closed loop power control in DTCH transmission test mode, and then set the transmission power.

(3) Measure the transmission power to confirm it within **TBD** of the set value.

(4) Start the TPC command transmission in the code dmain analyzer, and enable closed loop power control in the base station under test.

(5) Measure the absolute accuracy of transmission power in the base station under test each time TPC command is transmitted.

(6) Set the spectrum analyzer: center frequency is TRX transmission frequency, frequency span is zero-span, bandwidth of resolution is **TBD**, bandwidth of video is **TBD**, and range is **TBD**. Then measure the control step accuracy and control cycle of transmission power, and the transmission ramp up and ramp down time. Carry out the measurement in different symbol rates.

6.4.4.3 Minimum requirement

The minimum requirements are next:

Control range is **TBD**, control step is **TBD**, absolute control accuracy is less than **TBD**, relative control accuracy is less than **TBD** and within **TBD** at **TBD**th power control, control cycle is 0.625ms, and TPC command pattern is **TBD**.

6.5 Transmitted RF carrier power versus time

[Editor's note: This section is tentatively taken from Section 6.1.1.7 of ARIB Vol.5]

6.5.1 Definition

Transmission on/off ratio is a ratio of the mean power when transmitting and the radiation power in no signal state in the transmission frequency band.

6.5.2 Test conditions and measurement method

Refer to Figure 6.1.1.7-1 for a functional block diagram of the test setup.

1. Connect the base station RF output port to the spectrum analyzer.
2. Set the spectrum analyzer condition as follows.

Median frequency	: carrier frequency
Sweep spectrum range	: [0]MHz
Resolution bandwidth	: [**]Hz
Video bandwidth	: Equivalent of resolution bandwidth
Y-axis scale	: 10dB/div
Input level	: Maximum amplitude is to be 70% to 90% of the full scale
Sweep mode	: Single mode
Sweep trigger	: Freerun or video trigger. Generally + voltage, but adjustment is necessary
Sweep time	: [**]m sec
Detection mode	: Sample mode

3. Set the base station to transmit a signal modulated with a combination of BCCH1, BCCH2,

   FACH, and Dedicated Traffic Channels as stated in Table 6.1.1.7-1.
   Total power at the RF output port shall be the nominal power as specified by the manufacturer.

4. Measure the transmission on power.

5. Stop the transmission of the base station.
6. Measure the transmission off power.
7. Calculate the on/off ratio

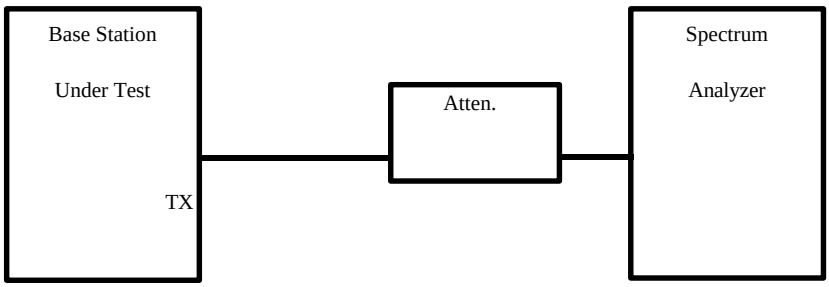

Figure 6.1.1.7-1 Functional Setup for Transmission on/off Ratio Test.

Table 6.1.1.7-1 Base Station Test Model. Nominal

Type	Number of Channels	Fraction of Power(linear)	Fraction of Power (dB)	Comments
BCCH1	1	*****	*****	
BCCH2	1	*****	*****	
FACH	1	*****	*****	
DTCH	***	*****	*****	

6.5.3 Minimum requirement

The transmission on/off ratio shall be more than [ ] dB.

6.6 Adjacent channel power

[Editor's note: This section is tentatively taken from Section 6.1.1.3 of ARIB Vol.5]

6.6.1 Definition

The adjacent channel interference power shall be defined as the power that is radiated within a bandwidth of ±[***]Hz, of which center frequency is separated by Δf Hz from the subject carrier frequency, measured at the base station RF output port.

