



**Fixed Radio Systems;
Multipoint Equipment and Antennas;
Part 2: Harmonised Standard for access to radio spectrum**

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Contents

Intellectual Property Rights	7
Foreword.....	7
Modal verbs terminology.....	8
Introduction	8
1 Scope	10
2 References	10
2.1 Normative references	10
2.2 Informative references.....	11
3 Definition of terms, symbols and abbreviations.....	13
3.1 Terms.....	13
3.2 Symbols.....	17
3.3 Abbreviations	17
4 Framework for requirements	19
4.1 Generality.....	19
4.1.0 The "Manufacturer's declaration" concept.....	19
4.1.1 Applicability of requirements	19
4.1.1.1 Generality.....	19
4.1.1.2 The Equipment Classification (EqC)	20
4.1.2 Asymmetric MP implementations	20
4.2 RF reference architecture	21
4.2.1 Reference block diagram	21
4.2.2 Measure reference points and system loading	21
5 Technical requirements specifications	22
5.1 General requirements	22
5.2 Environmental profile.....	22
5.3 Transmitter requirements	22
5.3.1 General requirements.....	22
5.3.2 Transmitter output power.....	22
5.3.2.1 General	22
5.3.2.2 Transmitter maximum power and EIRP.....	22
5.3.2.3 Transmitter output power environmental variation.....	23
5.3.3 Transmitter Radio Frequency tolerance.....	23
5.3.4 Transmitter Radio Frequency spectrum mask and emissions	23
5.3.4.1 Transmitter Radio Frequency spectrum mask.....	23
5.3.4.2 Transmitter discrete CW components exceeding the transmitter Radio Frequency spectrum mask limits	26
5.3.5 Transmitter unwanted emissions in the spurious domain	27
5.3.6 Transmitter power control (ATPC and RTPC).....	28
5.3.6.1 General	28
5.3.6.2 Automatic Transmitter Power Control (ATPC)	28
5.3.6.3 Remote Transmitter Power Control (RTPC).....	28
5.3.7 Transmitter Remote Frequency Control (RFC)	29
5.3.8 Transmitter Dynamic Change of Modulation Order.....	29
5.4 Receiver requirements	29
5.4.1 General.....	29
5.4.2 Receiver unwanted emissions in the spurious domain.....	29
5.4.3 BER as a function of receiver input signal level (RSL).....	29
5.4.3.1 General	29
5.4.3.2 Single signal performance.....	29
5.4.3.3 Performance with maximum system loading (EqC-PET = D only).....	31
5.4.3.4 Receiver Dynamic range	31
5.4.4 Receiver selectivity.....	32
5.4.4.0 Introduction.....	32

5.4.4.1	Receiver co-channel interference sensitivity.....	32
5.4.4.2	Receiver first adjacent channel interference sensitivity	34
5.4.4.3	Receiver blocking (CW spurious interference sensitivity).....	36
5.4.4.4	Receiver radio-frequency intermodulation and Receiver second adjacent channel interference sensitivity	36
5.4.4.4.1	Requirement background.....	36
5.4.4.4.2	Requirement limit.....	37
6	Testing for conformance with technical requirements	37
6.1	General	37
6.2	Environmental conditions for testing	38
6.2.1	Generality	38
6.2.2	Minimum profile for indoor use	39
6.2.3	Minimum profile for outdoor use	39
6.3	Transmitter requirements	39
6.3.1	General.....	39
6.3.1.1	Summary table for transmitter test conditions	39
6.3.1.2	Spectrum analyser settings	41
6.3.2	Transmitter output power.....	41
6.3.2.1	General	41
6.3.2.2	Transmitter Maximum power and EIRP	41
6.3.2.3	Transmitter output power environmental variation	42
6.3.3	Transmitter Radio Frequency tolerance.....	42
6.3.4	Transmitter Radio Frequency spectrum mask and emissions	42
6.3.4.1	Transmitter Radio Frequency spectrum mask.....	42
6.3.4.2	Transmitter Discrete CW components exceeding the transmitter Radio Frequency spectrum mask limit	43
6.3.5	Transmitter unwanted emissions in the spurious domain	43
6.3.6	Transmitter power control (ATPC and RTPC).....	43
6.3.6.1	General	43
6.3.6.2	Automatic Transmitter Power Control (ATPC).....	43
6.3.6.3	Remote Transmitter Power Control (RTPC).....	44
6.3.7	Transmitter Remote Frequency Control (RFC).....	44
6.3.8	Transmitter dynamic Change of Modulation Order.....	45
6.4	Receiver requirements.....	45
6.4.1	General.....	45
6.4.2	Receiver unwanted emissions in the spurious domain.....	46
6.4.3	BER as a function of receiver input signal level (RSL).....	47
6.4.3.1	General	47
6.4.3.2	Single signal performance.....	47
6.4.3.3	Performance at maximum system loading (EqC-PET = D only)	47
6.4.3.4	Receiver dynamic range.....	47
6.4.4	Receiver selectivity.....	47
6.4.4.1	Receiver co-channel interference sensitivity.....	47
6.4.4.2	Receiver first adjacent channel interference sensitivity	48
6.4.4.3	Receiver blocking (CW spurious interference sensitivity).....	48
6.4.4.4	Receiver radio-frequency intermodulation and receiver second adjacent channel interference sensitivity	48
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	50
Annex B (normative):	Test report in relation to flexible systems applications	52
B.1	Wide radio-frequency band covering units specification and tests	52
B.2	Multirate/Multiformat covering equipment specification and tests	54
Annex C (normative):	Equipment classification (EqC) and system capacity	55
C.1	General	55
C.2	EqC description	55
C.2.1	Void.....	55

