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**Digital cellular telecommunications system (Phase 2+) (GSM);
Base Station System (BSS) equipment specification;
Radio aspects
(3GPP TS 51.021 version 13.8.0 Release 13)**

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Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	9
1 Scope	10
2 References	10
3 Definitions, abbreviations, frequency bands and channels.....	12
3.1 Definitions	12
3.2 Abbreviations	14
3.3 Frequency bands and channels	15
3.3.1 Frequency bands	15
3.3.2 Channels and channel numbering	15
4 General test conditions and declarations	16
4.1 Output power and determination of power class	16
4.2 Specified frequency range	17
4.3 Frequency hopping	17
4.4 RF power control.....	18
4.5 Downlink discontinuous transmission (DTX)	18
4.6 Test environments	18
4.6.1 Normal test environment	18
4.6.2 Extreme test environment	19
4.6.2.1 Extreme temperature	19
4.6.3 Vibration.....	19
4.6.4 Power supply	20
4.7 Acceptable uncertainty of measurement equipment	20
4.8 Interpretation of measurement results	24
4.9 Selection of configurations for testing.....	24
4.10 BTS Configurations.....	25
4.10.1 Receiver diversity	25
4.10.2 Duplexers.....	25
4.10.3 Power supply options.....	26
4.10.4 Ancillary RF amplifiers	26
4.10.5 BSS using antenna arrays	26
4.10.6 BTS supporting 8-PSK modulation	27
4.10.7 BTS supporting additional modulations in EGPRS2	28
4.10.8 Supported Symbol Rate.....	28
4.10.9 Support of RTTI and/or FANR	28
4.10.10 Multicarrier BTS.....	28
4.10.11 Support of EC-GSM-IoT	29
5 Format and interpretation of tests.....	30
6 Transmitter	30
6.1 Static Layer 1 functions.....	31
6.1.1 Test purpose.....	31
6.1.2 Test case	31
6.1.3 Void	31
6.1.4 Conformance requirement	31
6.1.5 Requirement reference	31
6.2 Modulation accuracy	31
6.2.1 Test purpose.....	31
6.2.2 Test case	32
6.2.3 Void	33
6.2.4 Conformance requirement	33

6.2.5	Requirement reference	34
6.3	Mean transmitted RF carrier power and equivalent combined power	35
6.3.1	Test purpose	35
6.3.2	Test case	35
6.3.3	Void	36
6.3.4	Conformance requirement	36
6.3.5	Requirement reference	37
6.4	Transmitted RF carrier power versus time	37
6.4.1	Test purpose	37
6.4.2	Test case	38
6.4.3	Void	38
6.4.4	Conformance requirement	38
6.4.5	Requirement reference	42
6.5	Adjacent channel power	42
6.5.1	Spectrum due to modulation and wideband noise	43
6.5.1.1	Test purpose	43
6.5.1.2	Test case	43
6.5.1.3	Void	43
6.5.1.4	Conformance requirement	44
6.5.1.4.1	Normal BTS Minimum requirement	44
6.5.1.4.2	Multicarrier BTS Minimum requirement	44
6.5.1.4.3	Micro and Pico-BTS Minimum requirement	45
6.5.1.5	Requirement reference	46
6.5.2	Switching transients spectrum	46
6.5.2.1	Test purpose	46
6.5.2.2	Test case	46
6.5.2.3	Void	48
6.5.2.4	Conformance requirement	48
6.5.2.5	Requirement reference	48
6.6	Spurious emissions from the transmitter antenna connector	48
6.6.1	Conducted spurious emissions from the transmitter antenna connector, inside the BTS transmit band	49
6.6.1.1	Test Purpose	49
6.6.1.2	Test Case	49
6.6.1.3	Void	49
6.6.1.4	Conformance requirement	49
6.6.1.5	Requirement Reference	49
6.6.2	Conducted spurious emissions from the transmitter antenna connector, outside the BTS transmit band	50
6.6.2.1	Applicability (Phase 2)	50
6.6.2.1.1	Test Purpose	50
6.6.2.1.2	Test Case	50
6.6.2.1.3	Void	51
6.6.2.1.4	Conformance requirement	51
6.6.2.1.5	Requirement Reference	51
6.6.2.2	Applicability (Phase 2+)	51
6.6.2.2.1	Test Purpose	51
6.6.2.2.2	Test Case	52
6.6.2.2.3	Void	53
6.6.2.2.4	Conformance requirement	53
6.6.2.2.5	Requirement Reference	54
6.6.2.3	Applicability (Release 1999 and later releases GSM 400, GSM 900 and DCS 1800)	54
6.6.2.3.1	Test Purpose	54
6.6.2.3.2	Test Case	54
6.6.2.3.3	Void	55
6.6.2.3.4	Conformance requirement	55
6.6.2.3.5	Requirement Reference	55
6.6.2.4	Applicability (Release 4 and later releases GSM 700, GSM 850 and PCS 1900)	55
6.6.2.4.1	Test Purpose	55
6.6.2.4.2	Test Case	55
6.6.2.4.3	Void	56
6.6.2.4.4	Conformance requirement	56
6.6.2.4.5	Requirement Reference	56