6.6.2 Test conditions and measurement method

1. Connect a spectrum analyzer (or other suitable test equipment) to the base station RF output port, using an attenuator or directional coupler if necessary.
2. The spectrum analyzer (Digital storage type) is set as shown below.

Median frequency	: carrier frequency
Sweep spectrum range	: [25]MHz
Resolution bandwidth	: [**]Hz
Video bandwidth	: Equivalent of resolution bandwidth
Y-axis scale	: 10dB/div
Input level	: Maxmum amplitude is to be 70% to 90% of the full scale
Sweep mode	: Single mode
Sweep trigger	: Freerun or video trigger. Generally + voltage, but adjustment is necessary
Sweep time	: [**]msec
Detection mode	: Sample mode

3. Set the base station to transmit a signal modulated with a combination of BCCH1, BCCH2, FACH, and Dedicated Traffic Channels as stated in Table 6.1.1.3-1.

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.
5. Sweep the spectrum analyzer over an above sweep spectrum range at least.

Table 6.1.1.3-1 Base Station Test Model, Nominal

Type	Number of Channels	Fraction of Power(linear)	Fraction of Power (dB)	Comments
BCCH1	1	*****	*****	
BCCH2	1	*****	*****	
FACH	1	*****	*****	
DTCH	***	*****	*****	

6.6.3 Minimum requirement

The adjacent channel interference power against the mean output power of the base station in the transmission band shall not exceed the limits specified below.

Δf :[***]Hz off : [***] dB/[***]Hz or less

6.7 Spurious emissions from the transmitter antenna connector

[Editor's note: This section is tentatively taken from Section 6.1.1.4 of ARIB Vol.5]

6.7.1 Definition

Spurious emissions are emissions at frequencies that are outside the assigned CDMA Channel, measured at the base station RF output port.

6.7.2 Test conditions and measurement method

1. Connect a spectrum analyzer to the base station RF output port, using an attenuator

or directional coupler if necessary.

2. The spectrum analyzer (Digital storage type) is set as shown below.

Median frequency	: spurious frequency
Sweep spectrum range	: [**]Hz
Resolution bandwidth	: [**]Hz
Video bandwidth	: Equivalent of resolution bandwidth
Y-axis scale	: 10dB/div
Input level	: Maximum amplitude is to be 70% to 90% of the full scale
Sweep mode	: Single mode
Sweep trigger	: Freerun or video trigger. Generally + voltage, but adjustment is necessary.
Sweep time	: [**]msec
Detection mode	: Sample mode

3. Set the base station to transmit a signal modulated with a combination of BCCH1,

BCCH2, FACH, and Dedicated Traffic Channels as stated in Table 6.1.1.4-1.

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.

5. Sweep the spectrum analyzer over a frequency range from a low radio frequency

(about 25 MHz) to three times the carrier frequency at least.

Table 6.1.1.4-1. Base Station Test Model, Nominal

Type	Number of Channels	Fraction of Power(linear)	Fraction of Power(dB)	Comments
BCCH1	1	[**]	[**]	
BCCH2	1	[**]	[**]	
FACH	1	[**]	[**]	
DTCH	[**]	[**]	[**]	

6.7.3 Minimum requirement

The spurious emission level against the mean output power of the base station in the Transmission band shall not exceed the limits specified below.

In the (a) Concerned Operator's System Bands and the (b) Other Bands Within Cellular Band,

the spurious emission level within a [**]kHz bandwidth shall not exceed a level Specified

in the Table 6.1.1.4-2. In the (c) Other Bands, the spurious emission level within a 1MHz bandwidth shall not exceed a level specified in the Table 6.1.1.4-2. Each transmission band

is defined as follows:

(a) Concerned Operator's System Bands: The bands of the concerned operator's system used for this CDMA system.

