



**Fixed Radio Systems;
Characteristics and requirements for
point-to-point equipment and antennas;
Part 2: Digital systems operating in frequency bands
from 1 GHz to 86 GHz;
Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU**

STANDARD PREVIEW
<https://standards.globalspec.com/stds/etsi/302217-2-v3-1-2017-05>
4e27-9888-610020170505

Reference

REN/ATTM-0431

Keywords

antenna, DFRS, digital, DRRS, FWA,
point-to-point, radio, regulation, transmission

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2017.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	9
Foreword.....	9
Modal verbs terminology.....	9
Introduction	9
1 Scope	10
2 References	10
2.1 Normative references	10
2.2 Informative references.....	11
3 Definitions, symbols and abbreviations	14
3.1 Definitions.....	14
3.2 Symbols.....	14
3.3 Abbreviations	14
4 Technical requirements specifications	14
4.1 General requirements	14
4.1.1 Requirements framework.....	14
4.1.1.1 Introduction and equipment flexibility.....	14
4.1.1.2 Operating frequency bands.....	15
4.1.1.3 Spectral efficiency classes.....	16
4.1.1.4 System alternatives.....	17
4.1.1.5 Channel arrangements and utilization.....	17
4.1.1.6 Specific Requirements for frequency bands.....	17
4.1.2 Minimum RIC density	19
4.1.3 Payload flexibility.....	19
4.1.4 System identification and traffic loading	20
4.1.5 Environmental profile.....	21
4.2 Transmitter requirements	21
4.2.0 General: system loading.....	21
4.2.1 Transmitter power and power tolerance.....	22
4.2.1.1 Maximum power and EIRP.....	22
4.2.1.2 Combined TX power output and EIRP limits	22
4.2.1.3 Output power tolerance.....	22
4.2.2 Transmitter power and frequency control.....	23
4.2.2.1 Power Control (ATPC and RTPC).....	23
4.2.2.1.0 General background.....	23
4.2.2.1.1 Automatic Transmit Power Control (ATPC).....	23
4.2.2.1.2 Remote Transmit Power Control (RTPC)	23
4.2.2.2 Remote Frequency Control (RFC)	23
4.2.3 Radio Frequency (RF) spectrum mask.....	23
4.2.3.1 Limits background	23
4.2.3.2 Limits	26
4.2.4 Discrete CW components exceeding the spectrum mask limit	39
4.2.4.1 Discrete CW components at the symbol rate	39
4.2.4.2 Other discrete CW components exceeding the spectrum mask limit	39
4.2.5 Unwanted emissions in the <i>spurious domain</i> - external.....	40
4.2.6 Dynamic Change of Modulation Order	41
4.2.7 Radio frequency tolerance	41
4.2.8 Emission limitations outside the allocated band	42
4.3 Receiver requirements	42
4.3.0 General: System loading	42
4.3.1 Unwanted emissions in the <i>spurious domain</i> - external.....	42
4.3.2 BER as a function of receiver input signal level RSL	42
4.3.3 Receiver selectivity.....	43
4.3.3.1 Introduction.....	43
4.3.3.2 Co-channel "external", first and second adjacent channel interference sensitivity	43

