ETSI EN 302 217-1 V2.1.1 (2013-07)

Fixed Radio Systems;
Characteristics and requirements for
point-to-point equipment and antennas;
Part 1: Overview and system-independent
common characteristics

Reference
REN/ATTM-04016

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

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Contents

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 1 of a multi-part deliverable covering the Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas, as identified below:

Part 1: "Overview and system-independent common characteristics";

Part 2-1: "System-dependent requirements for digital systems operating in frequency bands where frequency co-ordination is applied";

Part 2-2: "Digital systems operating in frequency bands where frequency co-ordination is applied; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive";

Part 3: "Equipment operating in frequency bands where both frequency coordinated or uncoordinated deployment might be applied; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE";

Part 4-1: "System-dependent requirements for antennas";

Part 4-2: "Antennas; Harmonized EN covering the essential requirements of article 3.2 of R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	25 June 2013
Date of latest announcement of this EN (doa):	30 September 2013
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2014
Date of withdrawal of any conflicting National Standard (dow):	31 March 2014

Major variants with respect to previous published version

- System options identification has been changed, in line with corresponding changes in Parts 2-1 [i.33] and 2-2 [i.34] of EN 302 217. Old systems notations (A.1, … B.1, … C.1, … D.1, … E.1 ….) have been removed and the system capacity is defined in term of minimum Radio Interface Capacity (RIC) rather than previous hierarchic PDH/SDH interfaces. Each equipment in the scope of the present document refers to a coherent set of transmitter and receiver requirements uniquely defined on the basis of the following identifying parameters:

  1) operating frequency band;

  2) operating radio frequency channel separation;

3) spectral efficiency class, to which the minimum RIC density is associated.

- Cross reference to older "historical" source ENs, no longer of interest has been moved to an annex.
- Required new and updated "definitions".
- Alignment of frequency bands and equipment options introduced in other parts of EN 302 217 series.

Introduction

(i) Generality and historical background

Digital Fixed Radio Systems (DFRS), used in European countries, had been historically specified in a relatively large number of specific European Norms produced by ETSI.

Those previous documents, already superseded by first version of this EN 302 217 series, contained both essential requirements and other requirements that, even if not considered essential under the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (hereafter mentioned as the R&TTE Directive) [1], may be applicable.

Standards for point-to-point systems, including antennas, cover a very large range of traffic capacities, channel separations (CS), modulation formats and applications over a very wide range of frequency bands that are summarized in table 1.

Table 1: Digital Fixed Radio Systems (DFRS) parameters

Parameter	Range
Frequency bands	from 1 GHz to 86 GHz
Traffic capacities	from 9,6 kbit/s to 622 Mbit/s and to Gigabit/s and above in the highest bands
Channel separations	from 25 kHz to 112 MHz and to Gigahertz and above in the highest bands
Modulation formats	from 2 to 2 048 states (amplitude and/or phase and/or frequency modulated states)
Typical applications	**POINT-TO-POINT (P-P) CONNECTIONS:** rural and urban low/medium/high capacity links for mobile infrastructure, transport/trunk (long haul), FWA/BWA/MWA backhaul, access, governmental (non-military) links, private fixed networks, SAP/SAB P to P audio and video links **STAND ALONE ANTENNAS:** for all of the above applications when integral antennas are not employed

The regulatory framework for placing radio systems on the market, established by the R&TTE Directive [1] also requires the availability of Harmonized ENs covering the essential requirements under article 3.2 of the R&TTE Directive [1]. EN 302 217 series meet this demand by providing a rational subdivision of requirements into general, system dependent "not essential" and "essential" requirements from the perspective of the R&TTE Directive [1].

Part 1 includes system-independent common characteristics; these requirements are not essential under article 3.2 of the R&TTE Directive [1].

EN 302 217-2-2 [i.34], EN 302 217-3 [i.35] and EN 302 217-4-2 [i.37] are relevant to essential requirements under article 3.2 of the R&TTE Directive [1]. Additional system can be added for new available FS bands and for completing market available options.

In the present document, equipment is grouped into families of either similar frequency bands or applications. Five families are identified for frequency bands where frequency co-ordination is applied, corresponding, in both EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34], to annexes referenced from A to E and one family associated with applications of packet data and combination of other signals mapped into proprietary transport modules, detailed in annex F.

A frequency bands from 1,4 GHz to 2,7 GHz;

B frequency bands from 3 GHz to 11 GHz (channel separation around 60 MHz and from 1,75 MHz up to around 30 MHz);

C frequency bands from 3 GHz to 11 GHz (channel separation 40 MHz);

D frequency bands 13 GHz, 15 GHz and 18 GHz;

E frequency bands from 23 GHz to 55 GHz;

Ea frequency bands from 71 GHz to 76 GHz and 81 GHz to 86 GHz (additional requirements when link-by-link coordination is applied);

F definition of equivalent data rates for packet data, PDH/SDH and other signals on the traffic interface.

In the same way EN 302 217-3 [i.35] three families are identified for frequency bands where either co-ordinated or uncoordinated deployment might be applied (see note), corresponding to annexes referenced from UA to UC.

UA frequency band from 57 GHz to 59 GHz;

UB frequency band from 64 GHz to 66 GHz;

UBa frequency band from 57 GHz to 66 GHz (alternative, in overlapping bands, to UA and UB);

UC frequency bands from 71 GHz to 76 GHz and 81 GHz to 86 GHz.

NOTE: In these bands, CEPT administrations might have different views on the licensing and deployment requirements, ranging among uncoordinated, user self coordination (sometimes called "light licensing") or conventional link-by-link coordination. Therefore, from R&TTE Directive [1] point of view, the minimum of characteristics are considered among essential requirements, unless there is clear evidence that link-by-link coordination is the predominant method and additional requirements are consequently defined in EN 302 217-2-2 [i.34]; in this case, the supplier may chose between a "minimal" or a more complete assessment according the extension of the market addressed.

(ii) Cross references to previously relevant ENs and TSs

The EN 302 217 series replaced and superseded a number of older standards (frequency and/or capacity oriented), which remained, only as "historical" documents, in the ETSI data base. Provided that they may still be referenced in some documentation, annex C provides, for information, an overview of the correspondence between equipment considered in those standards and part/annexes in the present document.

Table 2: Void

(iii) Summary of system options provided

A number of options for equipment implementation are identified in EN 302 217 series; the set of characteristics applicable to each option is uniquely identified through three parameters:

- operating frequency band;
- operating radio frequency channel separation (CS);
- spectral efficiency class (as defined in EN 302 217-2-2 [i.34]).

Each option so identified has a "nominal" payload requirement in term of minimum RIC (Radio Interface Capacity) to be fulfilled when packet payloads are used (e.g. Ethernet, ATM, etc.); in case PDH/SDH traffic are alternatively provided, annex F of EN 302 217-2-2 [i.34] gives the translation from the minimum RIC to the minimum hierarchic interfaces.

Table 3 summarizes the relevant cross-reference between channel separation in various Fixed Service frequency bands and the available options of equipment provided in EN 302 217 series. They are shown in term of the minimum RIC payload, which, depending on the channel separation, correspond to a specific spectral efficiency class detailed in clause 1.2 of EN 302 217-2-2 [i.34] (identified, with increasing spectral efficiency, as classes 1, 2, 3, 4L, 4H, 5L, 5H, 6L, 6H 7 and 8). In classes from 5 to 8, two further sub-classes suffix (i.e. A and B) are provided for the same channel separation depending on whether ACAP or CCDP operation is, respectively, considered for the equipment use.

The minimum RIC payload in tables 3a and 3b are the minimum required for conformance to the present document and are based on the "minimum RIC density" defined, for each spectral efficiency class, in clause 1.2 of EN 302 217-2-2 [i.34]. Only some cases of systems in annex A, due to the smaller channel separation provided, are (exceptionally) labelled with typical *gross bit rate* rather than minimum RIC capacity rates.

However, equipment may offer a variety of base band interfaces, e.g. typical hierarchical rates PDH or SDH, ISDN, Ethernet as well as mixture of these or other standardised interfaces. Mapping/multiplexing of the various base-band interfaces into common frame(s) suitable for radio transmission may be done using standardised higher hierarchical frames or other proprietary methods.

Tables F.1a through F.1h in annex F of EN 302 217-2-2 [i.34] summarise the "minimum RIC" considered in the present document and, when only PDH or SDH interfaces are provided, give the equivalent capacity in term of number of 2 048 Mbit/s streams provided as multiple or single multiplexed PDH or SDH interfaces. These minimum capacities will be associated to the relevant channel separation and spectral efficiency classes defined.

The cells in tables 3a and 3b are filled only on the basis of available physical single equipment transmission capacity (up to a minimum RIC of 862 Mbit/s for class 8 systems), which is relevant for R&TTE Directive [1] Art. 3.2 assessment. Doubled capacity is, in principle, possible for any option using CCDP operation or, more in general, subdividing the payload over two channels; however, specific test procedures are provided in EN 302 217-2-2 [i.34] only for STM-4 interface or other high speed data interfaces when their payload is split over more than one equipment.