C.2.2	Primary Equipment Type (EqC-PET)	55
C.2.3	Secondary Equipment Type (EqC-SET)	56
C.2.4	Equivalent Modulation Order (EqC-EMO)	56
C.2.5	Channel Separation (EqC-ChS)	57
C.2.6	Frequency Operating Range (EqC-FR)	57
C.2.7	Station Type (EqC-STN)	57
C.3	System capacity	58
C.3.1	General	58
C.3.2	Capacity of equipment with EqC-PET = T, O or M	58
C.3.3	Capacity of equipment with EqC-PET = F	58
C.3.4	Capacity of equipment with EqC-PET = D	59
C.4	Classification of equipment	60
C.4.1	Equipment profiles in the scope of present document	60
Annex D (informative):	Transmitter Radio Frequency Spectrum mask background for ATPC and/or RTPC implementation.....	62
D.0	Introduction	62
D.1	ATPC impact	62
D.2	RTPC Impact	63
Annex E (informative):	Overview of technology features of multipoint systems	64
E.1	General	64
E.2	Network topology	64
E.3	Multiplexing methods	64
E.4	Multiple access methods	65
E.5	Duplex methods	65
E.6	Modulation methods	66
E.6.1	Modulation techniques	66
E.6.2	Equivalent Modulation Order (EMO)	66
E.7	Error correction	67
E.8	Other relevant system characteristics	67
Annex F (informative):	Frequency bands	68
F.1	Frequency ranges	68
F.2	Frequency ranges CEPT applications	70
Annex G (informative):	Summary Table of EqC subject to conformance declaration	71
G.1	The right to copy	71
Annex H (informative):	System architecture	72
H.1	General architecture	72
H.2	Point-to-Multipoint (P-mP) architectures	72
H.3	Mesh (or MP-MP) architectures	74
Annex I (informative):	Mixed-mode operation	75
I.1	Introduction	75
I.2	General description of mixed-mode systems	75
I.3	Background for transmitter and receiver requirements operating in mixed-mode	75
I.3.1	Requirements summary	75

I.3.2	Transmitter Radio Frequency spectrum masks for mixed-mode systems	75
I.3.3	Receiver adjacent channel interference sensitivity	77
I.3.4	Receiver co-channel interference sensitivity	77
Annex J (informative): Antennas		78
J.1	Antenna generality	78
J.2	Antenna profiles	78
Annex K (informative): Typical reference model for BER, MGBR and EMO.....		79
K.1	General	79
K.2	Interface X'_1 to X'_N	80
K.3	Payload processing block	80
K.4	Multiple access block	81
K.5	Outer error correcting block	81
K.6	Inner error correcting block.....	81
K.7	Modulator	82
K.8	Choice of reference point for BER, MGBR and EMO	82
K.9	Examples	82
K.9.1	16 QAM TDMA system with 3/4 rate convolutional coding	82
K.9.2	16 QAM TDMA system with 1/2 rate convolutional coding and 204/188 Reed Solomon coding	83
K.9.3	16 QAM TDMA system with 1/2 rate turbo coding	83
K.9.4	16 QAM FDMA system with 1/2 rate convolutional coding	83
Annex L (informative): Test interpretation and measurement uncertainty		84
Annex M (informative): Bibliography		85
Annex N (informative): Change History		86
History		87