4.3.3.2.1	Requirements basics	43
4.3.3.2.2	Limits for co-channel and first adjacent channel	44
4.3.3.2.3	Limits for second adjacent channel interference	44
4.3.3.3	CW spurious interference (blocking & spurious response rejection)	45
4.4	Antenna Characteristics	46
4.4.1	Integral antennas or dedicated antennas	46
4.4.1.1	Introduction	46
4.4.1.2	Radiation Pattern Envelope (Off-axis EIRP density)	46
4.4.1.3	Antenna gain	46
4.4.1.4	Antenna Cross-Polar Discrimination (XPD)	46
4.4.2	Guidelines for <i>stand-alone</i> antennas	46
5	Testing for compliance with technical requirements	47
5.1	Environmental and other conditions for testing	47
5.1.1	Environmental conditions	47
5.1.2	Test interpretation and measurement uncertainty	47
5.1.3	Other basic conditions	48
5.2	Test methods for the transmitter	48
5.2.0	General test summary	48
5.2.1	Transmitter power and power tolerance	50
5.2.1.1	Transmitter power and EIRP	50
5.2.1.2	Combined TX power output and EIRP limits	50
5.2.1.3	Output power tolerance	50
5.2.2	Transmitter power and frequency control	50
5.2.2.1	Transmitter Power Control (ATPC and RTPC)	50
5.2.2.1.1	ATPC	50
5.2.2.1.2	RTPC	51
5.2.2.2	Remote Frequency Control (RFC)	51
5.2.3	RF spectrum mask	51
5.2.4	Discrete CW components exceeding the spectrum mask limit	52
5.2.5	Unwanted emissions in the spurious domain - external	52
5.2.6	Dynamic Change of Modulation Order	52
5.2.7	Radio frequency tolerance	52
5.3	Test methods for the receiver	53
5.3.0	General test summary	53
5.3.1	Unwanted emissions in the spurious domain - external	54
5.3.2	BER as a function of receiver input signal level (RSL)	54
5.3.3	Receiver selectivity	54
5.3.3.1	Void	54
5.3.3.2	Co-channel "external" first and second adjacent channel interference sensitivity	54
5.3.3.2.1	Co-channel and first adjacent channel	54
5.3.3.2.2	Second adjacent channel	54
5.3.3.3	CW spurious interference	55
5.4	Antenna test methods for systems with integral or dedicated antenna	55
5.4.0	General test summary	55
5.4.1	Radiation Pattern Envelope (Off-axis EIRP density)	55
5.4.2	Antenna gain	55
5.4.3	Antenna Cross-Polar Discrimination (XPD)	55
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	56
Annex B (normative):	Frequency bands from 1,4 GHz to 2,6 GHz	58
B.1	Introduction	58
B.2	General characteristics	58
B.2.1	Frequency characteristics and channel arrangements	58
B.2.2	Transmission capacities	58
B.3	Transmitter	59
B.3.1	General requirements	59
B.3.2	RF spectrum masks options	60

B.4	Receiver.....	60
B.4.1	General requirements	60
B.4.2	BER as a function of receiver input signal level (RSL)	60
B.4.3	Co-channel "external" and adjacent channels interference sensitivity	61
Annex C (normative): Frequency bands from 3,5 GHz to 11 GHz (channel separation up to 30 MHz and 56/60 MHz)		63
C.1	Introduction	63
C.2	General characteristics	63
C.2.1	Frequency characteristics and channel arrangements	63
C.2.2	Transmission capacities	64
C.3	Transmitter	65
C.3.1	General requirements	65
C.3.2	RF spectrum masks	65
C.4	Receiver.....	65
C.4.1	General requirements	65
C.4.2	BER as a function of Receiver input Signal Level (RSL)	65
C.4.3	Co-channel "external" and adjacent channel interference sensitivity	67
Annex D (normative): Frequency bands from 4 GHz to 11 GHz (channel separation 40 MHz)		68
D.1	Introduction	68
D.2	General characteristics	68
D.2.1	Frequency characteristics and channel arrangements	68
D.2.2	Transmission capacities	68
D.3	Transmitter	69
D.3.1	General requirements	69
D.3.2	RF spectrum masks	69
D.4	Receiver.....	70
D.4.1	General requirements	70
D.4.2	BER as a function of Receiver input Signal Level (RSL)	70
D.4.3	Co-channel "external" and adjacent channel interference sensitivity	71
Annex E (normative): Frequency bands 13 GHz, 15 GHz and 18 GHz.....		72
E.1	Introduction	72
E.2	General characteristics	72
E.2.1	Frequency characteristics and channel arrangements	72
E.2.2	Transmission capacities.....	73
E.3	Transmitter	73
E.3.1	General requirements	73
E.3.2	RF spectrum masks	73
E.4	Receiver.....	74
E.4.1	General requirements	74
E.4.2	BER as a function of Receiver input Signal Level (RSL)	74
E.4.3	Co-channel "external" and adjacent channel interference sensitivity	76
Annex F (normative): Frequency bands from 23 GHz to 42 GHz		78
F.1	Introduction	78
F.2	General characteristics	78
F.2.1	Frequency characteristics and channel arrangements	78
F.2.2	Transmission capacities.....	79
F.3	Transmitter	79

