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**IMT cellular networks;  
Harmonised Standard for access to radio spectrum;  
Part 18: E-UTRA, UTRA and GSM/EDGE  
Multi-Standard Radio (MSR) Base Station (BS)**

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## Foreword

ETSI EN 301 908-18 V15.0.1 (2021-06)

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

For non-EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.6] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A-1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document is part 18 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.4].

### Proposed national transposition dates

Date of latest announcement of this EN (doa):	3 months after ETSI publication
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## Introduction

The present document is part of a set of standards developed by ETSI that are designed to fit in a modular structure to cover radio equipment within the scope of the Radio Equipment Directive [i.1]. The present document is produced following the guidance in ETSI EG 203 336 [i.2] as applicable.

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# 1 Scope

The present document specifies technical characteristics and methods of measurements for the following equipment types:

- Multi-Standard Radio capable Base stations (NR, E-UTRA, UTRA, GSM/EDGE, NB-IoT).

Operation of NR in combination with UTRA or GSM/EDGE is not supported.

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1-1.

**Table 1-1: Base station operating bands**

Band designation and Band Category (note 1)	Direction of transmission	MSR Base Station operating bands	Relevant EC/ECC decision
1 (BC1)	Transmit	2 110 MHz to 2 170 MHz	[i.19] and [i.20].
	Receive	1 920 MHz to 1 980 MHz	
3 (BC2)	Transmit	1 805 MHz to 1 880 MHz	[i.17] and [i.18]
	Receive	1 710 MHz to 1 785 MHz	
7 (BC1) (note 3)	Transmit	2 620 MHz to 2 690 MHz	[i.21] and [i.22]
	Receive	2 500 MHz to 2 570 MHz	
8 (BC2)	Transmit	925 MHz to 960 MHz	[i.17] and [i.22]
	Receive	880 MHz to 915 MHz	
20 (BC1)	Transmit	791 MHz to 821 MHz	[i.12] and [i.13]
	Receive	832 MHz to 862 MHz	
22 (BC1) (note 13)	Transmit	3 510 MHz to 3 590 MHz	[i.7] and [i.24]
	Receive	3 410 MHz to 3 490 MHz	
28 (BC1) (notes 4 and 6)	Transmit	758 MHz to 803 MHz	[i.9] and [i.10]
	Receive	703 MHz to 748 MHz	
31 (BC1) (note 14)	Transmit	462,5 MHz to 467,5 MHz	[i.11]
	Receive	452,5 MHz to 457,5 MHz	
32 (BC1) (notes 10, 11 and 13)	Transmit	1 452 MHz to 1 496 MHz	[i.14], [i.15] and [i.16]
	Receive	N/A	
33 (BC3)	Transmit and Receive	1 900 MHz to 1 920 MHz	[i.19]
38 (BC3)	Transmit and Receive	2 570 MHz to 2 620 MHz	[i.22] and [i.23]
40 (BC3)	Transmit and Receive	2 300 MHz to 2 400 MHz	[i.21]
41 (BC3) (note 7)	Transmit and Receive	2 496 MHz to 2 690 MHz	[i.22] and [i.23]
42 (BC3)	Transmit and Receive	3 400 MHz to 3 600 MHz	[i.7] and [i.24]
43 (BC3)	Transmit and Receive	3 600 MHz to 3 800 MHz	[i.7] and [i.24]
50 (BC3) (note 10)	Transmit and Receive	1 432 MHz to 1 517 MHz	[i.15]
51 (BC3) (note 10)	Transmit and Receive	1 427 MHz to 1 432 MHz	[i.15]
65 (BC1) (notes 2 and 16)	Transmit	2 110 MHz to 2 200 MHz	[i.19], [i.20] and [i.25]
	Receive	1 920 MHz to 2 010 MHz	
67 (BC1) (notes 10 and 15)	Transmit	738 MHz to 758 MHz	[i.9] and [i.10]
	Receive	N/A	
68 (BC1) (note 15)	Transmit	753 MHz to 783 MHz	[i.9] and [i.10]
	Receive	698 MHz to 728 MHz	
69 (BC1) (notes 2 and 10)	Transmit	2 570 MHz to 2 620 MHz	[i.22] and [i.23]
	Receive	N/A	
72 (BC1) (note 14)	Transmit	461 MHz to 466 MHz	[i.11]
	Receive	451 MHz to 456 MHz	
75 (BC1) (notes 2 and 10)	Transmit	1 432 MHz to 1 517 MHz	[i.14], [i.15] and [i.16]
	Receive	N/A	