6.6.2.5	Applicability (Release 7 and later releases GSM 400, T-GSM 810, GSM 900 and DCS 1800).....	56
6.6.2.5.1	Test Purpose	56
6.6.2.5.2	Test Case	56
6.6.2.5.3	Void	58
6.6.2.5.4	Conformance requirement	58
6.6.2.5.5	Requirement Reference	58
6.6.2.5a	Applicability (Release 7 and later releases GSM 700, GSM 850 and PCS 1900)	58
6.6.2.5a.1	Test Purpose	59
6.6.2.5a.2	Test Case	59
6.6.2.5a.3	Void	59
6.6.2.5a.4	Conformance requirement	59
6.6.2.5a.5	Requirement Reference	60
6.6.2.6	Applicability (Release 8 and later releases GSM 400, T-GSM 810, GSM 900 and DCS 1800).....	60
6.6.2.6.1	Test Purpose	60
6.6.2.6.2	Test Case	60
6.6.2.6.3	Void	61
6.6.2.6.4	Conformance requirement	61
6.6.2.6.5	Requirement Reference	62
6.6.2.7	Applicability (Release 8 and later releases GSM 700, GSM 850 and PCS 1900)	62
6.6.2.7.1	Test Purpose	63
6.6.2.7.2	Test Case	63
6.6.2.7.3	Void	64
6.6.2.7.4	Conformance requirement	64
6.6.2.7.5	Requirement Reference	65
6.6.2.8	Applicability (Release 8 and later releases GSM 400, GSM 900 and DCS 1800).....	65
6.6.2.8.1	Test Purpose	65
6.6.2.8.2	Test Case	66
6.6.2.8.3	Void	67
6.6.2.8.4	Complete conformance	67
6.6.2.8.5	Requirement Reference	67
6.6.2.9	Applicability (Release 12 and later releases GSM 400, T-GSM 810, GSM 900, ER-GSM 900 and DCS 1800).....	67
6.6.2.9.1	Test Purpose	67
6.6.2.9.2	Test Case	67
6.6.2.9.3	Void	69
6.6.2.9.4	Conformance requirement	69
6.6.2.9.5	Requirement Reference	69
6.6.2.10	Applicability (Release 12 and later releases GSM 400, T-GSM 810, GSM 900 and DCS 1800).....	69
6.6.2.10.1	Test Purpose	70
6.6.2.10.2	Test Case	70
6.6.2.10.3	Void	71
6.6.2.10.4	Conformance requirement	71
6.6.2.10.5	Requirement Reference	72
6.6.2.11	Applicability (Release 12 and later releases GSM 400, GSM 900, ER-GSM 900 and DCS 1800).....	72
6.6.2.11.1	Test Purpose	72
6.6.2.11.2	Test Case	73
6.6.2.11.3	Void	74
6.6.2.11.4	Conformance requirement	74
6.6.2.11.5	Requirement Reference	74
6.7	Intermodulation attenuation (GSM 400, GSM 900, ER-GSM 900 and DCS 1800).....	74
6.7.1	Test purpose.....	74
6.7.2	Test case	74
6.7.3	Void	76
6.7.4	Conformance requirement	76
6.7.5	Requirement reference.....	77
6.8	Intra Base Station System intermodulation attenuation.....	78
6.8.1	Test purpose.....	78
6.8.2	Test case	78
6.8.3	Void	79
6.8.4	Conformance requirement	79
6.8.5	Requirement reference.....	79
6.9	Intra Base Station System intermodulation attenuation, MXM 850 and MXM 1900	80