F.3.1	General requirements	79
F.3.2	RF spectrum masks	80
F.4	Receiver.....	80
F.4.1	General requirements	80
F.4.2	BER as a function of Receiver input Signal Level (RSL)	80
F.4.3	Co-channel "external" and adjacent channel interference sensitivity	83
Annex G (normative): Frequency bands from 50 GHz to 55 GHz		84
G.1	Introduction	84
G.2	General characteristics	84
G.2.1	Frequency characteristics and channel arrangements	84
G.2.2	Transmission capacities.....	85
G.3	Transmitter	85
G.3.1	General requirements	85
G.3.2	RF spectrum masks	85
G.4	Receiver.....	85
G.4.1	General requirements	85
G.4.2	BER as a function of Receiver input Signal Level (RSL)	86
G.4.3	Co-channel "external" and adjacent channel interference sensitivity	86
Annex H (normative): Frequency band 57 GHz to 66 GHz		87
H.1	Introduction	87
H.2	General characteristics	87
H.2.1	Frequency characteristics and channel arrangements	87
H.2.2	Transmission capacities.....	87
H.3	Transmitter	88
H.3.1	General requirements	88
H.3.2	Combined TX power output and EIRP limits.....	88
H.3.2.1	Maximum power and EIRP	88
H.3.2.2	Equipment without ATPC as permanent feature	89
H.3.2.3	Equipment implementing ATPC as permanent feature.....	89
H.3.3	RF spectrum masks	92
H.3.4	Emissions outside the 57 GHz to 66 GHz range	92
H.4	Receiver.....	92
H.4.1	General requirements	92
H.4.2	BER as a function of Receiver input Signal Level (RSL)	92
H.4.3	Co-channel "external" and adjacent channel interference sensitivity	93
H.5	Minimum antenna gain.....	94
Annex I (normative): Frequency band 64 GHz to 66 GHz		95
I.1	Introduction	95
I.2	General characteristics	95
I.2.1	Frequency characteristics and channel arrangements	95
I.2.2	Transmission capacities.....	96
I.2.2.1	Channel arrangement based on $N \times 50$ MHz	96
I.2.2.2	Channel arrangement based on $N \times 30$ MHz	96
I.3	Transmitter	97
I.3.1	General requirements	97
I.3.2	Combined TX power and EIRP limits.....	97
I.3.2.1	Generality	97
I.3.2.2	Equipment without ATPC as permanent feature	97
I.3.2.3	Equipment implementing ATPC as permanent feature.....	98
I.3.3	RF spectrum mask	100
I.3.4	Emissions outside the 64 GHz to 66 GHz range	100

I.4	Receiver.....	100
I.4.1	General requirements	100
I.4.2	BER as a function of Receiver input Signal Level (RSL).....	100
I.4.2.1	Channel arrangement based on $N \times 50$ MHz.....	100
I.4.2.2	Channel arrangement based on $N \times 30$ MHz.....	100
I.4.3	Co-channel "external" and adjacent channel interference sensitivity.....	101
I.4.3.1	Channel arrangement based on $N \times 50$ MHz.....	101
I.4.3.2	Channel arrangement based on $N \times 30$ MHz.....	102
I.5	Minimum antenna gain.....	102
Annex J (normative): Frequency bands from 71 GHz to 86 GHz		103
J.1	Introduction	103
J.2	General characteristics	103
J.2.1	Frequency characteristics and channel arrangements.....	103
J.2.2	Transmission capacities.....	104
J.3	Transmitter	104
J.3.1	General requirements	104
J.3.2	Combined maximum transmitter power and EIRP.....	105
J.3.2.1	Generality	105
J.3.2.2	Equipment without ATPC as permanent feature	105
J.3.2.3	Equipment implementing ATPC as permanent feature.....	106
J.3.3	RF spectrum masks	108
J.3.4	Emissions outside the 71 GHz to 76 GHz and 81 GHz to 86 GHz ranges.....	108
J.3.4.1	General requirement	108
J.3.4.2	Requirement for emissions above 86 GHz band edge.....	108
J.3.4.3	Conformance statement (see note).....	109
J.4	Receiver.....	109
J.4.1	General requirements	109
J.4.2	BER as a function of Receiver input Signal Level (RSL).....	109
J.4.3	Co-channel "external" and adjacent channel interference sensitivity.....	111
J.5	Minimum antenna gain.....	112
Annex K:	 Void	113
Annex L:	 Void	114
Annex M:	 Void	115
Annex N (normative): Definition of equivalent data rates for packet data, PDH/SDH and other signals on the traffic interface.....		116
N.1	Introduction	116
N.2	General characteristics	116
N.2.1	Frequency characteristics and channel arrangements.....	116
N.2.2	Transmission capacities.....	116
N.3	System parameters.....	119
N.3.0	Introduction	119
N.3.1	Transmitter	119
N.3.2	Receiver.....	119
N.3.3	FER as a function of BER	119
Annex O (normative): Test report in relation to flexible systems applications		121
O.1	Wide radio-frequency band covering units	121
O.2	Multirate/multiformat equipment	123
O.2.0	Introduction	123
O.2.1	Generic required tests in the test report.....	124