(b) Other Bands Within Cellular Band: The 2.0G-band including other operator's cellular system bands, but excluding the (a) Concerned Operator's System Bands.

(c) Other Bands: Other bands entirely consisting of all frequencies, but excluding the above bands (a) and (b).

Table 6.1.1.4-2. Spurious Emission Limits When Transmitting.

Measurement Band	Maximum Spurious Emission Level
Concerned Operator's System Bands	Shown the Adjacent channel leakage power in 6.1.1.3
Other Bands Within Cellular Band	-[**]dB/[**]kHz or [**] μW(-[**]dBm)/[**]kHz, whichever the level is smaller.
Other Bands	If the mean transmission power is no more than 25W: 25μW(-16dBm)/1MHz or less. If the mean transmission power is more than 25W: -60dBc/1MHz or less, and 20mW(+13dBm)/1MHz or less. [current rules in each country shall apply.]

6.8 Intermodulation attenuation

[Editor's note: This section is tentatively taken from Section 6.1.1.5 of ARIB Vol.5]

6.8.1 Definition

The transmit intermodulation shall be defined by the ratio of the output power of subject transmitted signal to the output power of intermodulation product when an interference signal (that differs from frequency of subject signal) is added at a level [**]dB lower than that of the subject signal. The frequency of the interference signal shall be [**]MHz or more off the subject signal, however, as for interference signal whose frequency is in the range of 5MHz to 10MHz off the subject signal, adjacent channel leakage power is used instead of the output of intermodulation product.

6.8.2 Test conditions and measurement method

1. Configure the base station according to the test model described in Figure 6.1.1.5-1.

2. Conditions for measuring instrument is set as follows:

(1) The transmitting wave must have enough directivity so that no leak nor measurement

error occurs in the standard signal generator.

(2) Setting of standard signal generator

Median frequency: Transmission average frequency [**]MHz

(3) The spectrum analyzer (Digital storage type) is set as shown below.

Median frequency	: Intermodulation spurious frequency
Sweep spectrum range	: [**]Hz
Resolution bandwidth	: [**]Hz
Video bandwidth	: Equivalent of resolution bandwidth
Y-axis scale	: 10dB/div
Input level	: Maximum amplitude is to be 70% to 90% of the full scale
Sweep mode	: Single mode
Sweep trigger	: Freerun or video trigger. Generally + voltage, but adjustment is necessary.
Sweep time	: [**]msec
Detection mode	: Sample mode

3. Set the base station to transmit a signal modulated with a combination of BCCH1, BCCH2, FACH, and Dedicated Traffic Channels as stated in Table 6.1.1.4-1.

4. Set the median Frequency of the standard signal generator at the carrier +[**]MHz (or –[**]MHz) and set the output level of standard signal generator so that a maximum transmission output of –[**]dB is in terms of the unit under test antenna output end calculation.

5. Set the switching selector on the unit under test side and obtain power of transmission intermodulated wave by the spectrum analyzer.

6. The ratio of the maximum transmission output and the maximum value of power obtained in 2 corresponds to the transmission intermodulation.

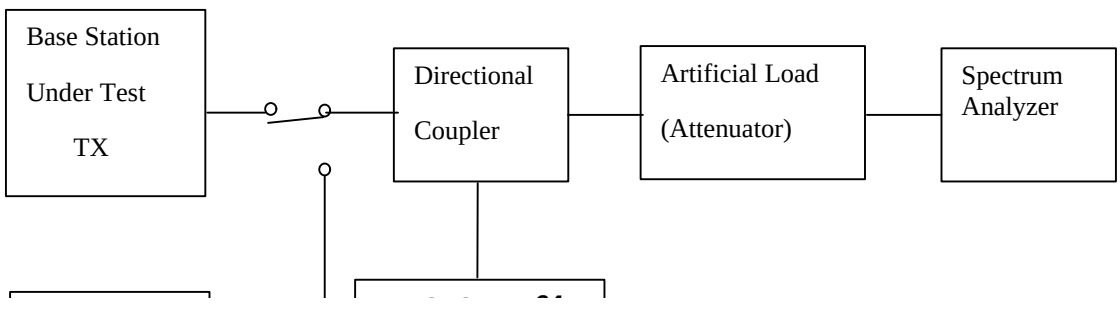

Figure 6.1.1.5-1. Functional Setup for Base Station Intermodulation Spurious Response Testes

6.8.3 Minimum requirement

The Transmit intermodulation level against the mean output power of the base station shall not exceed the limits specified below.