Table 3a: Cross reference of available equipment and antenna requirements in parts and annexes of EN 302 217 series: Bands from 1,4 GHz to 18 GHz

EN 302 217 series																
Common requirements ⇨		**Part 1 (present document) (System independent common characteristics)**														
Antenna requirements ⇨		**Part 4-1 (Antenna general and complementary requirements) and Part 4-2 (HS for R&TTED Art. 3.2 Antenna characteristics)**														
Equipment requirements ⇨		**Part 2-1 (system-dependent complementary characteristics) and Part 2-2 (HS for R&TTED Art. 3.2 equipment characteristics)**														
Relevant annex in Part 2-1 and Part 2-2 ⇨		**A**					**B or D**									**C**
Frequency band (GHz)⇨		1,4; 2,4	2,1; 2,6	1,4; 2,1; 2,6	2,1; 2,6		**Annex B** : 3,5 ; 4 ; U4 ; L6 ; U6 ; 7 ; 8 ; 10,5 ; 11 **Annex D** : 13 ; 15 ; 18								**Annex B :** U6	4, U4, U6, 8, 11
Minimum RIC (Mbit/s) provided with relevant equipment characteristics	**Channel separation (MHz) ⇨**	CS < 1,75 and 2	1,75	3,5	7	14	1,75	3,5	7	13,75 / 14 / 15	27,5 / 28 / 29 / 29,65 / 30	55 / 56 / 58 / 59,3 / 60	110 (note 1)	20	40	
	Spectral efficiency ⇩															
	Reference index ⇩ / **Class ⇩**															
	1 / **1**	(note 2)		2												
	2 / **2**	(note 2)	2	4	8	16	2	4	8	16	32	64	128			
	3 / **3**						3	6	12	24	48	96	191			
	4 / **4L**	(note 2)	4	8	16	32	4	8	16	32	64	128	256	45		
	5 / **4H**							sSTM-14 (*)	24	49	98	196	392			
	6 / **5L**								29	58						
	6 / **5LA, 5LB**										117	235	470		168	
	7 / **5H**							sSTM-22 (*)	34	68						
	7 / **5HA, 5HB**										137	274 (**)	548		137 (***) 196	
	8 / **6L**								39	78						
	8 / **6LA, 6LB**										156	313	627		224	
	9 / **6H**									88						
	9 / **6HA, 6HB**										176	352	705		252 (**)	
	10 / **7**									98						
	10 / **7A, 7B**										196	392	784		280	
	11 / **8**									107						
	8A, 8B										215	431	862		308	
Equivalent capacity for hierarchic-only systems		Annex F of parts 2-1 [i.33] and 2-2 [i.34]														

NOTE 1: CS 110 MHz available only in 18 GHz band.
NOTE 2: For channel separations of 2 MHz and other various smaller than 1,75 MHz, only typical "gross bit rates" are defined.
(*): These systems are intended only for the transport of subSTM-0 capacities only in 18 GHz band.
(**): STM-4 capacity as combination of two 2 x STM-1 equipment operating on two channels in ACAP or CCDP or even non adjacent operation is also described.
(***): Minimum RIC 137 Mbit/s option is special provision only for commonality of use of 5HB/28 MHz like equipment modulation also into 40 MHz channel arrangements.

Table 3b: Cross reference of available equipment and antenna requirements in parts and annexes of EN 302 217 series: Bands from 23 GHz to 80 GHz

EN 302 217 series																							
Common requirements ⇨			Part 1 (present document) (System independent common characteristics)																				
Antenna requirements ⇨			Part 4-1 (Antenna general and complementary requirements) and Part 4-2 (HS for R&TTED Art. 3.2 Antenna characteristics)																				
Equipment requirements ⇨			Part 2-1 (system-dependent complementary characteristics) and Part 2-2 (HS for R&TTED Art. 3.2 equipment characteristics)																		Part 3 (R&TTED Art. 3.2 equipment characteristics)			
Relevant annex Part 2-2 ⇨			E											Ea (note 1)							UA	UB	UBa	UC
Frequency band (GHz) ⇨			23, 26, 28, 31, 32, 38, 42						50, 52, 55					71 to 76 and 81 to 86 (note 1)							57 to 59	64 to 66	57 to 66 (note 2)	71 to 76 81 to 86
Minimum RIC (Mbit/s) provided with relevant equipment characteristics	Spectral efficiency ⇩		Channel separation (MHz)						Channel separation (MHz)					Channel separation (MHz)							Channel size free or multiple of predefined slots			
	Reference index ⇩	Class ⇩	3,5	7	14	28	56	112	3,5	7	14	28	56	250	500	750	1 000	1 250	1 500	1 750	2 000				
	1	1							2	4(***)	8(***)	16(***)	32(***)	142	285	427	570	712	855	997	1 140	See minimum spectral efficiency reported in the annexes.			
	2	2	4(**)	8	16	32	64	128	4	8	16	32	64(***)	285	570	855	1 140(*)	1 425	1 710	1 995	2 280				
	3	3	6(**)	12	24	48	96	191	6	12	24	48	96(***)	425	850	1 275	1 700	2 125(*)	2 550	2 975	3 400				
	4	4L	8(**)	16	32	64	128	256		16	32	64	128(***)	570	1 140(*)	1 710	2 280(*)	2 850							
	5	4H		24	49	98	196	392						875	1 750	2 625									
	6	5L		29	58																				
	6	5LA, 5LB				117	235	470						1 050(*)	2 100(*)	3 150(*)									
	7	5H		34	68																				
	7	5HA, 5HB				137	274 (****)	548						1 225	2 450										
	8	6L		39	78																				
	8	6LA, 6LB				156	313	627						1 400	2 800										
	9	6H			88																				
	9	6HA, 6HB				176	352	705																	
	10	7			98																				
	10	7A, 7B				196	392	784																	
	11	8			107																				
	11	8A, 8B				215	431	862																	
Equivalent capacity for hierarchic only systems			Annexes F of parts 2-1 and 2-2																				

NOTE 1: Requirements for the bands 71 GHz to 76 GHz and 81 GHz to 86 GHz in annex Ea of Part 2-2 [i.34] are "additional" to those reported in annex UC of Part 3 [i.35].
NOTE 2: Alternative, in overlapping bands, to annexes UA and UB.
(*): RIC rounded down to closest N × 1 Gbit/s rate shall also be considered valid.
(**) Not provided in 42 GHz band.
(***): Not provided in 50 GHz band.
(****): STM-4 capacity as combination of two 2 x STM-1 equipment operating on two channels in ACAP or CCDP or even non adjacent operation is also described.

(iv) User's guide

The requirements applicable to a specific point to point digital fixed radio systems (including its antenna) are summarised in figure 0 showing the major structure of the whole EN 302 217 series. The requirements are subdivided across the six parts of the EN series corresponding to their four major categories.

The first category (the present document) corresponds to "common" system independent characteristics which are either common to the whole family of equipment, i.e. performance and availability, environmental profiles, power supply, system block diagram, TMN interface, mechanical characteristics and baseband interfaces and parameters. The symbols and abbreviations, which apply to the EN 302 217 series, are listed in the present document. The present document defines those requirements and characteristics set out in the other parts of EN 302 217 series.

The second category (found in EN 302 217-2-1 [i.33] and EN 302 217-4-1 [i.36]) corresponds to "complementary" characteristics and requirements, which are not relevant to article 3.2 of the R&TTE Directive [1] but may guarantee better performance to the actual deployed links. Therefore, the supplier may wish to claim compliance to all or some of these requirements for showing enhanced characteristics of its product.

However, for completeness, EN 302 217-2-1 [i.33] and EN 302 217-4-1 [i.36] provide comprehensive description of the "main" and "complementary" requirements, for equipment operating in co-ordinated frequency bands and for "antennas".

Main requirements are requirements that are also related to the "essential requirements" under article 3.2 of the R&TTE Directive [1] and are further detailed in EN 302 217-2-2 [i.34], for equipment operating in co-ordinated frequency bands, and EN 302 217-4-2 [i.37], for antennas.

Complementary requirements are requirements that are not related to essential requirements under article 3.2 of the R&TTE Directive [1]. Nevertheless they are considered, having been commonly agreed for proper system operation and deployment when specific deployment conditions or compatibility requirements are present. Compliance to all or some of these requirements is made on a voluntary basis.

The limits for main and complementary requirements that are not common or parameterized for all of the equipment covered by one part, but specific to one frequency range, one RIC or PDH/SDH capacity, etc., are located in annexes.

The third category (EN 302 217-2-2 [i.34] and EN 302 217-4-2 [i.37]) is for equipment intended for frequency bands where link-by-link radio frequency coordination (either under administration control or required to the users in licensing procedure) over a specific radio frequency channels arrangement is generally used; it corresponds to essential phenomena, with respect to article 3.2 of the R&TTE Directive [1] and are consequently defined in harmonized standards. In this case a complete set of TX and RX parameters is retained essential and requirements are provided in the same format as in EN 302 217-2-1 [i.33] and EN 302 217-4-1 [i.36]. The limiting values associated with the essential requirements which are not common to all of the equipment covered by one part, but specific to one frequency range, one RIC or PDH/SDH capacity, etc, are located in annexes. Reference to each annex is the same for EN 302 217-2-1 [i.33] as in EN 302 217-2-2 [i.34]. An HS-RTT (requirements table) summarizes those requirements to be addressed in order to claim compliance.

The fourth category (EN 302 217-3 [i.35] and still EN 302 217-4-2 [i.37]) is for equipment intended for frequency bands where, for their propagation or regulatory nature, the conventional link-by-link radio frequency coordination is not generally used and a number of administrations may also apply less restrictive (and less protecting) regulatory measures. It still corresponds to essential phenomena, with respect to article 3.2 of the R&TTE Directive [1] and are consequently defined as harmonized standards. In this case a reduced set of TX and RX parameters is retained essential; however, when the coordinated deployment is considered predominant, additional set of requirements is further included in EN 302 217-2-2 [i.34] and the supplier may chose between the "minimal" or the more complete assessment according the extension of the market addressed.

To conclude, EN 302 217 series will be used as a decision tree, from the present document down to the relevant annexes/sub-annexes of parts EN 302 217-2-1 [i.33], EN 302 217-2-2 [i.34] and EN 302 217-3 [i.35].
At every level, a check of compliance is recommended to be performed.

EN 302 217-2-1	
System dependent requirements for digital systems operating in frequency bands where frequency co-ordination is applied	
4	General characteristics
5	Main requirements
6	Complementary requirements
Annex A	Frequency bands 1,4 GHz to 2,7 GHz
Annex B	Frequency bands from 3 GHz to 11 GHz (CS up to 30 MHz)
Annex C	Frequency bands from 3 GHz to 11 GHz (CS 40 MHz)
Annex D	Frequency bands 13 GHz, 15 GHz and 18 GHz
Annex E	Frequency bands from 23 GHz to 55 GHz
Annex Ea	Frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz
Annex F	Transmission of Packet Data
Annex G (informative)	Additional information

EN 302 217-3 (Harmonized Standard)	
Equipment operating in frequency bands where both frequency coordinated or uncoordinated deployment might be applied. Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive	
4.1	Environmental profile
4.2	RF channel selection
4.3	Transmitter requirements
4.4	Receiver requirements
5	Testing for compliance to technical requirements
Annex A (normative)	HS Requirement & conformance Test specifications (HS-RTT)
Annex B (normative)	Wide radio frequency band covering units and multirate equipment specification and tests
Annex UA (normative)	Frequency band around 58 GHz
Annex UB (normative)	Frequency band 64 GHz to 66 GHz
Annex UBa (normative)	Frequency band 57 GHz to 66 GHz
Annex UC (normative)	Frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz
Annex UD (informative)	Rationale for the interference limit formula
Annex UE (informative)	Capacity and Receiver characteristics in the bands 64 GHz to 66 GHz, 71 GHz to 76 GHz and 81 GHz to 86 GHz

