**TSG RAN Meeting #22** **RP-030599**
**Maui, Hawaii, US, 9 - 12 December 2003**

**Title** **CRs (Rel-5 and Rel-6 Category A) to TS 25.141, "Correction of transmitter tests in case of TX-diversity"**
**Source** **TSG RAN WG4**
**Agenda Item** **7.5.5**

| RAN4 Tdoc | Spec | CR | R | Cat | Rel | Curr Ver | Title | Work Item |
|---|---|---|---|---|---|---|---|---|
| R4-031069 | 25.141 | 321 | 1 | F | Rel-5 | 5.7.0 | Correction of transmitter tests in case of TX-diversity | TEI5 |
| R4-031072 | 25.141 | 323 | 1 | A | Rel-6 | 6.3.0 | Correction of transmitter tests in case of TX-diversity | TEI5 |

**3GPP TSG RAN WG4 (Radio) Meeting #29** **R4-031069**

**San Diego, USA 17 - 21 November 2003**

CR-Form-v7

# CHANGE REQUEST

⌘ **25.141** **CR** **321** ⌘ **rev** **1** ⌘ Current version: **5.7.0** ⌘

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

***Proposed change affects:*** UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Correction of transmitter tests in case of TX-diversity |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI5 |
| ***Date:*** | ⌘ | 26/11/2003 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | Rel-5 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*

| | |
|---|---|
| *2* | *(GSM Phase 2)* |
| *R96* | *(Release 1996)* |
| *R97* | *(Release 1997)* |
| *R98* | *(Release 1998)* |
| *R99* | *(Release 1999)* |
| *Rel-4* | *(Release 4)* |
| *Rel-5* | *(Release 5)* |
| *Rel-6* | *(Release 6)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | This CR aligns the test specification with the core specification 25.104 where it is mentioned that the transmitter requirements are applicable to each antenna connector (main and diversity) when the BS supports transmit diversity. |
| ***Summary of change:*** | ⌘ | • The principle of the transmitter measurements for BS supporting transmit diversity is explained in general sections 4.6 and 6.1.<br>• Some explanations for the EVM test are removed since this test follows the rules mentioned in the general sections. |
| ***Consequences if not approved:*** | ⌘ | Test specification and core specification will be inconsistent for BS supporting transmit diversity.<br>**Isolated impact analysis:**<br>The CR has no impact on Node-B or UE implementation as it clarifies the correct testing of transmitter requirements in case of transmit diversity |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.6.1, 4.6.5, 4.6.6 (new), 6.1, 6.7.1.4.2, |

| ***Other specs affected:*** | ⌘ | Y | N | | ⌘ |
|---|---|---|---|---|---|
| | | | X | Other core specifications | |
| | | | X | Test specifications | |
| | | | X | O&M Specifications | |

| | | |
|---|---|---|
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR323r1 cat. A to 25.141 v6.3.0 |

**How to create CRs using this form:**

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

# 4.6 BS Configurations

## 4.6.1 Receiver diversity

For the tests in clause 7 of the present document, the specified test signals shall be applied to one receiver antenna connector, with the remaining receivers are disabled or their antenna connectors being terminated ~~with 50 Ω~~.

## 4.6.2 Duplexers

The requirements of the present document 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 the present document 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 6.5.3.4.3, 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

The requirements of the present document shall be met with the ancillary RF amplifier fitted. At tests according to clauses 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 the present document 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**

| Receiver Tests | Subclause | TX amplifier only | RX amplifier only | TX/RX amplifiers combined (Note) |
|---|---|---|---|---|
| | 7.2 | | X | X |
| | 7.5 | | X | X |
| | 7.6 | | X | X |
| | 7.7 | | X | |
| Transmitter Tests | 6.2 | X | | X |
| | 6.5.1 | X | | X |
| | 6.5.2.2 | X | | X |
| | 6.5.3 | X | | X |
| | 6.6 | X | | X |

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 subclauses 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 subclause 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: diversity reception does not meet this requirement)~~ thus the outputs from the transmitters as well 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.

In case of diversity, main and diversity antenna are not considered as an antenna array.