If the mean transmission power is no more than 25W: 25μW(-16dBm) / 1MHz or less.

If the mean transmission power is more than 25W : -60dBc/1MHz or less, and 20mW (+13dBm) / 1MHz or less.

6.9 Intra Base Station System intermodulation attenuation

[Editor's note: Title only. To be filled in later.]

7 Receivers

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. The manufacturer shall provide appropriate logical or physical test access to perform all test in this subclause. Measurements shall include any RX multicoupler.

The tests in this subclause assume that the receiver is not equipped with diversity. For receivers with diversity, the tests may 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.

For receivers with diversity, testing of essential conformance shall be performed by applying the specified signals to one of the receiver inputs, and terminating or disabling the other(s).

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

7.1 Static Layer 1 receiver functions (nominal error ratios)

[Editor's note: Title only. To be filled in later.]

7.2 Erroneous Frame Indication Performance

[Editor's note: Title only. Further study is needed.]

7.3 Static Reference Sensitivity Level

[Editor's note: Tentatively taken from section 6.1.2.1 of ARIB Vol.5.]

The contents of this section are for further study.

7.3.1 Definition

The reception sensitivity is the minimum static reception signal power per diversity branch, measured at the RF input port (antenna feeder connector), at which a minimum performance is obtained for one transport channel using DCH or RACH. The signal power is assumed to be equally applied to the two RF inputs for diversity. The reception sensitivity can be defined for each supported information rate and service. The dimension shall be power and the unit dBm.

7.3.2 Test conditions and measurement methods

This test is performed without interfering signal with equal power applied to each RF input branch according to Figure 6.1.2.1.2-1. In the case duplex operation is supported, the measurement configuration principle is indicated for one duplex branch in Figure 6.1.2.1.2-2. The reference point for signal power is at the input of each receiver (antenna connector).