EN 302 217-2-2 (Harmonized Standard)	
Digital systems operating in frequency bands where frequency co-ordination is applied; Harmonized EN covering the essential requirements of Article 3.2 of the R&TTE Directive	
4	Technical requirements specifications
4.1	Environmental profile
4.2	Transmitter requirements
4.3	Receiver requirements
4.4	Antenna directional requirements
5	Testing for compliance with technical requirements
Annex A (normative)	Frequency bands 1,4 GHz to 2,7 GHz
Annex B (normative)	Frequency bands from 3 GHz to 11 GHz (CS up to 30 MHz and 56/60 MHz)
Annex C (normative)	Frequency bands from 3 GHz to 11 GHz (CS 40 MHz)
Annex D (normative)	Frequency bands 13 GHz, 15 GHz and 18 GHz
Annex E (normative)	Frequency bands from 23 GHz to 55 GHz
Annex Ea (normative)	Frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz
Annex F (normative)	Definition of equivalent data rates for packet data, PDH/SDH and other signals on the traffic interface
Annex G (normative)	Test report in relation to flexible systems applications
Annex H (normative)	HS Requirement & conformance Test specifications (HS-RTT)
Annex I (informative)	Impact of power control (ATPC and/or RTPC), mixed mode and bandwidth adaptive operation on spectrum mask and link design requirements
Annex J (informative)	Typical interference sensitivity behaviour for frequency planning purpose

EN 302 217-4-1	
System dependent requirements for antennas	
4	Frequency bands
5	Classification of antennas
6	Electrical characteristics
Annex A (normative)	Standardized RPE for Class 1 antennas in bands 3 GHz to 86 GHz
Annex B (informative)	Additional information
Annex C (informative)	Antenna gain and RPE information

EN 302 217-4-2 (Harmonized Standard)	
Antennas; Harmonized EN covering the essential requirements of article 3.2 of R&TTE Directive	
4	Technical requirements specifications
4.1	Environmental profile
4.2	Radiation Pattern Envelope (RPE)
4.3	Cross-Polar Discrimination (XPD)
4.4	Antenna gain
5	Testing for compliance with technical requirements
Annex A (normative)	HS Requirement & conformance Test specifications (HS-RTT)

Figure 0: Structure of this EN 302 217 series

1 Scope

The present document applies to the following digital fixed radio systems (DFRS), including equipment with integral antenna and antenna types:

- point-to-point systems intended for operation in frequency bands that require co-ordination;
- point-to-point systems intended for operation in frequency bands that do not require co-ordination;
- antennas for point-to-point operation.

The present document summarizes all characteristics, principles, terms and definitions that are common to all P-P equipment and antennas and its consultation is necessary when using all other parts of EN 302 217 series.

EN 302 217-2-1 [i.33] and EN 302 217-4-1 [i.36] summarize the other system dependent characteristics and include limits for "non-essential" requirements, EN 302 217-2-2 [i.34], EN 302 217-3 [i.35] and EN 302 217-4-2 [i.37] contain the whole description and limits of "essential" requirements under article 3.2 of the R&TTE Directive [1].

Health and safety requirements, relevant to article 3.1a of the R&TTE Directive [1] are not considered in any part of this EN 302 217 series. CENELEC is responsible for the relevant standards.

EMC conditions and requirements, relevant to article 3.1b of the R&TTE Directive [1] and any other essential requirement relevant to article 3.3 of the R&TTE Directive [1] are not in the scope of any part of this EN 302 217 series. They may be found in EN 301 489-1 [i.26] and EN 301 489-4 [i.27].

NOTE: A list of such harmonised ENs is available on the web site http://www.newapproach.org.

For administration's guidance when notifying their regulated interfaces in accordance with article 4.1 of the R&TTE Directive [1], annex B provides explanatory considerations on the applicability of the TCAM-RIG format for P-P fixed links. An example of such a notification is also provided. Annex B has been elaborated in co-ordination with the CEPT ECC WGSE.

2 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.

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.

2.1 Normative references

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

[1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[2] ETSI EN 300 019-1-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-0: Classification of environmental conditions; Introduction".

[3] ETSI EN 300 019-2-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-0: Specification of environmental tests; Introduction".

[4] ETSI EN 300 019-1-1: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-1: Classification of environmental conditions; Storage".

[5] ETSI EN 300 019-2-1: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-1: Specification of environmental tests; Storage".

[6] ETSI EN 300 019-1-2: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-2: Classification of environmental conditions; Transportation".

[7] ETSI EN 300 019-2-2: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-2: Specification of environmental tests; Transportation".

[8] ETSI EN 300 019-1-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weatherprotected locations".

[9] ETSI EN 300 019-2-3: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-3: Specification of environmental tests; Stationary use at weatherprotected locations".

[10] ETSI EN 300 019-1-4: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weatherprotected locations".

[11] ETSI EN 300 019-2-4: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-4: Specification of environmental tests; Stationary use at non-weatherprotected locations".

[12] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 2: Operated by -48 V direct current (dc)".

[13] ETSI EN 300 132-3: "Environmental Engineering (EE); Power supply interface at the input to telecommunications and datacom (ICT) equipment; Part 3: Operated by rectified current source, alternating current source or direct current source up to 400 V ".

[14] ETSI ETS 300 233: "Integrated Services Digital Network (ISDN); Access digital section for ISDN primary rate".

[15] ETSI EN 301 126-1: "Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures".

[16] ETSI EN 302 099: "Environmental Engineering (EE); Powering of equipment in access network".

[17] ETSI EN 301 126-3-1: "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".

[18] IEEE 802.3-2008: "IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications".

[19] ISO/IEC 8802-3: "Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirements Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

[20] Recommendation ITU-R F.746: "Radio-frequency arrangements for fixed service systems".

[21] Recommendation ITU-R F.750: "Architectures and functional aspects of radio-relay systems for synchronous digital hierarchy (SDH)-based network".

[22] Recommendation ITU-R F.752: "Diversity techniques for point-to-point fixed wireless systems".

[23] Recommendation ITU-R F.1093: "Effects of multipath propagation on the design and operation of line-of-sight digital fixed wireless systems".

[24] Recommendation ITU-R F.1101: "Characteristics of digital fixed wireless systems below about 17 GHz".

[25] Recommendation ITU-R F.1102: "Characteristics of fixed wireless systems operating in frequency bands above about 17 GHz".

[26] Recommendation ITU-R F.1668: "Error performance objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections".

[27] Recommendation ITU-R F.1703: "Availability objectives for real digital fixed wireless links used in 27 500 km hypothetical reference paths and connections".

[28] Recommendation ITU-R P.530: "Propagation data and prediction methods required for the design of terrestrial line-of-sight systems".

[29] Recommendation ITU-T G.703: "Physical/electrical characteristics of hierarchical digital interfaces".

[30] Recommendation ITU-T G.704: "Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels".

[31] Recommendation ITU-T G.707: "Network node interface for the synchronous digital hierarchy (SDH)".

[32] Recommendation ITU-T G.708: "Sub STM-0 network node interface for the synchronous digital hierarchy (SDH)".

[33] Recommendation ITU-T G.826: "End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections".

[34] Recommendation ITU-T G.828: "Error performance parameters and objectives for international, constant bit-rate synchronous digital paths".

[35] Recommendation ITU-T G.829: "Error performance events for SDH multiplex and regenerator sections".

[36] Recommendation ITU-T G.957: "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".

[37] Recommendation ITU-T I.356: "B-ISDN ATM layer cell transfer performance".

[38] Recommendation ITU-T I.357: "B-ISDN semi-permanent connection availability".

[39] Recommendation ITU-T I.412: "ISDN user-network interfaces - Interface structures and access capabilities".

[40] Recommendation ITU-T V.11: "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

[41] Recommendation ITU-T V.24: "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[42] Recommendation ITU-T V.28: "Electrical characteristics for unbalanced double-current interchange circuits".

[43] Recommendation ITU-T Y.1540: "Internet protocol data communication service - IP packet transfer and availability performance parameters".

2.2 Informative references

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] ETSI TR 101 035: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH) aspects regarding Digital Radio Relay Systems (DRRS)".

[i.2] CEPT/ECC/REC 01-05: "List of parameters of digital point-to-point fixed radio links used for national planning".

[i.3] 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.4] ETSI EN 300 197 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio systems for the transmission of digital signals operating at 32 GHz and 38 GHz".

[i.5] ETSI EN 300 198 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio systems for the transmission of digital signals operating at 23 GHz".

[i.6] ETSI EN 300 234 (historical): "Fixed Radio Systems; Point-to-point equipment; High capacity digital radio systems carrying 1 x STM-1 signals and operating in frequency bands with about 30 MHz channel spacing and alternated arrangements".

[i.7] ETSI EN 300 407 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for digital radio systems for the transmission of digital signals operating at 55 GHz".

[i.8] ETSI EN 300 408 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for digital radio systems for the transmission of digital signals and analogue video signals operating at around 58 GHz, which do not require co-ordinated frequency planning".

[i.9] ETSI EN 300 417 (series): "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment".

[i.10] ETSI EN 300 430 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio systems for the transmission of STM-1 digital signals operating in the 18 GHz frequency band with channel spacing of 55 MHz and 27,5 MHz".

[i.11] ETSI EN 300 431 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio system for the transmission of digital signals operating in the frequency range 24,50 GHz to 29,50 GHz".

[i.12] ETSI EN 300 630 (historical): "Fixed Radio Systems; Point-to-point equipment; Low capacity point-to-point digital radio systems operating in the 1,4 GHz frequency band".

[i.13] ETSI EN 300 631 (historical): "Fixed Radio Systems; Point-to-point Antennas; Antennas for point-to-point fixed radio systems in the 1 GHz to 3 GHz band".

[i.14] ETSI EN 300 633 (historical): "Fixed Radio Systems; Point-to-point equipment; Low and medium capacity point-to-point digital radio systems operating in the frequency range 2,1 GHz to 2,6 GHz".

[i.15] ETSI EN 300 639 (historical): "Fixed Radio Systems; Point-to-point equipment; Sub-STM-1 digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 28 MHz co-polar and 14 MHz cross-polar channel spacing".

[i.16] ETSI EN 300 645: "Telecommunications Management Network (TMN); Synchronous Digital Hierarchy (SDH) radio relay equipment; Information model for use on Q interfaces".

[i.17] ETSI EN 300 786 (historical): "Fixed Radio Systems; Point-to-point equipment; Sub-STM-1 digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 14 MHz co-polar channel spacing".

[i.18] ETSI EN 300 833 (historical): "Fixed Radio Systems; Point-to-point antennas; Antennas for point-to-point fixed radio systems operating in the frequency band 3 GHz to 60 GHz".