6.9.1	Test purpose.....	80
6.9.2	Test cases.....	80
6.9.2.1	200 kHz carriers-only.....	80
6.9.2.2	200 kHz and ANSI-136 30 kHz carriers.....	80
6.9.3	Void.....	80
6.9.4	Conformance requirement.....	80
6.9.5	Requirement reference.....	81
6.10	Intra Base Station System intermodulation attenuation, PCS 1900, GSM 850 and GSM 700.....	81
6.10.1	Test purpose.....	81
6.10.2	Test case.....	81
6.10.3	Void.....	82
6.10.4	Conformance requirement.....	82
6.10.5	Requirement reference.....	82
6.11	Intermodulation attenuation (GSM 700, GSM 850, MXM 850, PCS 1900 and MXM 1900).....	82
6.11.1	Test purpose.....	82
6.11.2	Test case.....	83
6.11.3	Void.....	84
6.11.4	Conformance requirement.....	84
6.11.5	Requirement reference.....	85
6.12	Wideband noise and intra BSS intermodulation attenuation in multicarrier operation.....	86
6.12.1	Test purpose.....	86
6.12.2	Test case.....	86
6.12.3	Void.....	88
6.12.4	Conformance requirement.....	88
6.12.5	Requirement reference.....	90
7	Receivers.....	90
7.1	Static Layer 1 receiver functions (nominal error ratios).....	90
7.1.1	Test Purpose.....	90
7.1.2	Test Case.....	91
7.1.3	Void.....	94
7.1.4	Conformance requirement.....	94
7.1.5	Requirement Reference.....	95
7.2	Erroneous Frame Indication Performance.....	95
7.2.1	Test Purpose.....	95
7.2.2	Test Case.....	95
7.2.3	Void.....	96
7.2.4	Conformance requirement.....	96
7.2.5	Requirement reference.....	96
7.3	Static Reference Sensitivity Level.....	97
7.3.1	Test Purpose.....	97
7.3.2	Test Case.....	97
7.3.3	Void.....	104
7.3.4	Conformance requirement.....	104
7.3.5	Requirements Reference.....	109
7.4	Multipath Reference Sensitivity Level.....	109
7.4.1	Test Purpose.....	109
7.4.2	Test Case.....	109
7.4.3	Void.....	123
7.4.4	Conformance requirement.....	124
7.4.5	Requirement Reference.....	134
7.5	Reference interference level.....	134
7.5.1	Test Purpose.....	134
7.5.2	Test Case.....	134
7.5.3	Void.....	153
7.5.4	Conformance requirement.....	154
7.5.5	Requirements Reference.....	170
7.6	Blocking Characteristics.....	170
7.6.1	Test Purpose.....	170
7.6.2	Test Case.....	170
7.6.3	Void.....	178
7.6.4	Conformance requirement.....	178