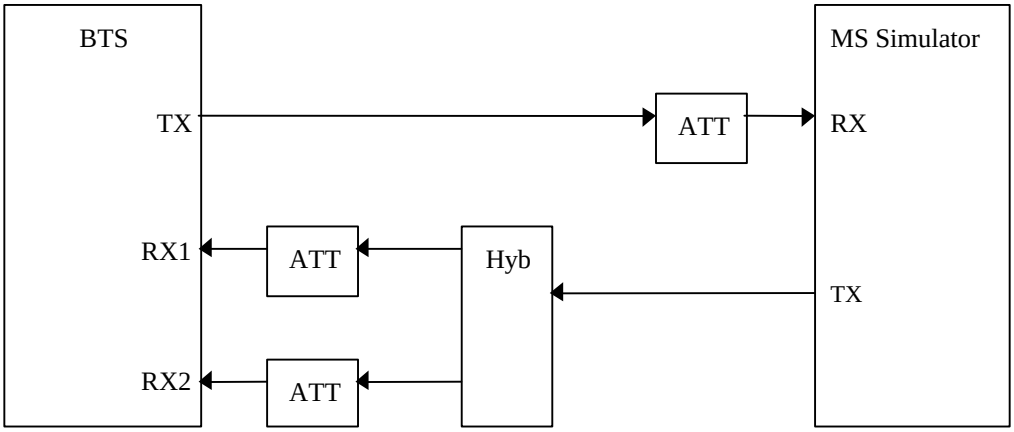

Figure 6.1.2.1.2-1

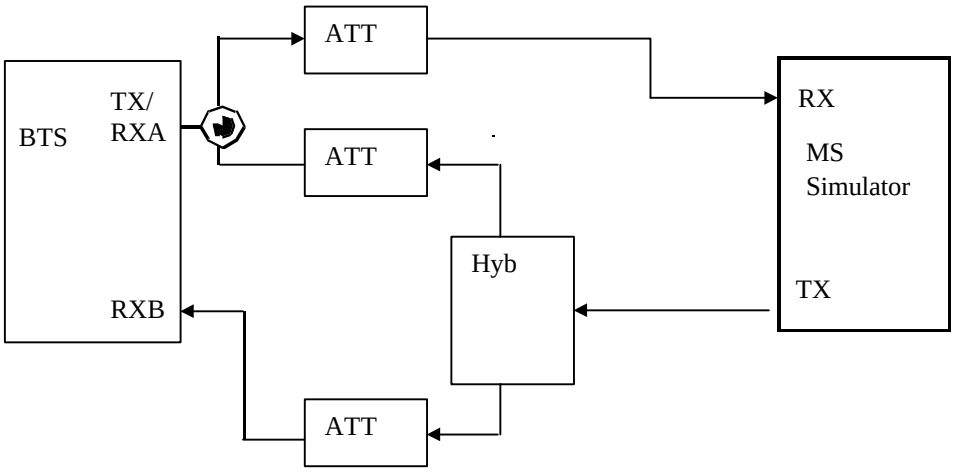

Figure 6.1.2.1.2-2

For each transport channel information rate and bearer service for which sensitivity is specified by the manufacturer, the applicable test in table 6.1.2.1.2-1 shall pass for an input signal equal to the specified sensitivity level.

[BER and UER measurement methods should be defined.]

Transport channel, information rate, service	Physical Channel, channel bit rate	Channel Frequency	Criteria (after channel decoding)	Remark

RACH, TBD kbps, packet	Common control, reverse link 16 ksps	Highest and lowest supported frequency	UER < 3%	
RACH, TBD kbps, packet	Common control, reverse link 64 ksps	Highest and lowest supported frequency	UER < 3%	
DCH, TBD kbps voice	DPDCH, TBD kbps	Highest and lowest supported frequency	BER < 10^-3	
DCH, TBD kbps low speed UDI	DPDCH, TBD kbps	Highest and lowest supported frequency	BER < 10^-6	
DCH, TBD kbps high speed UDI	DPDCH, TBD kbps	Highest and lowest supported frequency	BER < 10^-6	
DCH, TBD kbps, packet	DPDCH, TBD kbps	Highest and lowest supported frequency	UER < 3%	

Table 6.1.2.1.2-1

Note that in the table, services that are not supported by a certain product need not be tested. It might also be that other rates are supported. If sensitivity is specified for other rates, they shall be tested in a similar manner and the criteria shall be given in the specification.

7.3.3 Minimum Requirement

[There is no minimum required reception sensitivity.]

7.4 Multipath Reference Sensitivity Level

[Editor's note: Title only. Further study is needed.]

7.5 Reference interference level

[Editor's note: Tentatively taken from section 6.1.2.6 of ARIB Vol.5.]

7.5.1 Definitions

Spurious Response is a measure of the ability to receive a CDMA signal on the assigned channel frequency in the presence of one interference tone that is outside the assigned channel.

The level of desired signal shall be set +3 dB higher than the reference sensitivity level (refer to 6.1.2.2). The level of interference signal shall be as specified for the base station type, and the frequency within the specified band. This interfering signal shall not yield a bit error rate greater than $1x10^{-3}$ on the desired DTCH.