[i.19] ETSI EN 301 127 (historical): "Fixed Radio Systems; Point-to-point equipment; High capacity digital radio systems carrying SDH signals (up to 2 x STM-1) in frequency bands with about 30 MHz channel spacing and using co-polar arrangements or Co-Channel Dual Polarized (CCDP) operation".

[i.20] ETSI EN 301 128 (historical): "Fixed Radio Systems; Point-to-point equipment; Plesiochronous Digital Hierarchy (PDH); Low and medium capacity digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands".

[i.21] ETSI EN 301 167: "Transmission and Multiplexing (TM); Management of Synchronous Digital Hierarchy (SDH) transmission equipment; Fault management and performance monitoring; Functional description".

[i.22] ETSI EN 301 216 (historical): "Fixed Radio Systems; Point-to-point equipment; Plesiochronous Digital Hierarchy (PDH); Low and medium capacity and STM-0 digital radio system operating in the frequency bands in the range 3 GHz to 11 GHz".

[i.23] ETSI EN 301 277 (historical): "Fixed Radio Systems; Point-to-point equipment; High capacity digital radio systems transmitting STM-4 or 4 x STM-1 in a 40 MHz radio frequency channel using Co-Channel Dual Polarized (CCDP) operation".

[i.24] ETSI EN 301 387 (historical): "Fixed Radio Systems; Point-to-point equipment; Plesiochronous Digital Hierarchy (PDH); Low and medium capacity digital radio systems operating in the frequency band 48,5 GHz to 50,2 GHz".

[i.25] ETSI EN 301 461 (historical): "Fixed Radio Systems; Point-to-point equipment; High capacity fixed radio systems carrying SDH signals (2 x STM-1) in frequency bands with 40 MHz channel spacing and using Co-Channel Dual Polarized (CCDP) operation".

[i.26] ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

[i.27] ETSI EN 301 489-4: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 4: Specific conditions for fixed radio links and ancillary equipment".

[i.28] ETSI EN 301 669 (historical): "Fixed Radio Systems; Point-to-point equipment; High capacity digital radio systems carrying STM-4 in two 40 MHz channels or 2 x STM-1 in a 40 MHz channel with alternate channel arrangement".

[i.29] ETSI EN 301 785 (historical): "Fixed Radio Systems; Point-to-point packet data equipment; Parameters for radio systems with packet data interfaces for transmission of digital signals operating in the frequency range 7, 8, 13, 15, 18, 23, 26, 28, 32, 38, 52 to 55 GHz".

[i.30] ETSI EN 301 786 (historical): "Fixed Radio Systems; Point-to-point equipment; Parameters for digital radio systems for the transmission of digital signals operating at 52 GHz".

[i.31] ETSI EN 301 787 (historical): "Fixed Radio Systems; Point-to-Point equipment; Parameters for radio systems for the transmission of Sub-STM-0 digital signals operating in the 18 GHz frequency band".

[i.32] ETSI EN 302 062 (historical): "Fixed Radio Systems; point-to-point equipment; High capacity digital radio relay systems carrying STM-4, 4 x STM-1 or 2 x STM-1 signals in bands with 55/56 MHz channel spacing".

[i.33] ETSI EN 302 217-2-1: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 2-1: System-dependent requirements for digital systems operating in frequency bands where frequency co-ordination is applied".

[i.34] ETSI EN 302 217-2-2: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 2-2: Digital systems operating in frequency bands where frequency co-ordination is applied; Harmonized EN covering the essential requirements of Article 3.2 of the R&TTE Directive".

[i.35] ETSI EN 302 217-3: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 3: Equipment operating in frequency bands where both frequency coordinated or uncoordinated deployment might be applied; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.36] ETSI EN 302 217-4-1: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-1: System-dependent requirements for antennas".

[i.37] ETSI EN 302 217-4-2: "Fixed Radio Systems; Characteristics and requirements for point-to-point equipment and antennas; Part 4-2: Antennas; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

[i.38] ETSI EN 300 119 (all parts): "Environmental Engineering (EE); European telecommunication standard for equipment practice".

[i.39] ETSI ETS 300 635: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Radio specific functional blocks for transmission of M x STM-N".

[i.40] ETSI TS 102 329 (withdrawn 2009): "Fixed Radio Systems; Point-to-Point equipment; Radio equipment and antennas for use in Point-to-Point High Density applications in the Fixed Services (HDFS) frequency band 64 GHz to 66 GHz".

[i.41] ETSI TS 102 524 (withdrawn 2009): "Fixed Radio Systems; Point-to-Point equipment; Radio equipment and antennas for use in Point-to-Point Millimetre wave applications in the Fixed Services (mmwFS) frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz".

[i.42] Recommendation ITU-R F.751: "Transmission characteristics and performance requirements of radio-relay systems for SDH-based networks".

[i.43] Recommendation ITU-R F.1191: "Bandwidths and unwanted emissions of digital fixed service systems".

[i.44] Recommendation ITU-T G.773: "Protocol suites for Q-interfaces for management of transmission systems".

[i.45] Recommendation ITU-T G.783: "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

[i.46] Recommendation ITU-T G.784: "Management aspects of the synchronous digital hierarchy (SDH) transport network element".

[i.47] The Radio Regulations, Edition of 2012.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document and of the whole EN 302 217 series, the following terms and definitions apply:

allocated radio frequency band: Derived from the definition of "allocation (of a frequency band)" (Radio Regulations [i.47], article 1.16): "entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specific conditions. This term is also applicable to the frequency band concerned".

NOTE: From the regulatory point of view two different applications might be envisaged:

- **Frequency band where frequency co-ordination is applied:** in these bands, in the licensing process, regulatory bodies enforce co-ordination rules to ensure that all links work on an "acceptable interference" bases.

- **Frequency band where frequency co-ordination is not applied:** in these bands, irrespective of any licensing process or with no licensing at all, the deployment is freely made by the user on a "first on-first served" bases without any warrantee of "acceptable interference" from the regulatory body.

antenna: part of the transmitting or receiving system that is designed to radiate and/or receive electromagnetic waves

NOTE: Antenna directional characteristics are part of essential requirements under article 3.2 of the R&TTE Directive [1].

Automatic Transmit Power Control (ATPC): function implemented to offer a dynamic power control that delivers maximum power only during deep fading; in this way for most of the time the interference is reduced and the transmitter operates in a higher linearity mode

NOTE 1: When this function is used, the transmit power is dynamically changed with respect to the propagation conditions. In principle, when ATPC is implemented, three different level of power may be identified:

- **maximum available power** (delivered only in conditions of deep fading);
- **maximum nominal power** (useable on a permanent basis when ATPC is disabled); it should be noted that this power is "nominal for the equipment" and is not to be confused with the "nominal level set link by link" by the frequency co-ordinating body. This is achieved through passive RF attenuators or use of the RTPC function;
- **minimum power** (delivered in unfaded conditions).

NOTE 2: Maximum nominal and maximum available power levels may be coincident or, in case of multi-state modulation formats, the maximum available power may be used to overdrive the transmitter (loosing linearity but gaining fade margin when the fade conditions have already impaired the expected RBER). Performance predictions are usually made with the maximum "available power".

bandwidth adaptive systems: system, the capacity of which may be dynamically changed by mean of bandwidth reduction during adverse propagation conditions

block assignment: application of block of spectrum assigned to one or more stations of an operator under a single exclusive licence

channel separation (CS): distance between adjacent channels in a radio frequency channels arrangement; it represents one of the major parameter for the identification of the radio equipment use and relevant requirements

conformity assessment procedure: See R&TTE Directive [1] annexes II to V.

co-polar pattern: diagram representing the radiation pattern of a test antenna when the reference antenna is similarly polarized, scaled in dBi or dB relative to the measured antenna gain

cross-Polar Discrimination (XPD): difference in dB between the co-polarized main beam gain and the cross-polarized one, measured within a defined angular region

cross-polar pattern: diagram representing the radiation pattern of a test antenna when the reference antenna is orthogonally polarized, scaled in dBi or dB relative to the measured antenna gain

environmental profile: range of environmental conditions under which equipment within the scope of the EN 302 217 series is required to comply with the provisions of the EN 302 217 series

essential phenomenon: radio frequency phenomenon related to the essential requirements under article 3.2 of the R&TTE Directive [1] that is capable of expression in terms of quantifiable technical parameters

frequency band: band of frequencies over which the performance characteristics of the equipment/antenna are set within specified limits

frequency block: portion of a radio-frequency band licensed or auctioned to a user

NOTE: It is commonly assumed that the user can freely deploy radio systems inside the block, complying only with few interblock coexistence rules and possibly with operational constraints given in the license/auction.

frequency slot: basis on which one or more slots can be aggregated to form a channel or a block

gain (of an antenna): ratio of the radiation intensity, in a given direction, to the radiation intensity that would be obtained if the power accepted by the antenna were radiated isotropically

NOTE: Value measured in dBi.

gross bit rate: total number of bit/s actually transmitted on the air; when divided by the actual modulation index it corresponds to the *symbol rate*

NOTE: In case of a transmitter working in burst mode, the *gross bit rate* is the instantaneous maximum transmission bit rate during the burst.

half power beamwidth (of an antenna): angle, relative to the main beam axis, between the two directions at which the measured co-polar pattern is 3 dB below the value on the main beam axis

input port(s): flange(s) or connector(s) through which access to the antenna system is provided

NOTE 1: These are shown in the following figure 1 at points D and D'.

NOTE 2: The points in figure 1 are reference points only; points B, C and D, B', C' and D' may coincide.

integral antenna: antenna which is declared as part of the radio equipment by the supplier

NOTE: Even when equipment with integral antenna is concerned, it might still be possible to separate the antenna from the equipment using a special tool. In such cases the assessment of the radio equipment and of the antenna against requirements of this EN 302 217 series could be done separately by the actual supplier(s).