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.4] 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 covers characteristics and requirements for fixed multipoint radio equipment and antennas using a variety of access and duplex methods and operating at a variety of bit rates in frequency bands as specified in the present document.

The present document is part 2 of a multi-part deliverable covering the Fixed Radio Systems; Multipoint Equipment and Antennas, as identified below:

Part 1: "Overview and Requirements for Digital Multipoint Radio Systems";

Part 2: "Harmonised Standard for access to radio spectrum";

Part 3: "Multipoint Antennas".

NOTE: Part 1 is no longer maintained and referenced in other parts of the series.

Proposed national transposition dates	
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

The present document defines the essential characteristics for multipoint radio equipment and up to 43,5 GHz to comply with article 3.2 of Directive 2014/53/EU [i.1].

For the purpose of the present document, multipoint radio systems can be considered as radio systems which interconnect a number of fixed stations (usually more than two). The topology of the systems may be Point-to-MultiPoint (P-MP), or MultiPoint-to-MultiPoint (MP-MP), known as "Mesh".

Depending on the application, MultiPoint Systems can be seen either as "Fixed Wireless Access" (FWA) systems to grant multiple access to different services with a variety of bit rates, or as "infrastructure" or "backhaul" applications when different stations in a network will be connected to support, e.g. duplex mobile telephony.

Either as narrowband or wideband system MultiPoint technology facilitates access to public and private networks (PSTN, Internet, PDN, etc.) to connect residential and business subscribers in urban, suburban and rural areas.

Access and infrastructure applications can be supported simultaneously.

In order to (technically) cover different market and network requirements, with an appropriate balance of performance to cost and effective use of the radio spectrum, the present document, together with ETSI EN 302 326-3 [i.2], offers a number of system types and antennas alternatives (integral or dedicated antennas), for selection by administrations, operators and manufacturers according to the desired use of the radio spectrum and network/market requirements.

Those options include:

- channel separation alternatives (as provided by the relevant CEPT Recommendation);
- spectral efficiency class alternatives (different modulation formats provided in radio equipment standards).

The applicability of this whole multi-part deliverable to MP equipment is governed by the definition of a number of equipment/system profiles that define the set of consistent requirements to which equipment would comply.

For compliance purposes, a specific type of equipment needs to be identified by an Equipment Classification (EqC) coherent set, as specified in Annex C.

Based on this Equipment Classification, the appropriate clauses of the present document have to be applied.

The present document introduces new technical features compared to the previous version in terms of RX intermodulation requirements and ATPC functionality, mandatory for managing the different CS/RS link lengths where the system has to operate as intended. In addition, it covers equipment operating in the band 40,5 GHz to 43,5 GHz frequency band, previously separated and handled covered by ETSI EN 301 997-2 [i.27], under the regime of 1999/5/EC Directive.

For more background information on the equipment parameters here identified as relevant to article 3.2 of Directive 2014/53/EU [i.1], see ETSI EN 302 326-3 [i.2].

Following annexes are embedded in the present document:

- Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU
- Annex B (normative): Test report in relation to flexible systems applications
- Annex C (normative): Equipment classification (EqC) and system capacity
- Annex D (informative): Transmitter Radio Frequency Spectrum mask background for ATPC and/or RTPC implementation
- Annex E (informative): Overview of technology features of multipoint systems
- Annex F (informative): Frequency bands
- Annex G (informative): Summary Table of EqC subject to conformance declaration
- Annex H (informative): System architecture
- Annex I (informative): Mixed-mode operation
- Annex J (informative): Antennas
- Annex K (informative): Typical reference model for BER, MGBR and EMO
- Annex L (informative): Test interpretation and measurement uncertainty
- Annex M (informative): Bibliography
- Annex N (informative): Change History

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1 Scope

The present document specifies technical characteristics and methods of measurements applicable to equipment used in MultiPoint (MP) Digital Fixed Radio Systems (DFRS) (see note 2) designed for use in the following sub-ranges (see note 3):

- 30 MHz to 1 GHz.
- 1 GHz to 3 GHz.
- 3 GHz to 11 GHz.
- 24,25 GHz to 29,5 GHz.
- 31,0 GHz to 33,4 GHz.
- 40,5 GHz to 43,5 GHz.