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 figure 4.1.

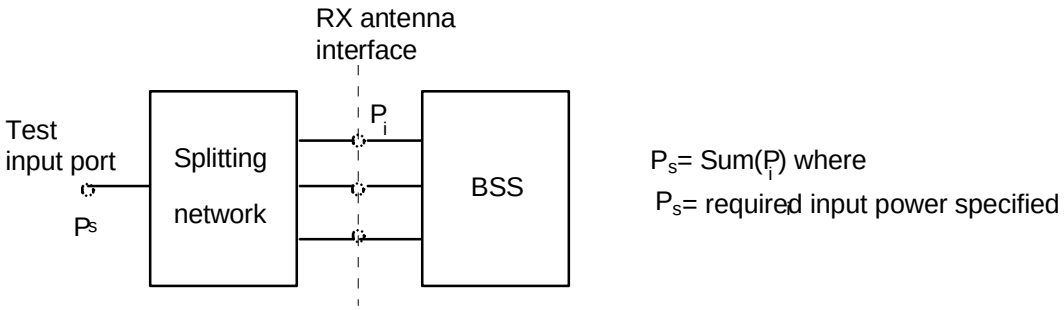


**Figure 4.1: Receiver test set-up**

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 figure 4.2.

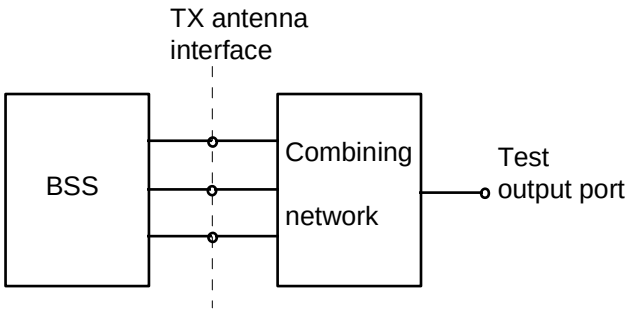


**Figure 4.2: Transmitter test set-up**

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

### 4.6.6 Transmit diversity

Unless otherwise stated, for the tests in clause 6 of the present document, the signal shall be measured at both main and diversity transmitters antenna connectors, with the remaining antenna connector being terminated.

## 4.7 Regional requirements

--- next changed section ---

# 6 Transmitter

## 6.1 General

Unless otherwise stated, the requirements in Section 6 assume transmission without diversity. In case of transmit diversity the requirements apply to each antenna connector separately, with the other one terminated. Unless otherwise stated, the requirements are unchanged.

Unless otherwise stated, all tests in this clause shall be performed at the BS antenna connector (test port A) with a full complement of transceivers for the configuration in normal operating conditions. If any external apparatus such as a TX amplifier, a filter or the combination of such devices is used, the tests according to subclauses 4.6.2 and/or 4.6.4, depending on the device added, shall be performed to ensure that the requirements are met at test port B.

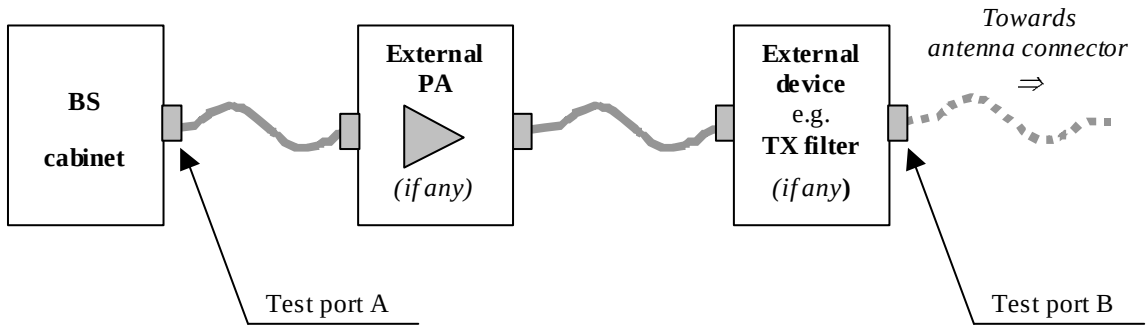


**Figure 6.1: Transmitter test ports**

Power levels are expressed in dBm.