Inter Port Isolation (IPI) (of an antenna): ratio in dB of the power level applied to one port of a multi-port antenna (e.g. dual polarization ports or multi-band ports) to the power level received in any other port of the same antenna as a function of frequency

isotropic radiator: hypothetical, lossless antenna having equal radiation intensity in all directions

main beam (of an antenna): radiation lobe containing the direction of maximum radiation

main beam axis (of an antenna): direction for which the radiation intensity is the maximum

maximum available power: See Automatic Transmit Power Control (ATPC).

maximum nominal power: See Automatic Transmit Power Control (ATPC).

mixed-mode (adaptive) system: system having the capability for stations to operate, according network and operator needs (e.g. according propagation variations), on different modulation orders switching dynamically between them within the same assigned radio frequency channel, adapting the system capacity accordingly (*multirate* operation)

NOTE: This capability may be used to improve capacity capabilities, with variable availability objectives, by adaptive adjustment for time-variant channel impairments. The switching between modulation orders may occur as frequently as the propagation conditions dictate and as appropriate to the system dynamic behaviour management, (e.g. on a per-symbol and/or, in *multi-carrier* systems, per-carrier basis).

multi-carrier (equipment): equipment where more than one modulated sub-carrier is radiated from the same transmitter within one polarisation of the assigned radio frequency channel

NOTE: For the purpose of this EN 302 217 series, all sub-carriers are assumed to be nominally equal in terms of modulation format, bandwidth and output power; dissimilar sub-carriers systems are not in the scope of the present EN series. In addition, OFDM modulated signals are not considered multi-carrier unless few equal OFDM modulated sub-carriers can be identified within the assigned radio frequency channel bandwidth.

multi-channel (system): system where the payload capacity is transmitted through two or more radio equipment operating over different (in frequency or in polarisation) assigned radio frequency channels

multirate systems: systems that can operate with multiple payload rates; the actual rate can either be statically preset (possibly coupled also with *Preset-mode* operation) or, when coupled with *Mixed-mode* operation, dynamically change according to the change in modulation format

national radio frequency channel arrangement: predefined centre frequencies raster, used on a national basis, for a number of radio frequency channels, covered by a national regulation in a frequency band in absence of, or different from, existing ECC or ITU-R recommended channel arrangements

NOTE: May all or in part overlap with other national or recommended radio frequency channel arrangements.

Network Interface Capacity (NIC): sum of the maximum bit rates of the implemented base band interfaces at reference point X/X'

nominal (channel) bandwidth: bandwidth, defined by the supplier, which the system will use when deployed in bands where no specific radio frequency channel arrangement is defined (or it is defined only in term of aggregation of basic slots)

NOTE: Its value can be defined as a free value (nominal bandwidth) or in term of the used aggregation of basic frequency slots to form the used channel (nominal channel bandwidth). This value, if required, may represent the reference for defining parametric requirements (e.g. spectrum density mask, spectrum efficiency, etc.).

occupied bandwidth: width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage $\beta/2$ of the total mean power of a given emission (Radio Regulations [i.47], article 1.153)

NOTE: For the purpose of the present document, $\beta/2$ is assumed to be equal to 0,5 % (Recommendation ITU-R F.1191 [i.43]).

operating frequency range: range(s) of radio frequency channels covered by the Equipment Under Test (EUT) without any change of HardWare (HW) units

preset-mode system: multi-rate and multi-format system that can be statically configured or preset to operate on a semi-permanent basis with one among several possible modulation orders within the same assigned radio frequency channel, changing consequently the payload rate

NOTE: Signals transmitted from any station use the single modulation order which has been preset. The presetting, if the licence permits, may be changed from time to time according to the operator's needs.

radiation pattern (of an antenna): diagram relating power flux density at a constant distance from the antenna at off-axis angles (non intentional antenna radiation) relative to a direction of the antenna main beam axis (intentional antenna radiation)

Radiation Pattern Envelope (RPE) (of an antenna): envelope below which the radiation pattern fits; diagrams representing the radiation pattern of a test antenna measured with a reference antenna, scaled in dBi or dB relative to the measured antenna gain

NOTE: For linearly polarized antennas, two different RPE are generally identified:

- **co-polar radiation pattern envelope:** diagram representing the radiation pattern of a test antenna when the reference antenna is similarly polarized, scaled in dBi or dB relative to the measured antenna gain;
- **cross-polar radiation pattern envelope:** diagram representing the radiation pattern of a test antenna when the reference antenna is orthogonally polarized, scaled in dBi, or dB relative to the measured antenna gain.

radio equipment: product, or relevant component thereof, capable of communication by means of the emission and/or reception of radio waves utilizing the spectrum allocated to terrestrial/space radiocommunication

NOTE: As defined in the R&TTE Directive [1].

radio frequency channel arrangement: predefined (centre frequencies) raster for a number of radio frequency channels

NOTE 1: Used by administrations for co-ordination in the same geographical area.

NOTE 2: As defined by Recommendation ITU-R F.746 [20].

radio frequency channel: portion of a radio frequency band, where a radio frequency channel arrangement has been established, dedicated to one fixed radio link

Radio Interface Capacity (RIC): maximum user net capacity (in term of system capability), defined at Z/Z' reference points, that can be transmitted over the radio interface defined at reference point C'

NOTE: RIC is defined at Z/Z' reference points and includes additional capacity added for framing and multiplexing/demultiplexing different baseband signals (at X/X' points) into a transport module, eventually integrated in the baseband processing of the radio system, virtually defined at the Z/Z' reference points (e.g. the STM-N for the standardized SDH case or the higher level PDH frames for the transport of N x 2 Mbit/s or similar declared proprietary multiplexing frames of different signals). It does not include other additional proprietary algorithms and signals used for specific radio systems purposes (typically error correction codes and radio system service channels).
When, for very short periods, internal system functions (e.g. link controls, ranging, etc.) uses part of all the transmission capacity, the RIC in these periods is not subject to minimum RIC requirement.

radome (of an antenna): cover of dielectric material, intended to protect an antenna from the effects of its physical environment

recommended (or harmonized) radio frequency channel arrangement: predefined centre frequencies raster for a number of radio frequency channels, covered by a ITU-R and/or ECC (or CEPT/ERC) Recommendation in a frequency band that is recommended (but not imposed) for harmonisation to the member countries where they use the relevant frequency band for the Fixed Service

reference mode (reference equipment class and *channel separation*): in *mixed-mode* systems, it identifies the operative mode which characteristics (i.e. system capacity, *spectral efficiency class* over a given *channel separation*) are used (i.e. declared in the licensing process) in the link per link coordination analysis, made for offering the reference availability objective commonly used for the whole network (i.e. the typical 99,99 % or any other generally used by the administration concerned for the frequency coordination of licensed P-P links). When also *bandwidth adaptive* operation is active, the *reference mode* is always related to the widest *channel separation* used.

Remote Frequency Control (RFC): many fixed digital radio systems offer this functionality as a qualifying aid to deployment

NOTE: When this function is used, the transmit centre frequency/channel can be set either by a local control unit, connected to the system control unit, or by a remote network management terminal. The frequency variation is static and usually made at the activation or re-commissioning of links in order to easily obtain the licensed frequency assigned by the co-ordinating body to the network operator for that link, in order to control network interference in the same geographical area.

Remote Transmit Power Control (RTPC): many fixed digital radio systems offer this functionality as a qualifying aid to the deployment

NOTE: When this function is used, the transmit power can be set either by a local control unit, connected to the system control unit, or by a remote network management terminal. The power variation is static and usually made at the activation or re-commissioning of links in order to easily obtain the EIRP required by the frequency co-ordinating body for that link, to control co-channel and adjacent channel interference in the same geographical area. In principle, this function is equivalent to the requirement power regulation capability (e.g. by fixed attenuators) commonly required in fixed systems.

Residual Bit Error Ratio (RBER): Bit Error Ratio observed over suitably long period (as specified by the test requirement) at a RSL where the thermal noise contribution is negligible (e.g. at least 10 dB RSL higher than the BER = 10^{-6} threshold)

Signature: test methodology, based on two ray path simulator, defined in Recommendation ITU-R F.1093 [23] for characterising digital radio receiver resistence to multipath phenomena

NOTE: First introduced by Bellcore work (Lundgren, Rummler - BSTJ 58 pp 1073-1100), the so defined signature of a point-to-point radio system is used in Recommendation ITU-R P.530 [28] for prediction of the selective outage probability due to multipath occurrence on a given link.

single-mode system: system designed to operate with a single modulation order only

spectral efficiency: defined as the ratio between the peak *gross-bit-rate* and the Occupied Bw or occupied ChS (whichever is applicable)

spectral efficiency class: formal subdivision of increasing modulation efficiency introduced in EN 302 217-2-2 [i.34] as major parameter for the identification of the radio equipment use and relevant requirements

NOTE: Actual modulation format used is not relevant in this definition; any modulation format can be used provided that the requirements of the class are met.

spectral efficiency reference index: indicates the "n" value for an ideal modulation format with 2^n different states

stand-alone antenna: antenna delivered independently from the fixed radio equipment, by the same or a different supplier and connected to the radio equipment on the field

sub-STM-1: old terminology for medium capacity Synchronous Transport Module at 51,84 Mbit/s defined as STM-0 by Recommendation ITU-T G.707 [31] and Recommendation ITU-R F.750 [21]

sub-STM-0: set of SDH transmission interfaces, defined in Recommendation ITU-T G.708 [32] which transport one or more TU Group(s)-2 (sSTM-2n interface) or one or more TU-12 (sSTM-1k interface) as defined by Recommendation ITU-T G.707 [31], with Section OverHead (9 bytes per frame)

NOTE: The sSTM-2n interfaces may be defined for optical, electrical or radio transport technologies. The sSTM-1k interfaces are defined for radio transport technologies; the sSTM-11 interface may also be used for reduced functionality, intra-station cable connections for VC11/VC12 payloads. The number (k) of TU-12 in sSTM-1k interfaces provided by Recommendation ITU-T G.708 [32] is limited to k = 1, 2, 4, 8 and 16.

symbol rate: total number of symbols/s actually transmitted on the air; it is equal to the *gross bit rate* divided by the actual modulation index

3.2 Symbols

For the purposes of the present document and of the whole EN 302 217 series, the following symbols apply:

°	degree
Ω	Ohm
CSmin	minimum practical Channel Separation (for a given radio-frequency channel arrangement)
dB	deciBel
dBc	deciBel relative to mean carrier power
dBi	deciBel relative to an isotropic radiator
dBm	deciBel relative to 1 mW
dBu	deciBel relative to 1 microVolt
dBW	deciBel relative to 1 Watt
GHz	GigaHertz
kg	kilogramme
kHz	kiloHertz
km	kilometre
kN	kiloNewton
m/s	metres per second
Mbit/s	Mega-bits per second
MHz	MegaHertz
mW	milliWatt
ns	nanosecond
ppm	parts per million
V	Volts
W/m^2	Watts per square metre

3.3 Abbreviations

For the purposes of the present document and of the whole EN 302 217 series, the following abbreviations apply:

AC	Alternating Current
ACAP	Adjacent Channel Alternate Polarization
ACCP	Adjacent Channel Co-Polarization
ACDP	Adjacent Channel Dual Polarized
APSK	Amplitude and Phase Shift Keying (modulation)
ARQ	Automatic Repeat Request
ATM	Asynchronous Transport Module
ATPC	Automatic Transmit Power Control
ATTM	ETSI TC-Access Terminals, Transmission and Multiplexing
AU	Administrative Unit
BB	Base Band
BBER	Background Block Error Ratio
BER	Bit Error Ratio
BW	equivalent noise BandWidth
BWA	Broadband Wireless Access

NOTE: Intended as any mixture of fixed, nomadic, mobile application.