NOTE 1: 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.

The present document is applicable to multipoint radio system equipment using any arbitrary access method. It applies to all equipment composing the MP systems, i.e. to Central Station (CS), Terminal Station (TS) and Repeater Station (RS).

Time Division Duplex (TDD) or Frequency Division Duplex (FDD or H-FDD) can be used on an equivalent basis.

Systems implementing an actual FH-CDMA access method with hopping period exceeding 400 ms are not considered within the scope of the present document.

NOTE 2: Applications intended for offering in the bands 3,4 GHz to 3,8 GHz the option of Nomadic Wireless Access (NWA), according to the NWA definition in Recommendation ITU-R F.1399 [i.14], are also considered in the scope of the present document.

NOTE 3: For more information on the applicable frequency bands, refer to Annex F.

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.

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

- [1] CEPT/ERC/REC 74-01 (2019): "Unwanted emissions in the spurious domain".
- [2] ETSI EN 301 390 (V1.3.1) (08-2013): "Fixed Radio Systems; Point-to-point and Multipoint Systems; Unwanted emissions in the spurious domain and receiver immunity limits at equipment/antenna port of Digital Fixed Radio Systems".
- [3] ETSI EN 301 126-2-1 (V1.1.1) (12-2000): "Fixed Radio Systems; Conformance testing; Part 2-1: Point-to-Multipoint equipment; Definitions and general requirements".

- [4] ETSI EN 301 126-2-2 (V1.1.1) (11-2000): "Fixed Radio Systems; Conformance testing; Part 2-2: Point-to-Multipoint equipment; Test procedures for FDMA systems".
- [5] ETSI EN 301 126-2-3 (V1.2.1) (11-2004): "Fixed Radio Systems; Conformance testing; Part 2-3: Point-to-Multipoint equipment; Test procedures for TDMA systems".
- [6] ETSI EN 301 126-2-4 (V1.1.1) (11-2000): "Fixed Radio Systems; Conformance testing; Part 2-4: Point-to-Multipoint equipment; Test procedures for FH-CDMA systems".
- [7] ETSI EN 301 126-2-5 (V1.1.1) (11-2000): "Fixed Radio Systems; Conformance testing; Part 2-5: Point-to-Multipoint equipment; Test procedures for DS-CDMA systems".
- [8] ETSI EN 301 126-2-6 (V1.1.1) (02-2002): "Fixed Radio Systems; Conformance testing; Part 2-6: Point-to-Multipoint equipment; Test procedures for Multi Carrier Time Division Multiple Access (MC-TDMA) systems".
- [9] ETSI EN 300 019-1-3 (V2.4.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".
- [10] ETSI EN 300 019-1-4 (V2.2.1) (04-2014): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".

2.2 Informative references

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- [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 EN 302 326-3: "Fixed Radio Systems; Multipoint Equipment and Antennas; Part 3: Multipoint Antennas".
- [i.3] ITU Radio Regulations (2016).
- [i.4] 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.5] ETSI EG 203 336 (V1.2.1): "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.6] ETSI TR 101 506 (V2.2.1): "Fixed Radio Systems; Generic definitions, terminology and applicability of essential requirements covering article 3.2 of Directive 2014/53/EU to Fixed Radio Systems".
- [i.7] Recommendation ITU-R SM.1539-1: "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329".
- [i.8] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