Band designation and Band Category (note 1)	Direction of transmission	MSR Base Station operating bands	Relevant EC/ECC decision
76 (BC1) (notes 2 and 10)	Transmit	1 427 MHz to 1 432 MHz	[i.15] and [i.16]
	Receive	N/A	
77 (BC3) (notes 8 and 12)	Transmit and Receive	3 300 MHz to 4 200 MHz	[i.7] and [i.24]
78 (BC3) (notes 9 and 12)	Transmit and Receive	3 300 MHz to 3 800 MHz	[i.7] and [i.24]
Band 87 (note 14)	Transmit	420 MHz to 425 MHz	[i.11]
	Receive	410 MHz to 415 MHz	
Band 88 (note 14)	Transmit	422 MHz to 427 MHz	[i.11]
	Receive	412 MHz to 417 MHz	
<p>NOTE 1: The band designations given are the MSR BS band designations. The relation between the band designations for MSR BS and the designations for NR, E-UTRA, UTRA and GSM/EDGE are given in table 4.4-1 of ETSI TS 137 141 [1].</p> <p>NOTE 2: The band is for NR and/or E-UTRA only.</p> <p>NOTE 3: The band is for NR, E-UTRA and/or UTRA only.</p> <p>NOTE 4: The band is for NR, E-UTRA and/or NB-IoT only.</p> <p>NOTE 5: Void.</p> <p>NOTE 6: In Europe according to [i.9] and [i.11], radio equipment in band 28 operates between 758 MHz and 791 MHz for the transmitter (<math>F_{DL\_low} = 758</math> MHz and <math>F_{DL\_high} = 791</math> MHz) and between 703 MHz and 736 MHz for the receiver (<math>F_{UL\_low} = 703</math> MHz and <math>F_{UL\_high} = 736</math> MHz).</p> <p>NOTE 7: In Europe according to [i.22] and [i.24], radio equipment in band 41 operates between 2 570 MHz and 2 620 MHz (<math>F_{DL\_low} = 2 570</math> MHz and <math>F_{DL\_high} = 2 620</math> MHz).</p> <p>NOTE 8: In Europe according to [i.7] and [i.25], radio equipment in band 77 operates between 3 400 MHz and 4 200 MHz (<math>F_{DL\_low} = 3 400</math> MHz and <math>F_{DL\_high} = 4 200</math> MHz).</p> <p>NOTE 9: In Europe according to [i.7] and [i.25], radio equipment in band 78 operates between 3 400 MHz and 3 800 MHz (<math>F_{DL\_low} = 3 400</math> MHz and <math>F_{DL\_high} = 3 800</math> MHz).</p> <p>NOTE 10: Restricted to NR and/or E-UTRA operation when carrier aggregation is configured. The downlink operating band is paired with the uplink operating band (external) of the carrier aggregation configuration that is supporting the configured Pcell.</p> <p>NOTE 11: Restricted to UTRA operation when dual band is configured (e.g. DB-DC-HSDPA or dual band 4C-HSDPA). The down link frequency(ies) of this band are paired with the uplink frequency(ies) of the other FDD band (external) of the dual band configuration.</p> <p>NOTE 12: The band is for NR only.</p> <p>NOTE 13: The band is for E-UTRA and/or UTRA only.</p> <p>NOTE 14: The band is for E-UTRA and/or NB-IoT only.</p> <p>NOTE 15: The band is for E-UTRA only.</p> <p>NOTE 16: This band includes two frequency ranges that are harmonised in Europe:</p> <p>(a) According to [i.23] and [i.24], radio equipment in band 65 operates between 2 110 MHz to 2 170 MHz for the transmitter (<math>F_{DL\_low} = 2 110</math> MHz and <math>F_{DL\_high} = 2 170</math> MHz), and between 1 920 MHz to 1 980 MHz for the receiver (<math>F_{UL\_low} = 1 920</math> MHz and <math>F_{UL\_high} = 1 980</math> MHz).</p> <p>(b) Based on [i.25], radio equipment in band 65 operates between 2 170 MHz to 2 200 MHz for the transmitter (<math>F_{DL\_low} = 2 170</math> MHz and <math>F_{DL\_high} = 2 200</math> MHz) and between 1 980 MHz to 2 010 MHz for the receiver (<math>F_{UL\_low} = 1 980</math> MHz and <math>F_{UL\_high} = 2 010</math> MHz) as the Complementary Ground Component (CGC) of a Mobile-satellite service by reference to the present Harmonised Standard.</p>			