BWe	evaluation BandWidth

NOTE: This is the resolution bandwidth in which spectrum components are measured.

C/I	Carrier to Interference ratio
CCDP	Co-Channel Dual Polarized
CEPT	Conférence Européenne des administrations des Postes et des Télécommunications (European Conference of Postal and Telecommunications administrations)
CMI	Coded Mark Inversion
CS	Channel Separation

NOTE: Sometimes referred in literature as Channel Spacing.

CSmin	minimum practical Channel Separation

NOTE: Defined for each given radio-frequency channel arrangement.

CW	Continuous Wave
DC	Direct Current
DFRS	Digital Fixed Radio System
DRRS	Digital Radio Relay System
DTE	Data Terminal Equipment
EC	European Community
ECC	Electronic Communication Committee of the CEPT
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
ERC	European Radiocommunications Committee of the CEPT, presently become ECC
ES	Errored Seconds
ESR	Errored Second Ratio
EUT	Equipment Under Test
Fc	Cut-off Frequency
FDD	Frequency Division Duplex
FEC	Forward Error Correction
FER	Frame Error Ratio
FLANE	Fixed Local Area Network Extension
FM	Fade Margin
FRS	Fixed Radio Systems
FS	Fixed Service
FSK	Frequency-Shift Keying (modulation)
FSS	Fixed Satellite Service
FWA	Fixed Wireless Access

HDB	High Density Bipolar
HDFS	High Density Fixed Service
HEN	Harmonized European Standard
HS-RTT	Harmonized Standard - Requirements and conformance Test specifications Table
IEC	International Electrotechnical Committee
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
IP	Internet Protocol
IPI	Inter-Port Isolation
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ITU-R	International Telecommunication Union - Radiocommunications standardization sector
ITU-T	International Telecommunication Union - Telecommunications standardization sector
L6	Lower 6

NOTE: 5 925 GHz to 6 425 GHz frequency band.

LO	Local Oscillator
MGWS	Multi-Gigabit Wireless Systems
mmwFS	millimeter-wave Fixed Service
MP	Multi Point
MP-MP	Multipoint-to-Multipoint
MWA	Mobile Wireless Access
N	Noise
n.a.	not applicable
NFD	Net Filter Discrimination
NIC	Network Interface Capacity
NNI	Network Node Interface
OJEU	Official Journal of the European Union
OSI	Open Systems Interconnection
PDH	Plesiochronous Digital Hierarchy
PFD	Power Flux Density
Pi	interference Power
P-MP	Point-to-Multipoint
P-P	Point-to-Point
PRBS	Pseudo Random Binary Sequence
PSD	Power Spectral Density
PSK	Phase-Shift Keying (modulation)
PSTN	Public Switched Telecommunication Network
QAM	Quadrature Amplitude Modulation
R&TTE	Radio equipment and Telecommunications Terminal Equipment
R&TTED	Radio equipment and Telecommunications Terminal Equipment Directive
RBER	Residual BER
RCSOH	Radio Complementary Section OverHead
RF	Radio Frequency
RFC	Remote Frequency Control
RFCOH	Radio Frame Complementary OverHead
RFER	Residual FER
RIC	Radio Interface Capacity
RL	Return Loss
RPE	Radiation Pattern Envelope
RR	Radio Regulation
RSL	Receiver Signal Level
RTPC	Remote Transmit Power Control
RX	Receive or Receiver
S/(N+I)	Signal to Noise plus Interference ratio
S/N	Signal to Noise ratio
S/XPI	Signal to Cross-Polar Interference ratio
SAB	Services Auxiliary to Broadcasting
SAP	Services Auxiliary to Programme making
SDH	Synchronous Digital Hierarchy
SOH	Section OverHead

SR Symbol Rate
SRL Spectrum Reference Level
sSTM-1k Synchronous Transport Module of k times VC-12 equivalent payload (k = 1, 2, 4, 8, 16)

NOTE: Defined by Recommendation ITU-T G.708 [32].

sSTM-2n Synchronous Transport Module of n times VC2 equivalent payload (n = 1, 2, 4)

NOTE: Defined by Recommendation ITU-T G.708 [32].

STM Synchronous Transport Module
STM-0 Synchronous Transport Module Level 0

NOTE: 51,840 Mbit/s AU-3 equivalent payload.

STM-1 Synchronous Transport Module Level 1

NOTE: 155,520 Mbit/s.

STM-4 Synchronous Transport Module Level 4

NOTE: 622,080 Mbit/s.

STM-N Synchronous Transport Module, level N
Sub-STM-0 generic term for a number of low capacity SDH transport modules

NOTE: sSTM-1k or sSTM-2n.

Sub-STM-1 old terminology for STM-0 module

NOTE: Before its formal adoption in Recommendation ITU-T G.707 [31].

TC ETSI Technical Committee
TCAM Telecommunication Conformity Assessment and Market Surveillance Committee
TCAM-RIG TCAM Radio Interface Group
TDD Time Division Duplex
TMN Telecommunications Management Network
TU Tributary Unit
TUG Tributary Unit Group
TX Transmit or Transmitter
U4 Upper 4

NOTE: 4,4 GHz to 5,0 GHz frequency band.

U6 Upper 6

NOTE: 6 425 GHz to 7 125 GHz frequency band.

VC Virtual Container
VC-n Virtual Container – order n

NOTE: Defined by Recommendation ITU-T G.707 [31].

VSWR Voltage Standing Wave Ratio
W/U Wanted to Unwanted signal ratio
WGSE Working Group Spectrum Engineering

XIF Cross-polarization Improvement Factor due to XPIC operation
XPD Cross-Polar Discrimination
XPI Cross-Polar Interference
XPIC Cross-Polar Interference Canceller

4 General characteristics

4.1 Performance and availability requirements

Equipment shall be designed in order to meet network performance and availability requirements appropriate for the type of traffic carried in a multimedia network. These network requirements (see note) are foreseen by Recommendation ITU-Ts G.826 [33] and G.828 [34], by Recommendation ITU-Ts I.356 [37] and I.357 [38] for ATM transmission and Y.1540 [43] for IP transmission. For transmission of Ethernet frames, network performance requirements of ISO/IEC 8802-3 [19] for 10 Mbit/s Medium Attachment Units and IEEE 802.3 [18] for 100 Mbit/s and 1 000 Mbit/s Physical Layer Devices shall be referred to.

The events for SDH multiplex and regenerator sections have to be measured according to Recommendation ITU-T G.829 [35].

The performance and availability objectives for any overall radio connections, used in the international or national portion of the digital path, have to be based on the criteria defined in Recommendation ITU-Rs F.1668 [26] and F.1703 [27].

The effect of the link design on performance is recognized and the general design criteria specified in Recommendation ITU-Rs F.752 [22], F.1093 [23], F.1101 [24] and F.1102 [25] are to be applied to the digital connection with respect to the propagation scenarios set out in Recommendation ITU-R P.530 [28].

NOTE: An exhaustive list of recommendations for network performance and availability requirements is not in the scope of the present document. The Recommendations referred in this clause are the basic ones for the most common applications in the fixed networks. Due to continuous evolution of the communication technology, other payloads/network applications might require different or new requirements that should be taken into due account in the equipment and link design for such applications.

4.2 Environmental profiles

There are three environmental profiles to be considered:

- environmental profile declared under the R&TTE Directive [1];

NOTE: With the generic term of environmental profile, it is here intended any variation of the "external" conditions (e.g. climatic and external primary/secondary power supply sources feeding the equipment to be assessed) that might affect the system parameters relevant to the "essential requirements" of article 3.2 of the R&TTE Directive [1].

- voluntary ETSI environmental profile;
- test environmental profiles.

4.2.1 Environmental profile declared under the R&TTE Directive

From the point of view of the R&TTE Directive [1], the essential requirements of EN 302 217-2-2 [i.34], EN 302 217-3 [i.35] and EN 302 217-4-2 [i.37] apply under the environmental profile for intended operation of the equipment and antennas, which shall be declared by the supplier.

4.2.2 ETSI environmental profiles

If conformance is voluntarily sought also to an ETSI standardized environmental profile, the radio equipment shall be required to meet the environmental conditions and related tests set out in the appropriate part(s) of the multipart standard EN 300 019-1-0 [2] to EN 300 019-2-4 [11], which defines weather protected and non-weather protected locations, classes and test severity.

NOTE: The environmental profile declared for the R&TTE Directive conformance may be different from any ETSI standardized one.

Environmental conditions for antennas are not generally included in the scope of EN 300 019 series; environmental profiles are left to supplier declaration only. However annex A of EN 302 217-4-1 [i.36] gives some generic guidance.

The equipment shall comply with all of the relevant requirements of the EN 302 217 series at all times when operating within the boundary limits of the chosen operational environmental profile of the equipment.

4.2.2.1 Equipment within weather-protected locations (indoor locations)

Equipment intended for telecommunications applications and operating inside weather protected locations shall meet the requirements of an appropriate environmental class characterized in the EN 300 019-1-3 [8] for such purpose. The supplier shall declare the selected class(es).

4.2.2.2 Equipment for not-weather-protected locations (outdoor locations)

Equipment intended for telecommunications applications and operating in non-weather protected locations shall meet the requirements of an appropriate environmental class characterized in the EN 300 019-1-4 [10] for such purpose. The supplier shall declare the selected class(es).

4.2.3 Test environment profiles

In the case of the R&TTE Directive [1], any test, carried out to generate the test report and/or declaration of conformity, required to fulfil any conformity assessment procedure set out by the R&TTE Directive [1] for radio equipment, shall be carried-out with the same principles and procedures, for reference and extreme conditions, specified in:

- clause 4.4 of EN 301 126-1 [15] for climatic conditions;
- table 1 of EN 301 126-1 [15] and relevant clauses of EN 302 217-2-2 [i.34] or EN 302 217-3 [i.35] for power supply conditions.

Requirements for testing at reference or extreme conditions, specified in relevant clauses of the EN 302 217 series, are set out according to the principles for similar requirements in EN 301 126-1 [15].

In the case of voluntary ETSI environmental profiles, the technical requirements of the EN 302 217 series apply under the environmental profile for operation of the equipment, which shall be determined by the environmental class of the equipment according to clause 4.4 of EN 301 126-1 [15]. Testing shall be in accordance with EN 300 019-2-3 [9] or EN 300 019-2-4 [11] for weather-protected and not-weather-protected profiles, respectively.