7.6.5	Requirements reference	180
7.7	Intermodulation characteristics	180
7.7.1	Test Purpose.....	180
7.7.2	Test Case.....	180
7.7.3	Void	182
7.7.4	Conformance requirement	182
7.7.5	Requirement Reference.....	182
7.8	AM suppression.....	183
7.8.1	Test Purpose.....	183
7.8.2	Test Case.....	183
7.8.3	Void	185
7.8.4	Conformance requirement	185
7.8.5	Requirement Reference.....	185
7.9	Spurious emissions from the receiver antenna connector.....	186
7.9.1	Test Purpose.....	186
7.9.2	Test Case.....	186
7.9.3	Void	187
7.9.4	Conformance requirement	187
7.9.5	Requirement Reference.....	187
8	Radiated spurious emissions	187
8.1	Test Purpose	187
8.2	Test Case	187
8.3	Void.....	189
8.4	Conformance requirement	189
8.5	Requirement reference	190
9	Radio link management.....	190
9.1	General	190
9.2	Synchronization.....	190
9.2.1	Timing Tolerance.....	190
9.2.1.1	Test purpose	190
9.2.1.2	Test case.....	191
9.2.1.3	Void.....	191
9.2.1.4	Conformance requirement.....	191
9.2.1.5	Requirement reference	191
9.3	Frame structure.....	191
9.3.1	BCCH Multiframe	192
9.3.1.1	Test purpose	192
9.3.1.2	Test case.....	192
9.3.1.2a	Test case for EC-GSM-IoT	192
9.3.1.3	Void.....	192
9.3.1.4	Conformance requirement.....	192
9.3.1.5	Requirement reference	192
9.3.2	TDMA-frame structure	192
9.3.2.1	Test purpose	192
9.3.2.2	Test case.....	193
9.3.2.3	Void.....	193
9.3.2.4	Conformance requirement.....	193
9.3.2.5	Requirement reference	193
9.4	Radio link measurements	193
9.4.1	Signal Strength.....	194
9.4.1.1	Measurement Accuracy.....	194
9.4.1.1.1	Test purpose	194
9.4.1.1.2	Test case	194
9.4.1.1.3	Void.....	194
9.4.1.1.4	Conformance requirement	194
9.4.1.1.5	Requirement reference.....	196
9.4.1.2	Selectivity of signal strength measurements	196
9.4.1.2.1	Test purpose	196
9.4.1.2.2	Test case	196
9.4.1.2.3	Void.....	197

9.4.1.2.4	Conformance requirement	197
9.4.1.2.5	Requirement reference	197
9.4.2	Signal quality	197
9.4.2.1	Test purpose	197
9.4.2.2	Test case	197
9.4.2.3	Void	198
9.4.2.4	Conformance requirement	198
9.4.2.5	Requirement reference	199
9.4.3	Idle channel signal level	199
9.4.3.1	Test purpose	199
9.4.3.2	Test case	199
9.4.3.3	Void	199
9.4.3.4	Conformance requirement	200
9.4.3.5	Requirement reference	200
9.5	Adaptive frame alignment	200
9.5.1	Test purpose	200
9.5.2	Test case	200
9.5.3	Void	201
9.5.4	Conformance requirement	201
9.5.5	Requirement reference	202
Annex A (informative): Testing of statistical parameters.....		203
A.1	General theoretical methodology	203
A.2	Detailed theoretical methodology	205
A.3	Limitations and corrections to the theoretical methodology	206
A.3.1	Independent errors	206
A.3.2	Gaussian distribution	206
A.3.3	Stationary random processes	206
A.3.4	Low error ratios	207
A.3.5	Total corrections	207
A.4	Alternative experimental methodology	207
A.5	Detailed definition of error events	208
Annex B (informative): Description of special test equipment.....		209
B.1	Base Station System Test Equipment (BSSTE)	209
B.1.1	Fading and multipath propagation simulator	209
B.2	Measurement set ups for TX intermodulation	209
B.2.1	Test set-up for Intermodulation Attenuation (6.7.)	209
B.2.1.1	RX-Band	210
B.2.1.2	Outside RX Band	210
B.2.2	Test set-up for Intra BSS Intermodulation Attenuation (6.8.)	211
B.2.2.1	RX-Band	211
B.2.2.2	TX-Band	211
Annex C (informative): Number of samples needed for statistical testing.....		212
C.1	GSM 900; Number of samples for testing	212
C.2	DCS 1800; Number of Samples for Testing	232
Annex D (informative): Change history		254
History		262