### 6.1.1 Test Models

--- next changed section ---

## 6.7 Transmit modulation

### 6.7.1 Error Vector Magnitude

#### 6.7.1.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3.84 MHz and roll-off $\alpha$ =0.22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot as defined by the C-PICH (when present) otherwise the measurement interval is one timeslot starting with the beginning of the SCH. The requirement is valid over the total power dynamic range as specified in 25.104 subclause 6.4.3. See Annex E of this specification for further details

### 6.7.1.2 Minimum Requirement

The Error Vector Magnitude shall be less than 17.5% when the base station is transmitting a composite signal using only QPSK modulation and shall be less than 12.5 % when the base station is transmitting a composite signal that includes 16QAM modulation.

The normative reference for this requirement is in TS 25.104 [1] subclause 6.8.2

### 6.7.1.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.1.2

### 6.7.1.4 Method of Test

This test method includes the procedure for subclause 6.3.4 Frequency error and 6.4.4.4 Total power dynamic range.

#### 6.7.1.4.1 Initial Conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

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

1) Connect the base station RF output port to the measurement equipment.
2) Set the base station to transmit a signal according to 6.1.1.1 (test model 1)
3) Set BS frequency

#### 6.7.1.4.2 Procedure

1) Start BS transmission at Pmax
2) Measure the Error Vector Magnitude and frequency error as defined in annex E and the mean power of the signal~~. If the base station supports STTD or closed loop transmit diversity, the measurements shall be made on both main and diversity RF output ports~~.
3) Set the total output power to Pmax-18dB using 6.1.1.4 (test model 4) and repeat step 2)

The following test shall be additionally performed if the base station supports HS-PDSCH transmission using 16QAM.

4) Set the total output power to Pmax using 6.1.1.4A (test model 5)
5) Measure the Error Vector Magnitude as defined in annex E and the mean power of the signal~~. If the base station supports STTD, the measurements shall be made on both main and diversity RF output ports~~.

### 6.7.1.5 Test Requirement

The Error Vector Magnitude shall be less than 17.5% when the base station is transmitting a composite signal using only QPSK modulation and shall be less than 12.5 % when the base station is transmitting a composite signal that includes 16QAM modulation.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

## 6.7.2 Peak Code Domain Error

**3GPP TSG RAN WG4 (Radio) Meeting #29** **R4-031072**

**San Diego, USA 17 - 21 November 2003**

*CR-Form-v7*

# CHANGE REQUEST

⌘ **25.141** **CR** **323** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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

***Proposed change affects:*** UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Correction of transmitter tests in case of TX-diversity |
| ***Source:*** | ⌘ | RAN WG4 |
| ***Work item code:*** | ⌘ | TEI5 |
| ***Date:*** | ⌘ | 26/11/2003 |
| ***Category:*** | ⌘ | **A** |
| ***Release:*** | ⌘ | Rel-6 |

*Use one of the following categories:*
***F*** *(correction)*
***A*** *(corresponds to a correction in an earlier release)*
***B*** *(addition of feature),*
***C*** *(functional modification of feature)*
***D*** *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

*Use one of the following releases:*

| | |
|---|---|
| *2* | *(GSM Phase 2)* |
| *R96* | *(Release 1996)* |
| *R97* | *(Release 1997)* |
| *R98* | *(Release 1998)* |
| *R99* | *(Release 1999)* |
| *Rel-4* | *(Release 4)* |
| *Rel-5* | *(Release 5)* |
| *Rel-6* | *(Release 6)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | This CR aligns the test specification with the core specification 25.104 where it is mentioned that the transmitter requirements are applicable to each antenna connector (main and diversity) when the BS supports transmit diversity. |
| ***Summary of change:*** | ⌘ | • The principle of the transmitter measurements for BS supporting transmit diversity is explained in general sections 4.6 and 6.1.<br>• Some explanations for the EVM test are removed since this test follows the rules mentioned in the general sections. |
| ***Consequences if not approved:*** | ⌘ | Test specification and core specification will be inconsistent for BS supporting transmit diversity.<br>**Isolated impact analysis:**<br>The CR has no impact on Node-B or UE implementation as it clarifies the correct testing of transmitter requirements in case of transmitdiversity |