NOTE 1: For BS capable of multi-band operation, the supported operating bands may belong to different Band Categories.

The present document covers conducted requirements for multi-RAT capable NR, E-UTRA, UTRA and GSM/EDGE MSR Base Stations for 3GPP™ Release 9, 10, 11, 12, 13, 14 and 15. This includes the requirements for MSR operating bands from 3GPP Release 16.

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference/>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI TS 137 141 (V15.11.0) (09-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing (3GPP TS 37.141 version 15.11.0 Release 15)".
- [2] ETSI TS 125 104 (V15.5.0) (04-2019): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 15.5.0 Release 15)".
- [3] ETSI TS 125 105 (V15.0.0) (07-2018): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105 version 15.0.0 Release 15)".
- [4] ETSI TS 136 104 (V15.9.0) (07-2020): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 15.9.0 Release 15)".
- [5] ETSI TS 145 005 (V15.3.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); GSM/EDGE Radio transmission and reception (3GPP TS 45.005 version 15.3.0 Release 15)".
- [6] ETSI EN 301 908-3 (V13.1.1) (09-2019): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)".
- [7] ETSI EN 301 908-14 (V15.1.1-13.0.1) (03-2021): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)".
- [8] Void.
- [9] ETSI EN 301 502 (V12.5.2) (03-2017): "Global System for Mobile communications (GSM); Base Station (BS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
- [10] ETSI TS 137 104 (V15.11.0) (09-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; NR, E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception (3GPP TS 37.104 version 15.11.0 Release 15)".
- [11] ETSI TS 136 141 (V15.9.0) (07-2020): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 15.9.0 Release 15)".
- [12] ETSI TS 125 141 (V15.4.0) (04-2019): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 15.4.0 Release 15)".
- [13] ETSI TS 125 142 (V15.0.1) (07-2018): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (TDD) (3GPP TS 25.142 version 15.0.1 Release 15)".

- [14] ETSI TS 151 021 (V15.3.0) (04-2020): "Digital cellular telecommunications system (Phase 2+) (GSM); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 51.021 version 15.3.0 Release 15)".
- [15] ETSI TS 138 141-1 (V15.6.0) (07-2020): "5G; NR; Base Station (BS) conformance testing; Part 1: Conducted conformance testing (3GPP TS 38.141-1 version 15.6.0 Release 15)".
- [16] ETSI TS 138 104 (V15.10.0) (07-2020): "5G; NR; Base Station (BS) radio transmission and reception (3GPP TS 38.104 version 15.10.0 Release 15)".
- [17] Void.

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] Directive 2014/53/EU of the European Parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.2] ETSI EG 203 336 (V1.2.1) (05-2020): "Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.3] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.4] ETSI EN 301 908-1 (V11.1.1): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements".
- [i.5] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".
- [i.6] Commission implementing decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.7] Commission Implementing Decision (EU) 2019/235 of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3 400-3 800 MHz frequency band.
- [i.8] ETSI TS 103 807 (V1.1.1): "Mobile Standards Group (MSG); IMT Cellular Networks Base Stations (BS)".
- [i.9] ECC Decision (15)01: "Harmonised technical conditions for mobile/fixed communications networks (MFCN) in the band 694-790 MHz including a paired frequency arrangement (Frequency Division Duplex 2x30 MHz) and an optional unpaired frequency arrangement (Supplemental Downlink)", Approved 06 March 2015.
- [i.10] Commission Implementing Decision (EU) 2016/687 of 28 April 2016 on the harmonisation of the 694-790 MHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services and for flexible national use in the Union.