7.5.2 Test conditions and measurement method

(a) Measuring system diagram

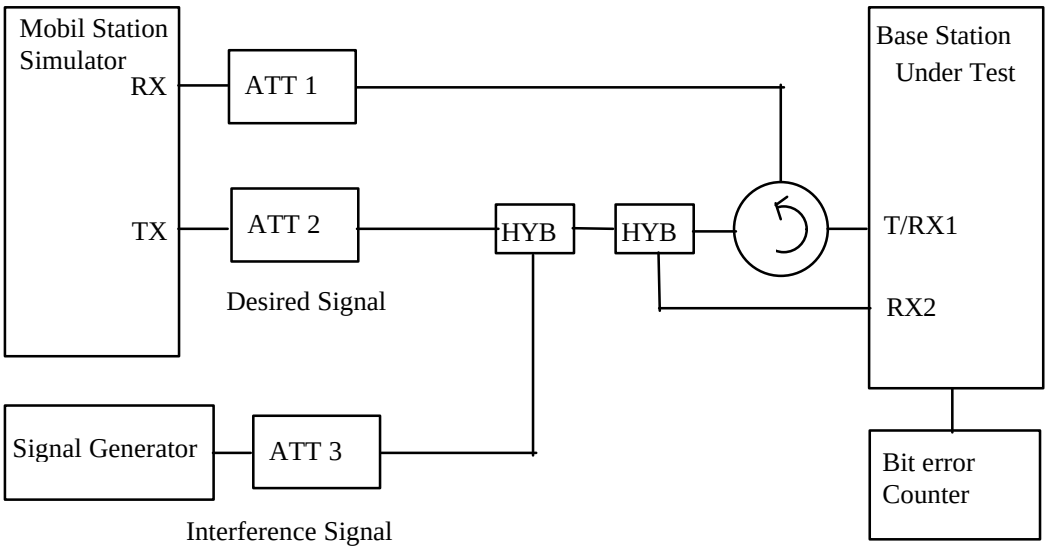

Figure 6.1.2.6.2 Measuring system Setup for Spurious Response

(b) Measurement method

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

(2) Transmitter power control (TPC) is disabled.*

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

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

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

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

(7) The requirement shall be met for all information rates and services specified for the BTS.

*****Necessity and method of closed loop measurement is for future study.

7.5.3 Minimum requirement

Applying the spurious level specified for the base station type, BER of the base station receiver shall be less than $1x10^{-3}$.

7.6 Blocking Characteristics

[Editor's note: Title only. Further study is needed.]

7.7 Intermodulation characteristics

[Editor's note: Tentatively taken from section 6.1.2.5 of ARIB Vol.5.]

7.7.1 Definition

Reception intermodulation sensitivity is the capability of the base station to handle the intermodulation product generated by two CW signals.