Any test, carried out to generate the test report and/or declaration of conformity, required to fulfil any conformity assessment procedure specification by the R&TTE Directive [1] for integral or stand-alone DFRS antennas (directional phenomena of EN 302 217-4-2 [i.37]), shall be carried-out at reference environmental conditions at the test field according to clause 4.1 of EN 301 126-3-1 [17].

The test report shall be produced according to the procedure specified by article 10 of the Directive 1999/5/EC [1].

4.3 Power supply

There are two power supply profiles to be considered:

- power supply profile declared under the R&TTE Directive [1];
- voluntary ETSI power supply profile.

4.3.1 Power supply profile declared under the R&TTE Directive

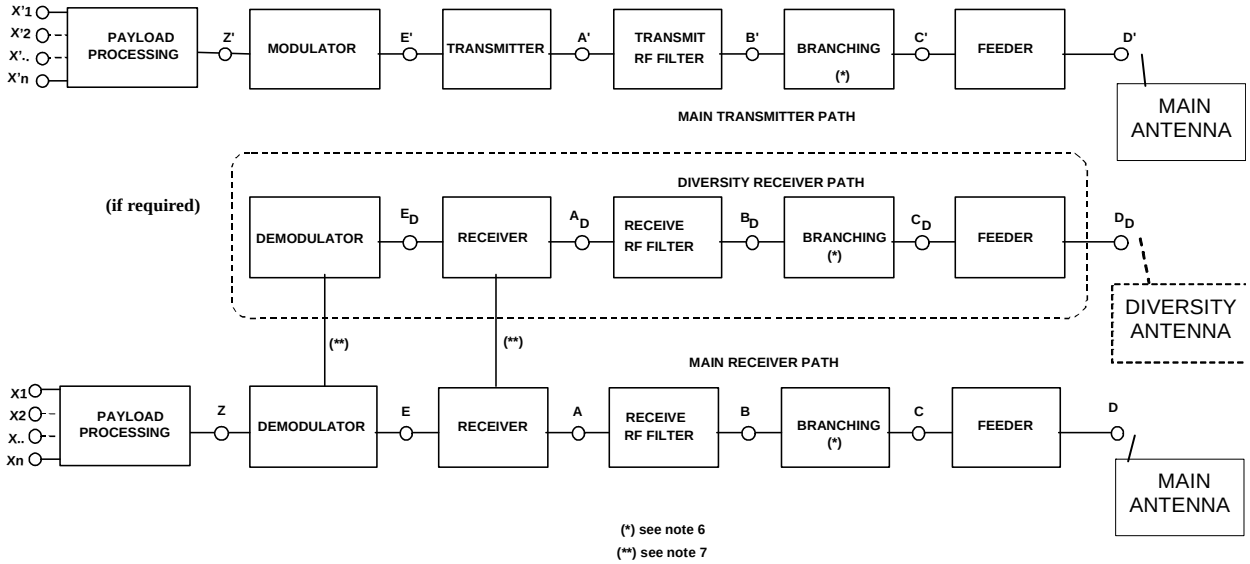
From the point of view of the R&TTE Directive [1], the essential requirements of EN 302 217-2-2 [i.34], EN 302 217-3 [i.35] and EN 302 217-4-2 [i.37] apply under the limits of any primary/secondary power supply external to the equipment under assessment, in accordance with the environment profile for intended operation of the equipment, which shall be declared by the supplier. See clauses 4.2.1 and 4.2.3.

4.3.2 ETSI power supply profile

If conformance is voluntarily sought also to an ETSI standardized power supply profile, the power supply interface shall be in accordance with the characteristics of one or more of the secondary voltages specified in EN 300 132-2 [12] and EN 300 132-3 [13]. When appropriate, in case of remote or local powering of user stations, also EN 302 099 [16] shall apply.

4.4 System block diagram

The reference points of the system block diagram below will be used in the descriptions of requirements and of test points in the other parts of EN 302 217 series [i.33], [i.34] and [i.35].



NOTE 1: For the purpose of defining the measurement points, the branching network does not include a combiner.
NOTE 2: The points shown above are reference points only and do not mandate any implementation; points C and C', D and D' in general coincide.
NOTE 3: Points B, C, B' and C' may coincide when a simple duplexer is used.
NOTE 4: Points X1, X2, … Xn and points X'1, X'2, … X'n correspond to one or more digital or analogue signal input reference points. They are generically referred to as X and X'.
NOTE 5: The subdivision of "Payload processing" and the "Modulator/demodulator" blocks is functional and not physical. The first functionally contains the payload processing needed for building up the transport module (e.g. framing, multiplexing and or concentration), the latter functionally contains mo-demodulation, coding-decoding and service signals processing needed for transmission (e.g. error correction algorithms and service channels). Points Z and Z', that might not be physically available, represent the virtual points where the radio interface capacity (RIC), referred in the provisions of annexes F of EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34], shall be defined.
NOTE 6: No filtering included.
NOTE 7: Alternative connection at RF, IF or Baseband level.

Figure 1: System block diagram

5 Baseband interfaces and parameters

The baseband parameters, specified in following clauses, refer to point X and X' of figure 1. Parameters for service channels and wayside traffic channels are outside the scope of the EN 302 217 series.

One or more of the following clauses will be applicable.

5.1 Plesiochronous interfaces

If applicable, Plesiochronous interfaces at 64 kbit/s, 2 Mbit/s, 8 Mbit/s, 34 Mbit/s and 140 Mbit/s shall comply with Recommendation ITU-T G.703 [29]. Parameters for service channels and wayside traffic channels are outside the scope of this EN 302 217 series.

5.2 ISDN interfaces

If applicable, the transmission of 2 Mbit/s signals using the structure and functions of ISDN primary multiplex signals is to be in accordance with Recommendation ITU-Ts G.703 [29], G.704 [30], I.412 [39] and ETS 300 233 [14].

5.3 Synchronous digital hierarchy interfaces

If applicable, the SDH baseband interface shall be in accordance with Recommendation ITU-Ts G.703 [29], G.707 [31], G.708 [32], G.783 [i.45], G.784 [i.46] and G.957 [36].

The following STM physical interfaces are possible:

- sSTM-1k and sSTM–2n (Recommendation ITU-T G.708 [32]);
- STM-0 CMI, HDB2, HDB3 electrical (Recommendation ITU-T G.703 [29]);
- STM-1 CMI electrical (Recommendation ITU-T G.703 [29]);
- STM-N optical (Recommendation ITU-T G.957 [36]).

The use of reserved bytes contained in the Section OverHead (SOH), and their termination shall be in accordance with Recommendation ITU-R F.750 [21]. Further details on the possible use of the SOH bytes including additional RFCOH or RCSOH are given in TR 101 035 [i.1].

5.4 Other baseband data interfaces

Other standardized base band data interfaces are possible; for equipment assessment when other base band interfaces are foreseen see annexes F in EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]. Those annexes provide the conditions under which current PDH/SDH specifications can be used for systems with traffic interface combinations other than those mentioned in the PDH/SDH specifications.

Examples of most common such interfaces are:

- low speed data interfaces in accordance to Recommendation ITU-Ts V.11 [40], V.24 [41] and/or V.28 [42];
- ethernet data interface: 10 Mbit/s, 100 Mbit/s and 1 000 Mbit/s interfaces in accordance with the OSI and physical layer requirements of ISO/IEC 8802-3 [19] and IEEE 802.3 [18], respectively.

The data interface offered by the equipment shall be declared by the supplier together with the relevant set of applicable international standards in agreement with the network operator.

Annex A (informative): Miscellaneous characteristics

A.1 Telecommunications Management Network (TMN) interface

If provided, the Telecommunications Management Network (TMN) interface should be in accordance with Recommendation ITU-Ts G.773 [i.44] and G.784 [i.46].

NOTE 1: Recommendation ITU-Rs, ETSI ETSs and ENs may also be relevant; the complete list is outside the scope of the present document.

NOTE 2: For SDH equipment the general requirements for TMN interface and functionality are given by:

- EN 300 417 series [i.9], EN 301 167 [i.21], ETS 300 635 [i.39] and EN 300 645 [i.16];
- Recommendation ITU-Ts G.784 [i.46] and G.773 [i.44];
- Recommendation ITU-Rs F.750 [21] and F.751 [i.42].

NOTE 3: The standardization of TMN interface functionalities is not under the responsibility of ETSI TC-ATTM; new TMN standards may become applicable with respect to the fixed digital radio systems considered in this EN 302 217 series.

A.2 Mechanical characteristics

The mechanical dimensions for indoor installations should be in agreement with EN 300 119 [i.38].

For outdoor installations each of the outdoor units should be weatherproof or weather protected.

NOTE: The following parameters should be taken into account in the design of equipment incorporating an external unit:

a) maximum weight of external unit;

b) size of external unit for wind loading considerations;

c) maximum weight of replaceable units;

d) ease of access of replaceable units.

Annex B (informative): Notification of interfaces under article 4.1 of the R&TTE Directive

This informative annex provides in table B.1 explanations on the applicability of the TCAM-RIG format to the notification of the regulated P-P fixed links Interfaces by the Administrations. Table B.2 gives an illustrative example of such a notification.

B.1 Applicability of TCAM-RIG format of radio interface specifications to Fixed Services

Table B.1: Compliance of TCAM-RIG format for P-P fixed links

Nr.	TCAM-RIG proposed parameter	CEPT ECC WGSE conclusions on applicability to FS
1	Frequency band	Applicable, for FS should mean limits of allocated band, which e.g. may include guard bands of the channel plan and duplex centre gap.
2	Radio service (some countries put this only in a separate allocation table)	Applicable, should be set to "Fixed Service" in this case.
3	Application	Applicable, for FS should specify whether this frequency band is assigned for P-P, P-MP, MP-MP; for infrastructure, access or other, or combination.
4	Channelling/modulation	Channelling only - the channelling arrangements should be specified, e.g. ref. to CEPT/ITU recommendation/annex and/or National (the latter to be explained or attached). National restrictions/modifications to CEPT/ITU plans to be described. Modulation for FS is technology specific, so should not be mentioned as a requirement, but suitable modulations may be derived from channel arrangements/EN classes, see also "Channel occupation rules".
5	Transmit power limit	Applicable, depends on type of FS application, etc. Actual meaning (output power and/or EIRP) may vary.
6	Channel occupation rules	Applicable in some cases (not for block assignments), may mean transmission capacity, minimum hop length, etc.
7	Duplex direction/separation	Applicable, for FS should read "Duplex type/spacing", in some cases reference to the specified channel arrangement may be sufficient, in other - should be explained, for FDD MP systems the uplink/downlink bands could be specified.
8	Licensing regime	Applicable, for FS could be Individual licence, block assignment, general licence. Other peculiarities should be mentioned if any (e.g. geographical limitations).
9	Additional essential requirements (article 3.3)	Not applicable for FS for the time being.
10	Frequency planning assumptions	Applicable, for FS could be expanded into: Antenna radiation pattern (ref EN), Emission spectrum mask (ref EN), Receiver parameters (ref EN) Minimum antenna gain, ATPC.
11	Reference	Applicable.
12	Remarks	Applicable.
13	Notification number (might help to trace back to the notification procedure and it is a requirement to give this reference number in the published regulation)	Applicable.