- [i.11] ECC Decision (16)02: "Harmonised technical conditions and frequency bands for the implementation of Broadband Public Protection and Disaster Relief (BB-PPDR) systems", Approved 17 June 2016.
- [i.12] ECC Decision (09)03: "Harmonised conditions for mobile/fixed communications networks (MFCN) operating in the band 790 - 862 MHz", 30 October 2009.
- [i.13] Commission Decision 2010/267/EU of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union.
- [i.14] ECC Decision (13)03: "The harmonised use of the frequency band 1 452-1 492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)".
- [i.15] ECC Decision 17(06): "The harmonised use of the frequency bands 1 427-1 452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)", Approved 17 November 2017, corrected 2 March 2018.
- [i.16] Commission Implementing Decision (EU) 2018/661 of 26 April 2018 amending Implementing Decision (EU) 2015/750 on the harmonisation of the 1452-1492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union as regards its extension in the harmonised 1427-1452 MHz and 1492-1517 MHz frequency bands.
- [i.17] Implementing Decision 2011/251/EU amending Decision 2009/766/EC on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community.
- [i.18] ECC Decision (06)13: "Designation of the bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial UMTS, LTE, WiMAX and IoT cellular systems", Approved 01 December 2006, Amended 8 March 2019.
- [i.19] ECC Decision (06)01: The harmonised utilisation of the bands 1920-1980 MHz and 2110-2170 MHz for mobile/fixed communications networks (MFCN) including terrestrial IMT systems, Approved 24 March 2006, Amended 8 March 2019.  
<https://standards.iteh.ai/catalog/standards/sist/1ce550c0-0052-412a-9331-588d-6047e3130130>
- [i.20] Commission Implementing Decision (EU) 2020/667 of 6 May 2020 amending Decision 2012/688/EU as regards an update of relevant technical conditions applicable to the frequency bands 1 920-1 980 MHz and 2 110-2 170 MHz.
- [i.21] ECC Decision 14(02): "Harmonised technical and regulatory conditions for the use of the band 2 300-2 400 MHz for Mobile/Fixed Communications Networks (MFCN)", Approved 27 June 2014.
- [i.22] ECC Decision 05(05): "Harmonised utilization of spectrum for Mobile/Fixed Communications Networks (MFCN) operating within the band 2 500-2 690 MHz", Approved 18 March 2005, Amended 05 July 2019.
- [i.23] Commission Implementing Decision (EU) 2020/636 of 8 May 2020 amending Decision 2008/477/EC as regards an update of relevant technical conditions applicable to the 2 500-2 690 MHz frequency band.
- [i.24] ECC Decision 11(06): "Harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz" Approved 09 December 2011, Amended 26 October 2018.
- [i.25] ECC Decision 06(09): "Designation of the bands 1980-2010 MHz and 2170-2200 MHz for use by systems in the Mobile-Satellite Service including those supplemented by a Complementary Ground Component (CGC)", Approved 01 December 2006, Amended 05 September 2007.

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

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

**band category:** group of operating bands for which the same MSR scenarios apply

NOTE: The band categories for MSR BS are defined in clause 4.4 of ETSI TS 137 141 [1] and are listed in table 1-1.

**Base Station class:** wide area Base Station, medium range Base Station or local Area Base Station, as declared by the manufacturer

**Base Station RF bandwidth:** bandwidth in which a Base Station transmits and/or receives single or multiple carrier(s) and/or RATs simultaneously within a supported operating band

NOTE: In single carrier operation, the Base Station RF bandwidth is equal to the channel bandwidth.

**Base Station RF bandwidth edge:** frequency of one of the edges of the Base Station RF bandwidth

**carrier:** modulated waveform conveying the NR, E-UTRA, UTRA or GSM/EDGE physical channels

**carrier aggregation:** aggregation of two or more NR or E-UTRA component carriers in order to support wider transmission bandwidths

**carrier aggregation band:** set of one or more operating bands across which multiple NR or E-UTRA carriers are aggregated with a specific set of technical requirements

NOTE: The term channel bandwidth is referred to as BS channel bandwidth in the NR specifications, since for NR the BS and UE may operate with differing bandwidths.