| | | | | | |
|---|---|---|---|---|---|
| ***Clauses affected:*** | ⌘ | 4.6.1, 4.6.5, 4.6.6 (new), 6.1, 6.7.1.4.2, | | | |
| ***Other specs affected:*** | ⌘ | **Y** | **N** | | |
| | | | **X** | Other core specifications | ⌘ |
| | | | **X** | Test specifications | |
| | | | **X** | O&M Specifications | |
| ***Other comments:*** | ⌘ | Equivalent CRs in other Releases: CR321r1 cat. F to 25.141 v5.7.0 | | | |

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# 4.6 BS Configurations

## 4.6.1 Receiver diversity

For the tests in clause 7 of the present document, the specified test signals shall be applied to one receiver antenna connector, with the remaining receivers are disabled or their antenna connectors being terminated with ~~50 Ω~~.

## 4.6.2 Duplexers

The requirements of the present document 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 the present document 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 6.5.3.4.3, 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

The requirements of the present document shall be met with the ancillary RF amplifier fitted. At tests according to clauses 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 the present document 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**

| Receiver Tests | Subclause | TX amplifier only | RX amplifier only | TX/RX amplifiers combined (Note) |
|---|---|---|---|---|
| | 7.2 | | X | X |
| | 7.5 | | X | X |
| | 7.6 | | X | X |
| | 7.7 | | X | |
| **Transmitter Tests** | 6.2 | X | | X |
| | 6.5.1 | X | | X |
| | 6.5.2.2 | X | | X |
| | 6.5.3 | X | | X |
| | 6.6 | X | | X |

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 subclauses 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 subclause 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: diversity reception does not meet this requirement)~~ thus the outputs from the transmitters as well 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.

In case of diversity, main and diversity antenna are not considered as an antenna array.

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 figure 4.1.

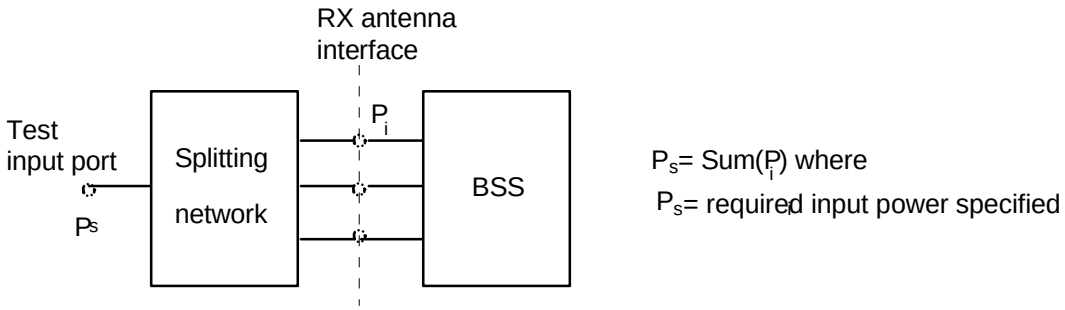


**Figure 4.1: Receiver test set-up**

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

### 4.6.6 Transmit diversity

Unless otherwise stated, for the tests in clause 6 of the present document, the signal shall be measured at both main and diversity transmitters antenna connectors, with the remaining antenna connector being terminated.

## 4.7 Regional requirements

--- next changed section ---

# 6 Transmitter

## 6.1 General

Unless otherwise stated, the requirements in Section 6 assume transmission without diversity. In case of transmit diversity the requirements apply to each antenna connector separately, with the other one terminated. Unless otherwise stated, the requirements are unchanged.

Unless otherwise stated, all tests in this clause shall be performed at the BS antenna connector (test port A) with a full complement of transceivers for the configuration in normal operating conditions. If any external apparatus such as a TX amplifier, a filter or the combination of such devices is used, the tests according to subclauses 4.6.2 and/or 4.6.4, depending on the device added, shall be performed to ensure that the requirements are met at test port B.