O.2.2	Reduced set of required tests in the test report	124
O.2.2.0	Introduction.....	124
O.2.2.1	Reduced transmitter tests	124
O.2.2.2	Reduced receiver tests	125
O.2.3	Bandwidth adaptive test set requirements	126
O.3	BER and C/I measurement in <i>multi-channels</i> systems (including <i>channels-aggregation</i>) when common SDH or Ethernet single/multiple-interfaces payload is provided.....	126
O.3.0	Introduction	126
O.3.1	Case 1: multi-interfaces/two-channels systems where each interface payload is transmitted on one channel only	127
O.3.2	Case 2: single interface or multi-interfaces/two-channels system where each payload interface is transmitted equally split on both channels	127
O.4	Test provisions for <i>channels-aggregation</i> equipment.....	129
O.4.1	General requirements and test method	129
O.4.2	Limits combination for <i>single-port</i> case.....	131
Annex P (informative):	Technical background for receiver selectivity and C/I interference sensitivity evaluation.....	134
P.1	Receiver selectivity	134
P.1.1	Introduction	134
P.1.2	Graphical representation of WBSEL.....	135
P.2	C/I interference sensitivity	136
P.2.1	Introduction	136
P.2.2	Ideal selectivity and best case C/I value for 2nd adjacent CS	137
Annex Q (informative):	Bibliography.....	140
Annex R (informative):	Change History	141
History		142

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This final draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM), and is now submitted for the 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.63] 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 2 of a multi-part deliverable covering Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas. Full details of the entire series can be found in ETSI EN 302 217-1 [4].

Proposed national transposition dates

Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The ETSI EN 302 217 series has been produced in order to rationalize a large number of previous ETSI ENs dealing with equipment and antennas for Point-to-Point (P-P) Fixed Service applications. For more details, see foreword in ETSI EN 302 217-1 [4].

1 Scope

The present document specifies technical characteristics and methods of measurements for Point-to-point (P-P) Digital Fixed Radio Systems (DFRS) operating in frequency bands allocated to Fixed Service (FS) from 1 GHz to 86 GHz, corresponding to the appropriate frequency bands from 1,4 GHz to 86 GHz as described in annex B to annex J.

Systems in the scope of the present document are generally intended to operate in full frequency division duplex (FDD) and covers also unidirectional applications. Time division duplex (TDD) applications, when possibly applicable in a specific band, are explicitly mentioned as appropriate in annex B through annex J.

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.1] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://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 EN 301 126-1 (V1.1.2) (09-1999): "Fixed Radio Systems; Conformance testing; Part 1: Point-to-point equipment - Definitions, general requirements and test procedures".
- [2] ETSI EN 301 126-3-1 (V1.1.2) (12-2002): "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".
- [3] 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".
- [4] ETSI EN 302 217-1 (V3.1.0) (01-2017): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 1: Overview, common characteristics and system-dependent requirements".
- [5] ETSI EN 302 217-4 (V2.0.3) (06-2016): "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4: Antennas".
- [6] IEEE 802.3™-2012: "IEEE Standard for Ethernet".
- [7] ITU Radio Regulations (2016).
- [8] Recommendation ITU-T O.151 (10-1992) / Corrigendum 1 (05-2002): "Error performance measuring equipment operating at the primary rate and above".
- [9] Recommendation ITU-T O.181 (05-2002): "Equipment to assess error performance on STM-N interfaces".
- [10] Recommendation ITU-T O.191 (02-2000): "Equipment to measure the cell transfer performance of ATM connections".