**carrier power:** power at the antenna connector in the channel bandwidth of the carrier, averaged over at least one subframe for NR or E-UTRA, at least one slot for UTRA and the useful part of the burst for GSM/EDGE

**channel bandwidth:** RF bandwidth supporting a single NR, E-UTRA, UTRA or GSM/EDGE RF carrier

NOTE: The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

**configured carrier power:** target maximum power for a specific carrier for the operating mode set in the BS

**contiguous spectrum:** spectrum consisting of a contiguous block of spectrum with no sub-block gap(s)

**downlink operating band:** part of the operating band designated for downlink

**inter RF bandwidth gap:** frequency gap between two consecutive Base Station RF bandwidths that are placed within two supported operating bands

**inter-band gap:** frequency gap between two supported consecutive operating bands

**intra-band contiguous carrier aggregation:** contiguous NR or E-UTRA carriers aggregated in the same operating band

**local area Base Station:** Base Stations characterized by requirements derived from picocell scenarios with a BS to UE minimum coupling loss equal to 45 dB

**lower Base Station RF bandwidth edge:** frequency of the lower edge of the Base Station RF bandwidth, used as a frequency reference point for transmitter and receiver requirements

**lower sub-block edge:** frequency at the lower edge of one sub-block

NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

**maximum Base Station RF bandwidth:** maximum RF bandwidth supported by a Base Station within each supported operating band

NOTE: The Maximum Base Station RF bandwidth for BS configured for contiguous and non-contiguous operation within each supported operating band is declared separately.

**maximum carrier output power:** carrier power available at the antenna connector for a specified reference condition

**maximum radio bandwidth:** maximum frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

**maximum throughput:** maximum achievable throughput for a reference measurement channel

**maximum total output power:** sum of the power of all carriers available at the antenna connector for a specified reference condition

**MB-MSR Base Station:** MSR Base Station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s)

**mean power:** power measured in the bandwidth and period of measurement applicable for each RAT

NOTE: Mean power for an E-UTRA carrier is defined in clause 3.1 of ETSI TS 136 141 [11] and mean power for a UTRA carrier is defined in clause 3.1 of ETSI TS 125 141 [12]. In case of multiple carriers, the mean power is the sum of the mean power of all carriers.

**measurement bandwidth:** bandwidth in which an emission level is specified

**medium range Base Station (BS):** Base Stations characterized by requirements derived from micro cell scenarios with a BS to UE minimum coupling loss equal to 53 dB

**MSR Base Station (BS):** Base Station characterized by the ability of its receiver and transmitter to process two or more carriers in common active RF components simultaneously in a declared Base Station RF bandwidth, where at least one carrier is of a different RAT than the other carrier(s)

**multi-band connector:** antenna connector of the BS type I-C associated with a transmitter or receiver that is characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different *operating band* than the other carrier(s) and where this different *operating band* is not a sub-band or superseding-band of another supported operating band.

**multi-band receiver:** receiver characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s)

**multi-band transmitter:** transmitter characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different operating band (which is not a sub-band or superseding-band of another supported operating band) than the other carrier(s)

**NB-IoT in-band operation:** operation of NB-IoT utilizing the resource block(s) within a normal E-UTRA carrier

**NB-IoT guard band operation:** operation of NB-IoT utilizing the unused resource block(s) within a E-UTRA carrier's guard-band

**NB-IoT standalone operation:** operation of NB-IoT utilizing its own spectrum, for example the spectrum currently being used by GERAN systems as a replacement of one or more GSM carriers, as well as scattered spectrum for potential IoT deployment

**non-contiguous spectrum:** spectrum consisting of two or more sub-blocks separated by sub-block gap(s)

**operating band:** frequency range in which NR, E-UTRA, UTRA or GSM/EDGE operates (paired or unpaired), that is defined with a specific set of technical requirements

NOTE: The operating band(s) for a Base Station is declared by the manufacturer. Operating bands have designations according to table I-1.