- [i.9] ETSI TR 102 215: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz".
- [i.10] ETSI TR 103 103 (V1.1.1): "Fixed Radio Systems; Point-to-point systems; ATPC, RTPC, Adaptive Modulation (mixed-mode) and Bandwidth Adaptive functionalities; Technical background and impact on deployment, link design and coordination".
- [i.11] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz".
- [i.12] ETSI TR 101 274: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Point-to-multipoint DRRS in the access network: Overview of different access techniques".
- [i.13] Recommendation ITU-R F.746: "Radio-frequency arrangements for fixed service systems".
- [i.14] Recommendation ITU-R F.1399: "Vocabulary of terms for wireless access".
- [i.15] CEPT/ECC/DEC(05)01: "The use of the band 27.5-29.5 GHz by the Fixed Service and uncoordinated Earth stations of the Fixed-Satellite Service (Earth-to-space)".
- [i.16] CEPT/ERC/REC(01)02: "Preferred channel arrangement for digital fixed service systems operating in the frequency band 31.8 - 33.4 GHz".
- [i.17] CEPT/ECC/REC(04)05: "Guidelines for accommodation and assignment of multipoint Fixed Wireless Systems in frequency bands 3.4-3.6 GHz and 3.6-3.8 GHz".
- [i.18] CEPT/ECC/REC(11)01: "Guidelines for assignment of frequency blocks for fixed wireless systems in the bands 24.5-26.5 GHz, 27.5-29.5 GHz AND 31.8-33.4 GHz".
- [i.19] CEPT/ERC/REC 12-05: "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.0 - 10.68 GHz".
- [i.20] CEPT/ERC/REC 12-08: "Harmonized radio frequency channel arrangements and block allocations for low, medium and high capacity systems in the band 3 600 MHz to 4 200 MHz".
- [i.21] CEPT/ERC/REC T/R 13-02: "Preferred channel arrangements for the fixed services in the range 22.0 - 29.5 GHz".
- [i.22] CEPT/ERC/REC 14-03: "Harmonized radio frequency channel arrangements for low and medium capacity systems in the band 3 400 MHz to 3 600 MHz".
- [i.23] CEPT/ECC/REC(02)02: "Channel arrangements for digital fixed service systems (point-to-point and point-to-multipoint) operating in the frequency band 31 - 31.3 GHz".
- [i.24] ETSI EG 202 306: "Transmission and Multiplexing (TM); Access networks for residential customers".
- [i.25] ETSI ETS 300 019 (all parts): "Equipment engineering; Environmental conditions and environmental tests for telecommunications equipment".
- [i.26] ETSI EN 300 019 (all parts): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".
- [i.27] ETSI EN 301 997-2: "Transmission and Multiplexing (TM); Multipoint equipment; Radio equipment for use in Multimedia Wireless Systems (MWS) in the frequency band 40,5 GHz to 43,5 GHz; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".
- [i.28] ETSI EN 301 126-3-2 (V1.2.1) (12-2003): "Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas - Definitions, general requirements and test procedures".
- [i.29] Recommendation ITU-R P.525-4: "Calculation of free-space attenuation".

- [i.30] CEPT/ECC/REC(01)04: "Recommended guidelines for the accommodation and assignment of multimedia wireless systems (MWS) and point-to-point (P-P) fixed wireless systems in the frequency band 40.5 - 43.5 GHz".
- [i.31] Decision 2007/344/EC: "Commission Decision of 16 May 2007 on harmonised availability of information regarding spectrum use within the Community".
- [i.32] Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.
- [i.33] Commission Implementing Decision (EU) 2019/784 of 14 May 2019 on the harmonisation of the 24,25-27,5 GHz frequency band for terrestrial systems capable of providing wireless broadband electronic communications services in the Union.
- [i.34] Decision 2008/411/EC: "Commission Decision of 21 May 2008 on the harmonisation of the 3 400 - 3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community".
- [i.35] ECO Frequency Information System (EFIS).
- NOTE: Available at <https://www.efis.dk>.
- [i.36] ECO Report 04: "Fixed Service in Europe Implementation Status".
- [i.37] Technical Regulation Information System (TRIS).
- NOTE: Available at <https://ec.europa.eu/growth/tools-databases/tris/en>.
- [i.38] ISO/IEC 7498-1: "Information technology -- Open Systems Interconnection -- Basic Reference Model: The Basic Model".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

active antenna: antenna including one or more active electronic components that interact with the Radio Frequency (RF) signal as e.g. amplifier or diode

antenna: part of the transmitting or receiving system that is designed to transmit or receive electromagnetic radiation

assigned band: frequency block or the aggregation of all RF channels assigned to a MP system

NOTE: The assigned band may consist also of several non-contiguous RF channels (see Figure 1).