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 reference 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 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); 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] CEPT/ERC/REC 74-01 (Cardiff 2011): "Unwanted emissions in the spurious domain".
- [i.4] CEPT/ERC/REC(01)02 (2010): "Preferred channel arrangement for digital fixed service systems operating in the frequency band 31.8 - 33.4 GHz".
- [i.5] CEPT/ERC/REC 12-02 (2007): "Harmonized radio frequency channel arrangements for analogue and digital terrestrial fixed systems operating in the band 12.75 GHz to 13.25 GHz".
- [i.6] CEPT/ERC/REC 12-03: "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 17.7 GHz to 19.7 GHz".
- [i.7] CEPT/ERC/REC 12-05 (2007): "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.0 - 10.68 GHz".
- [i.8] CEPT/ERC/REC 12-06 (2010): "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.7 GHz to 11.7 GHz".
- [i.9] CEPT/ERC/REC 12-07: "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 14.5 - 14.62 GHz paired with 15.23 - 15.35 GHz".
- [i.10] CEPT/ERC/REC 12-08: "Harmonized radio frequency channel arrangements and block allocations for low, medium and high capacity systems in the band 3600 MHz to 4200 MHz".
- [i.11] CEPT/ERC/REC 12-11 (2015): "Radio frequency channel arrangement for fixed service systems operating in the bands 48.5-50.2 GHz and 50.9-52.6 GHz".
- [i.12] CEPT/ERC/REC 12-12 (2015): "Radio frequency channel arrangement for fixed service systems operating in the band 55.78-57.0 GHz".
- [i.13] CEPT/ERC/REC 14-01 (2014): "Radio-frequency channel arrangements for high capacity analogue and digital radio-relay systems operating in the band 5925 MHz - 6425 MHz".
- [i.14] CEPT/ERC/REC 14-02 (2014): "Radio-frequency channel arrangements for medium and high capacity analogue or high capacity digital radio-relay systems operating in the band 6425 MHz - 7125 MHz".
- [i.15] CEPT/ERC/REC 14-03: "Harmonized radio frequency channel arrangements for low and medium capacity systems in the band 3400 MHz to 3600 MHz".
- [i.16] CEPT/ERC/REC T/R 12-01 (2010): "Preferred channel arrangements for fixed service systems operating in the band 37-39.5 GHz".
- [i.17] CEPT/ERC/REC T/R 13-01 (2010): "Preferred channel arrangements for fixed services systems operating in the frequency range 1-2.3 GHz".

- [i.18] CEPT/ERC/REC T/R 13-02 (2010): "Preferred channel arrangements for fixed services systems in the frequency range 22.0 - 29.5 GHz".
- [i.19] CEPT ECC/REC(01)04 (2014): "Recommended guidelines for the accommodation and assignment of Fixed Multimedia Wireless Systems (MWS) and Point-to-point (P-P) Fixed Wireless Systems in the frequency band 40.5-43.5 GHz".
- [i.20] Void.
- [i.21] CEPT ECC/REC(02)02 (2010): "Channel arrangement for digital fixed service systems (point-to-point and point-to-multipoint) operating in the frequency band 31 - 31.3 GHz".
- [i.22] CEPT ECC/REC (02)06 (2011): "Preferred channel arrangements for digital fixed service systems operating in the frequency range 7125-8500 MHz".
- [i.23] CEPT ECC/REC (05)02 (2009): "Use of the 64 - 66 GHz frequency band for Fixed Service".
- [i.24] CEPT ECC/REC(05)07 (2013): "Radio frequency channel arrangements for fixed service systems operating in the bands 71-76 GHz and 81-86 GHz".
- [i.25] CEPT ECC/REC(09)01: "Use of the 57 - 64 GHz frequency band for point-to-point Fixed Wireless Systems".
- [i.26] CEPT ECC/REC(14)06 (2015): "Implementation of Fixed Service Point-to-Point narrow channels (3.5 MHz, 1.75 MHz, 0.5 MHz, 0.25 MHz, 0.025 MHz) in the guard bands and centre gaps of the lower 6 GHz (5925 to 6425 MHz) and upper 6 GHz (6425 to 7125 MHz) bands".
- [i.27] Void.
- [i.28] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.29] ETSI TR 101 506 (V2.1.1): "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.30] ETSI TR 101 854: "Fixed Radio Systems; Point-to-point equipment; Derivation of receiver interference parameters useful for planning fixed service point-to-point systems operating different equipment classes and/or capacities".
- [i.31] 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.32] ETSI TR 102 243-1: "Fixed Radio Systems; Representative values for transmitter power and antenna gain to support inter- and intra-compatibility and sharing analysis; Part 1: Digital point-to-point systems".
- [i.33] ETSI TR 102 565: "Fixed Radio Systems (FRS); Point-to-point systems; Requirements and bit rates of PtP Fixed Radio Systems with packet data interfaces, effects of flexible system parameters, use of mixed interfaces and implications on IP/ATM networks.
- [i.34] ETSI TR 103 103: "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.35] Recommendation ITU-R F.382-8: "Radio-frequency channel arrangements for fixed wireless systems operating in the 2 and 4 GHz bands".
- [i.36] Recommendation ITU-R F.383-9: "Radio-frequency channel arrangements for high capacity fixed wireless systems operating in the lower 6 GHz (5 925 to 6 425 MHz) band".
- [i.37] Recommendation ITU-R F.384-11: "Radio-frequency channel arrangements for medium and high capacity digital fixed wireless systems operating in the 6 425-7 125 MHz band".