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1 Scope

The present document specifies the Radio Frequency (RF) test methods and conformance requirements for GSM 400, GSM 700, T-GSM 810, GSM 900, ER-GSM 900 and DCS 1800, PCS 1900, GSM 850, MXM 850 and MXM 1900 Base Station Systems (BSS)s. These have been derived from, and are consistent with, the core GSM specifications specified in the requirements reference subclause of each test with the exception that requirements expressed as a reference to regulatory documents (e.g. FCC) have not been included in the present document.

The present document is applicable to BSS meeting the requirements of either GSM Phase 2 or GSM Phase 2+. Unless otherwise stated, all tests are applicable to BSS meeting Phase 2 and/or Phase 2+ GSM requirements, because the requirements of the Phase 2 and Phase 2+ core GSM specifications which are referenced in the test are consistent. Most differences between Phase 2 and Phase 2+ requirements represent Phase 2+ features which are optional for the BSS to support.

Conformance requirements may be tested to verify all aspects of the performance of a BSS. These minimum 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 Rel-7, higher symbol rate is introduced for EGPRS2-B. EGPRS2-A and all other channels use normal symbol rate. For definition of normal and higher symbol rate see 3GPP TS 45.004. All tests and requirements apply to both symbol rates except otherwise stated in the test.

In some tests there are separate requirements for multicarrier BTS, that apply for all classes of multicarrier BTS (Wide Area, Medium Range and Local Area, cf. [22]) unless otherwise stated. If there is no separate requirement for a multicarrier BTS class, the requirement designated for BTS and normal BTS apply to that multicarrier BTS class.

In Rel-12, BTS operating in the ER-GSM 900 band is introduced. In some tests there are separate requirements for BTS operating in the ER-GSM 900 band. If there is no separate requirement, the requirements for normal BTS apply.

In Rel-13, BTS support of a low-complexity, low data throughput service in environments experiencing high propagation attenuation as indoors in basements etc. is introduced. This service, based on EGPRS, with extended coverage is called EC-GSM-IoT. The requirements for EGPRS apply in case no specific requirement is explicitly stated for EC-GSM-IoT.

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. The present document 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

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications "

[2] GSM 04.22: "Digital cellular telecommunications system (Phase 2+); Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

- [3] GSM 05.01: "Digital cellular telecommunications system (Phase 2); Physical layer on the radio path; General description".
- [4] GSM 05.02 (ETS 300 574): "Digital cellular telecommunications system (Phase 2); Multiplexing and multiple access on the radio path".
- [5] GSM 05.03 (ETS 300 575): "Digital cellular telecommunications system (Phase 2); Channel coding".
- [6] GSM 05.04 (ETS 300 576): "Digital cellular telecommunications system (Phase 2); Modulation".
- [7] GSM 05.05 (ETS 300 577): "Digital cellular telecommunications system (Phase 2); Radio transmission and reception".
- [8] GSM 05.08 (ETS 300 578): "Digital cellular telecommunications system (Phase 2); Radio subsystem link control".
- [9] GSM 05.10 (ETS 300 579): "Digital cellular telecommunications system (Phase 2); Radio subsystem synchronization".
- [10] 3GPP TS 08.20: "Digital cellular telecommunications system (Phase 2); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".
- [11] ETSI EN 300 019-1: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-0: Classification of environmental conditions Introduction".
- [12] IEC 60 068-2: "Basic environmental testing procedures; Part 2: Tests".
- [13] IEC 60 721: "Classification of environmental conditions".
- [14] ETSI ETR 027: "Radio and Equipment Systems; methods of measurement for mobile radio equipment".
- [15] ETSI ETR 028: "Radio and Equipment Systems; Uncertainties in the measurement of mobile radio equipment characteristics".
- [16] ITU-R Rec. SM.329-7: "Spurious emissions"
- [17] 3GPP TS 05.05: " Digital cellular telecommunications system (Phase 2+); Radio transmission and reception ".
- [18] 3GPP TS 45.001: "Physical layer on the radio path; General description".
- [19] 3GPP TS 45.002: "Multiplexing and multiple access on the radio path".
- [20] 3GPP TS 45.003: "Channel coding".
- [21] 3GPP TS 45.004: "Modulation".
- [22] 3GPP TS 45.005: "Radio transmission and reception".
- [23] 3GPP TS 45.008: "Radio subsystem link control".
- [24] 3GPP TS 45.010: "Radio subsystem synchronization".
- [25] TIA/EIA-136-C: "TDMA Third Generation Wireless".
- [26] EN 300 019-1-3: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-3; Classification of environmental conditions, Stationary use at weather-protected locations".
- [27] EN 300 019-1-4: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment Part 1-4; Classification of environmental conditions, Stationary use at non-weather-protected locations".
- [28] IEC 60 721-3-3 "Stationary use at weather protected locations".