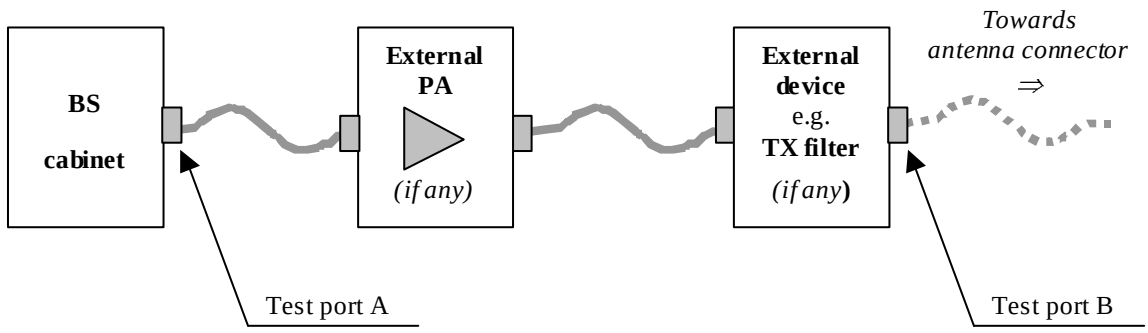


**Figure 6.1: Transmitter test ports**

Power levels are expressed in dBm.

### 6.1.1 Test Models

--- next changed section ---

# 6.7 Transmit modulation

## 6.7.1 Error Vector Magnitude

### 6.7.1.1 Definition and applicability

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3.84 MHz and roll-off $\alpha$ =0.22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot as defined by the C-PICH (when present) otherwise the measurement interval is one timeslot starting with the beginning of the SCH. The requirement is valid over the total power dynamic range as specified in 25.104 subclause 6.4.3. See Annex E of this specification for further details

### 6.7.1.2 Minimum Requirement

The Error Vector Magnitude shall be less than 17.5% when the base station is transmitting a composite signal using only QPSK modulation and shall be less than 12.5 % when the base station is transmitting a composite signal that includes 16QAM modulation.

The normative reference for this requirement is in TS 25.104 [1] subclause 6.8.2

### 6.7.1.3 Test Purpose

To verify that the Error Vector Magnitude is within the limit specified in 6.7.1.2

### 6.7.1.4 Method of Test

This test method includes the procedure for subclause 6.3.4 Frequency error and 6.4.4.4 Total power dynamic range.

#### 6.7.1.4.1 Initial Conditions

Test environment: normal; see subclause 4.4.1.

RF channels to be tested: B, M and T; see subclause 4.8

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

1) Connect the base station RF output port to the measurement equipment.
2) Set the base station to transmit a signal according to 6.1.1.1 (test model 1)
3) Set BS frequency

#### 6.7.1.4.2 Procedure

1) Start BS transmission at Pmax
2) Measure the Error Vector Magnitude and frequency error as defined in annex E and the mean power of the signal. The measurement shall be performed on all 15 slots of the frame defined by the test model. ~~If the base station supports STTD or closed loop transmit diversity, the measurements shall be made on both main and diversity RF output ports.~~
3) Set the total output power to Pmax-18dB using 6.1.1.4 (test model 4) and repeat step 2)

The following test shall be additionally performed if the base station supports HS-PDSCH transmission using 16QAM.

4) Set the total output power to Pmax using 6.1.1.4A (test model 5)

5) Repeat step 2)

#### 6.7.1.5 Test Requirement

The Error Vector Magnitude for every measured slot shall be less than 17.5% when the base station is transmitting a composite signal using only QPSK modulation and shall be less than 12.5 % when the base station is transmitting a composite signal that includes 16QAM modulation.

NOTE: If the above Test Requirement differs from the Minimum Requirement then the Test Tolerance applied for this test is non-zero. The Test Tolerance for this test is defined in subclause 4.2 and the explanation of how the Minimum Requirement has been relaxed by the Test Tolerance is given in Annex F.

### 6.7.2 Peak Code Domain Error