7.7.2 Test conditions and measurement method

(a) Measuring system diagram

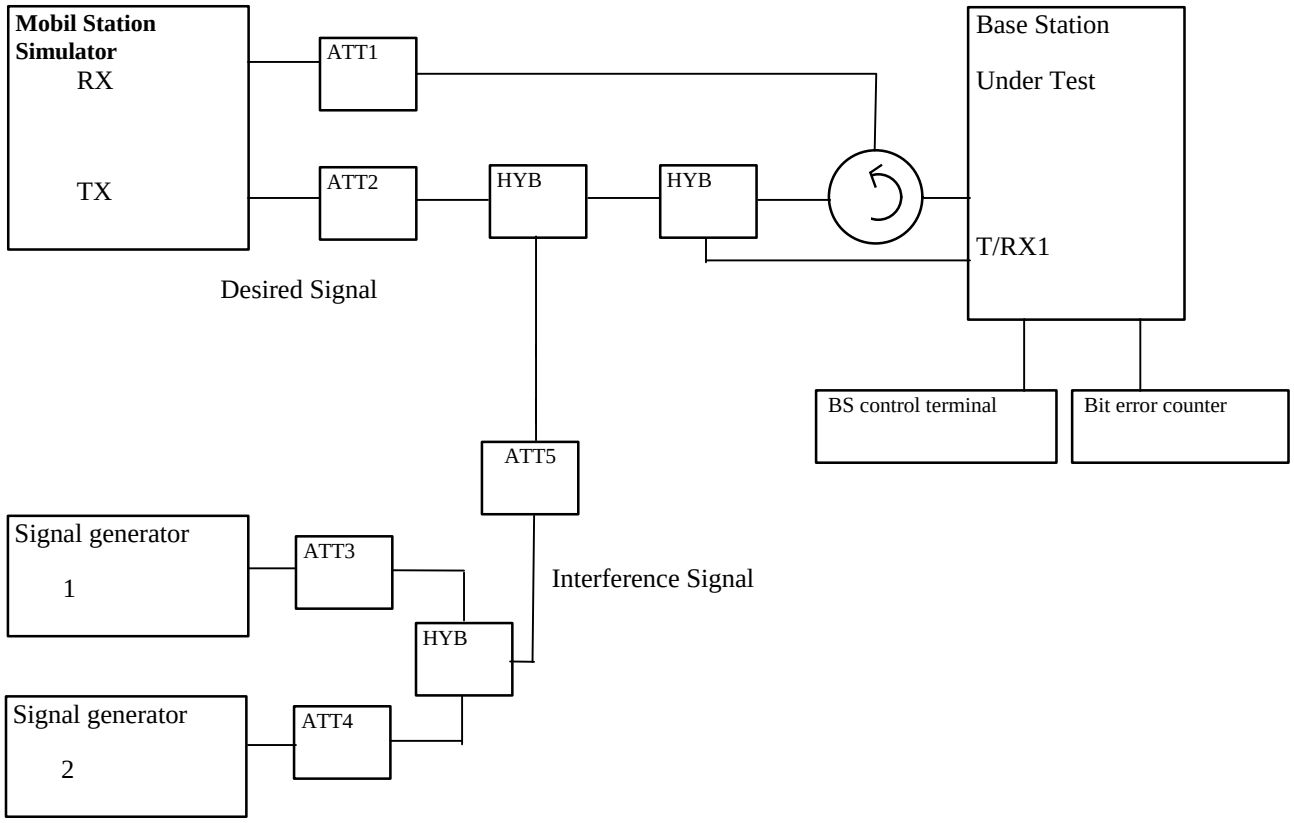

Figure 6.1.2.5.2 Measuring system Setup for Reception Intermodulation sensitivity

(b) Measurement method

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

(2) Transmitter power control(TPC) is disabled.*
(3) Transmit a PN signal from the MS simulator with a level 3dB higher than the minimum required sensitivity level. (refer to 6.1.2.2)
(4) Adjust the Signal generators to frequency offsets of [+10**] MHz and [+20.1**] MHz from the assigned WCDMA channel.
(5) Adjust the power of the Signal generators to the absolute value specified for the base station type.
(6) Measure the BER of the base station.
(7) Confirm that the BER of the base station receiver is less than $1x10^{-3}$.
(8) The requirement shall be met for all information rates and services specified for the BTS.
(9) Repeat the measurement for frequency offsets [-10**] MHz and [-20.1**] MHz.

* Necessity and method of closed loop measurement is for future study.

** These values are working assumption for the 5MHz carrier spacing.

7.7.3 Minimum requirement

Applying the interference signal level specified for the base station type, BER of the base station receiver shall be less than $1x10^{-3}$.

7.8 Spurious emissions from the receiver antenna connector

[Editor's note: Title only. Contents will be described in EMC section..]

8 Radiated spurious emissions

9 Radio link management

[Editor's note: Title only. Will be tentatively taken from section 6.2 through 6.5 of ARIB Vol.5.]

9.1 General

This clause describes the functions of the BSS which gain, maintain and release access to the radio link, the main objective being to provide a stable link for the higher protocol layers whilst hiding, as far as possible, the properties of the radiopath.

9.2 Synchronisation

9.3 Frame structure

9.4 Radio link measurements

Appendix-A History

Document history		
V0.0.0	28.Mar. 1999	1st draft