- [29] IEC 60 721-3-4 "Stationary use at non weather protected locations".
- [30] 3GPP TS 24.022 "Radio Link Protocol (RLP) for circuit switched bearer and teleservices".
- [31] 3GPP TS 48.020 "Rate adaption on the Base Station System - Mobile services Switching Centre (BSS - MSC) interface".
- [32] 3GPP TS 25.113 "Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)".
- [33] 3GPP TS 36.113 "E-UTRA - Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)".

3 Definitions, abbreviations, frequency bands and channels

3.1 Definitions

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

8-PSK: modulation type as defined 3GPP TS 45.004 clause 3.

Carrier Frequency: centre of the ARFCN under test.

GMSK: modulation type as defined by 3GPP TS 45.004 clause 2.

GSM: unless otherwise specified, references to GSM include GSM 400, GSM 700, T-GSM 810, GSM 850, GSM 900, ER-GSM 900, DCS 1800, PCS 1900, MXM 850 and MXM 1900.

GSM 900: unless otherwise specified, references to GSM 900 include P-GSM, E-GSM and R-GSM.

BSS: in the present document, the term BSS (or base station subsystem) applies to both a BTS and integrated BSS. If a separate BSC is required to perform tests on a BTS, the BSC may be regarded as test equipment and the environmental conditions of the BSC need not be controlled.

pico-BTS: as defined in 3GPP TS 45.005. In the present document, this also includes a BSS which incorporates a pico-BTS.

micro-BTS: as defined in 3GPP TS 05.05 and 3GPP TS 45.005. In the present document, this also includes a BSS which incorporates a micro-BTS.

Multicarrier BTS: defined as BTS, characterized by the ability to, in addition to single carrier operation, process two or more carriers in common active components simultaneously.

Wide Area (WA) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from macro cell scenarios. The class has either multicarrier transmitter only, or both multicarrier transmitter and receiver.

Medium Range (MR) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from micro cell scenarios. The class has both multicarrier transmitter and multicarrier receiver.

Local Area (LA) multicarrier BTS: defined as a class of multicarrier BTS, characterized by requirements derived from pico cell scenarios. The class has both multicarrier transmitter and multicarrier receiver.

MXM: mixed Mode system. Mixed-mode is defined as a network that deploys both 30 kHz RF carriers and 200 kHz RF carriers in geographic regions where the Federal Communications Commission (FCC) or similar regulations are applied. In the present document MXM 850 and MXM 1900 are defined.

normal BTS: any BTS or BSS as defined by 3GPP TS 05.05 and 3GPP TS 45.005 which is not a micro-BTS, pico-BTS or multicarrier BTS.

BSSTE: base Station System Test Equipment; see annex B.