- [i.38] Recommendation ITU-R F.385-10: "Radio-frequency channel arrangements for fixed wireless systems operating in the 7 110-7 900 MHz band".
- [i.39] Recommendation ITU-R F.386-9: "Radio-frequency channel arrangements for fixed wireless systems operating in the 8 GHz (7 725 to 8 500 MHz) band".
- [i.40] Recommendation ITU-R F.387-12: "Radio-frequency channel arrangements for fixed wireless systems operating in the 10.7-11.7 GHz band".
- [i.41] Recommendation ITU-R F.497-7: "Radio-frequency channel arrangements for fixed wireless systems operating in the 13 GHz (12.75-13.25 GHz) frequency band".
- [i.42] Recommendation ITU-R F.595-10: "Radio-frequency channel arrangements for fixed wireless systems operating in the 17.7-19.7 GHz band".
- [i.43] Recommendation ITU-R F.635-7: "Radio-frequency channel arrangements based on a homogeneous pattern for fixed wireless systems operating in the 4 GHz band".
- [i.44] Recommendation ITU-R F.636-4: "Radio-frequency channel arrangements for fixed wireless systems operating in the 14.4-15.35 GHz band".
- [i.45] Recommendation ITU-R F.637-4: "Radio-frequency channel arrangements for fixed wireless systems operating in the 21.2-23.6 GHz band".
- [i.46] Recommendation ITU-R F.746-10: "Radio-frequency arrangements for fixed service systems".
- [i.47] Recommendation ITU-R F.747-1: "Radio-frequency channel arrangements for fixed wireless systems operating in the 10-10.68 GHz band".
- [i.48] Recommendation ITU-R F.748-4: "Radio-frequency arrangements for systems of the fixed service operating in the 25, 26 and 28 GHz bands".
- [i.49] Recommendation ITU-R F.749-3: "Radio-frequency arrangements for systems of the fixed service operating in sub-bands in the 36-40.5 GHz band".
- [i.50] Recommendation ITU-R F.1098-1: "Radio-frequency channel arrangements for fixed wireless systems in the 1 900 - 2 300 MHz band".
- [i.51] Recommendation ITU-R F.1099-5: "Radio-frequency channel arrangements for high and medium capacity digital fixed wireless systems in the upper 4 GHz (4 400-5 000 MHz) band".
- [i.52] Void.
- [i.53] Recommendation ITU-R F.1191-3: "Necessary and occupied bandwidths and unwanted emissions of digital fixed service systems".
- [i.54] Recommendation ITU-R F.1242-0: "Radio-frequency channel arrangements for digital radio systems operating in the range 1 350 MHz to 1 530 MHz".
- [i.55] Recommendation ITU-R F.1243-0: "Radio-frequency channel arrangements for digital radio systems operating in the range 2 290-2 670 MHz".
- [i.56] Recommendation ITU-R F.1496-1: "Radio-frequency channel arrangements for fixed wireless systems operating in the band 51.4-52.6 GHz".
- [i.57] Recommendation ITU-R F.1497-2: "Radio-frequency channel arrangements for fixed wireless systems operating in the band 55.78-66 GHz".
- [i.58] Recommendation ITU-R F.1520-3: "Radio-frequency arrangements for systems in the fixed service operating in the band 31.8-33.4 GHz".
- [i.59] Recommendation ITU-R F.2005: "Radio-frequency channel and block arrangements for fixed wireless systems operating in the 42 GHz (40.5 to 43.5 GHz) band".
- [i.60] Recommendation ITU-R F.2006: "Radio-frequency channel and block arrangements for fixed wireless systems operating in the 71-76 and 81-86 GHz bands".