B.2 Proposed list of radio interface specifications for Fixed Services

It should be noted that the proposed list of radio interface specifications in table B.2 should be used in the framework of R&TTE Directive [1] when deciding on eligibility of FS equipment to be placed on the market and brought into service.

The list of parameters that are relevant to national spectrum management functions (e.g. for frequency assignment process) is wider/different, as e.g. described in ECC Recommendation CEPT/ECC/REC 01-05 [i.2] "List of parameters of digital point-to-point fixed links used for national planning". Administrations may request those parameters from the applicant/licensee during the licensing procedure.

It is understood that the proposed FS radio interface requirements provide a list of parameters, allowing individual Administrations to select those parameters necessary to the case, depending on the information in the European harmonized standards and the level of detail in their national frequency allocation tables.

Table B.2: Example of interface requirements for P-P fixed links notification

Parameter	Value (examples)	Filling instructions
Frequency band (GHz)	17,7 to 19,7	Limits of FS allocated band.
Radio service	Fixed Service	
Application/ System type	Infrastructure P-P	Infrastructure, access or other, or combination, etc.; P-P, P-MP, MP-MP.
Channelling	CEPT/ERC/REC 12-03 [i.3] 27,5 MHz channels only	Either reference to CEPT/ITU recommendation/annex and/or National plan (the latter to be explained or attached). National restrictions/modifications to CEPT/ITU plans to be described.
Transmit power limit	XX dBm EIRP	Should be specified whether it is an output power and/or EIRP; in accordance with RR provisions. For block assignment it may be complemented by additional provisions (e.g. border PFD limits).
Channel occupation rules	Min hop 10 km	May mean transmission capacity (possibly linked to channel width), minimum hop length, equipment class, etc.
Duplex type / spacing	CEPT/ERC/REC 12-03 [i.3] FDD	Either reference to the specified channel arrangement or explained, for FDD MP systems the uplink/downlink bands could be specified.
Licensing regime	Link-by-link assignment	Could be Link-by-link assignment, block assignment, and general licence. Other specifics should be mentioned, if any (e.g. geographical limitations).
Frequency planning assumptions	ATPC: XX dB	Could include requirements in accordance with articles 3.2 and 7.2 of the R&TTE Directive [1]: Antenna radiation pattern (ref EN), Emission spectrum mask (ref EN), Receiver parameters (ref EN), Minimum antenna gain, ATPC. For block assignment additional/alternative provisions may be set: PFD masks/limits, inter-operator co-ordination procedures, block edge mask, etc.
Reference	EN 302 217-2-2 [i.34]	Reference to harmonized standard, selected equipment class, etc.
Remarks		Any relevant remarks, additional info.
Notification number		For administrative reference purposes.
NOTE: References in the table are found in the [i.3] and [i.34] of clause 2.2.		

Annex C (informative): Cross references to previously relevant ENs and TSs

The EN 302 217 series replaced and superseded the standards that are listed in table C.1; among them the ENs have been labelled as "historical" in the ETSI data base, while the TSs have been withdrawn. Table C.1 provides also an overview of the correspondence between equipment considered in those ENs and part/annexes in the present document.

Requirements have been rationalized and redistributed in the present document and in other Parts of this EN 302 217 series according to a logic subdivision dictated by the coming into force of the R&TTE Directive [1].

Table C.1: List of ETSI standards that have been replaced and superseded by the EN 302 217 series

Equipment and antenna standards (see note 3)					
ETSI Reference number	**Version**	**Title**	**Fixed Service frequency bands of operation (see note 1)**	**Channel separation (MHz)**	**Relevant parts and annexes of EN 302 217 series (see note 2)**
EN 300 197 [i.4]	V1.6.x	Parameters for radio systems for the transmission of digital signals operating at 32 GHz and 38 GHz	32 GHz and 38 GHz	3,5 to 56	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 198 [i.5]	V1.5.x	Parameters for radio systems for the transmission of digital signals operating at 23 GHz	23 GHz	3,5 to 56	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 234 [i.6]	V1.3.x	High capacity digital radio systems carrying 1 x STM-1 signals and operating in frequency bands with about 30 MHz channel spacing and alternated arrangements	any from 4 GHz to 15 GHz	28 to 30	Annexes B and D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 407 [i.7]	V1.3.x	Parameters for digital radio systems for the transmission of digital signals operating at 55 GHz	55 GHz	3,5 to 56	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 408 [i.8]	V1.3.x	Parameters for digital radio systems for the transmission of digital signals and analogue video signals operating at around 58 GHz, which do not require co-ordinated frequency planning	58 GHz	50 and 100	Annex UA EN 302 217-3 [i.35] (V1.2.x)
EN 300 430 [i.10]	V1.4.x	Parameters for radio systems for the transmission of STM-1 digital signals operating in the 18 GHz frequency band with channel spacing of 55 MHz and 27,5 MHz	18 GHz	27,5 and 55	Annex D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 431 [i.11]	V1.4.x	Parameters for radio system for the transmission of digital signals operating in the frequency range 24,5 GHz to 29,5 GHz	26 GHz and 28 GHz	3,5 to 56	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 630 [i.12]	V1.3.x	Low capacity point-to-point digital radio systems in the 1,4 GHz frequency band	1,4 GHz	0,025 to 3,5	Annex A EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 631 [i.13]	V1.2.x	Antennas for point-to-point fixed radio systems in the 1 GHz to 3 GHz band	any from 1 GHz to 3 GHz	n.a.	EN 302 217-4-1 [i.36] and EN 302 217-4-2 [i.37]
EN 300 633 [i.14]	V1.3.x	Low and medium capacity point-to-point digital radio systems operating in the frequency range 2,1 GHz to 2,6 GHz	any from 2,1 GHz to 2,6 GHz	0,5 to 14	Annex A EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]

Equipment and antenna standards (see note 3)					
ETSI Reference number	**Version**	**Title**	**Fixed Service frequency bands of operation (see note 1)**	**Channel separation (MHz)**	**Relevant parts and annexes of EN 302 217 series (see note 2)**
EN 300 639 [i.15]	V1.3.x	Sub STM-1 digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 28 MHz co-polar and 14 MHz cross-polar channel spacing	13 GHz, 15 GHz and 18 GHz	14 and 28	Annex D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 786 [i.17]	V1.3.x	Sub STM-1 digital radio systems in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 14 MHz co-polar channel spacing	13 GHz, 15 GHz and 18 GHz	14	Annex D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 300 833 [i.18]	V1.4.x	Antennas for point-to-point fixed radio systems operating in the frequency band 3 GHz to 60 GHz	any from 3 GHz to 60 GHz	n.a.	EN 302 217-4-1 [i.36] and EN 302 217-4-2 [i.37]
EN 301 127 [i.19]	V1.3.x	High capacity digital radio systems carrying SDH signals (2 x STM-1) in frequency bands with about 30 MHz channel spacing and using Co-Channel Dual-Polarized (CCDP) operation	any from 4 GHz to 15 GHz	28 to 30	Annexes B and D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 128 [i.20]	V1.2.x	PDH low and medium capacity digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands	13 GHz, 15 GHz and 18 GHz	1,75 to 28	Annex D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 216 [i.22]	V1.2.x	PDH low and medium capacity and STM-0 digital radio systems operating in the frequency bands in the range 3 GHz to 11 GHz	any from 3 GHz to 11 GHz	1,75 to 30	Annex B EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 277 [i.23]	V1.2.x	High capacity digital radio systems transmitting STM-4 or 4 x STM-1 in a 40 MHz radio frequency channel using Co-Channel Dual Polarized (CCDP) operation	any from 4 GHz to 11 GHz	40	Annex C EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 387 [i.24]	V1.2.x	PDH low and medium capacity digital radio systems operating in the frequency band 48,5 GHz to 50,2 GHz	50 GHz	3,5 to 28	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 461 [i.25]	V1.3.x	High capacity fixed radio systems carrying SDH signals (2 x STM-1) in frequency bands with 40 MHz channel spacing and using Co-Channel Dual-Polarized (CCDP) operation	any from 4 GHz to 11 GHz	40	Annex C EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 669 [i.28]	V1.2.x	High capacity digital radio systems carrying STM-4 in two 40 MHz channels or 2 x STM-1 in a 40 MHz channel with alternate channel arrangement	any from 4 GHz to 11 GHz	40	Annex C EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 785 [i.29]	V1.2.x	Parameters for packet data radio systems for transmission of digital signals operating in the frequency range 7, 8, 13, 15, 18, 23, 26, 28, 32, 38, 52 to 55 GHz	7 GHz to 55 GHz	1,75 to 56	Annex F EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 786 [i.30]	V1.2.x	Parameters for digital radio systems for the transmission of digital signals operating at 52 GHz	52 GHz	3,5 to 56	Annex E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
EN 301 787 [i.31]	V1.1.x	Parameters for radio systems for the transmission of Sub-STM-0 digital signals operating in the 18 GHz frequency band	18 GHz	3,5	Annex D EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]

Equipment and antenna standards (see note 3)					
ETSI Reference number	**Version**	**Title**	**Fixed Service frequency bands of operation (see note 1)**	**Channel separation (MHz)**	**Relevant parts and annexes of EN 302 217 series (see note 2)**
EN 302 062 [i.32]	V.1.1.x	High capacity digital radio systems carrying 2 x STM-1, 4 x STM-1 or STM-4 signals in frequency bands with 55/56 MHz channel spacing	15 GHz, 18 GHz, 23 GHz, 26 GHz, 32 GHz and 38 GHz	55/56 and 110/112	Annexes D and E EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34]
TS 102 329 [i.40] (withdrawn in 2009)	V1.1.x	Radio equipment and antennas for use in Point-to-Point High Density applications in the Fixed Services (HDFS) frequency band 64 GHz to 66 GHz	65 GHz	Flexible or N*30 MHz (N=1÷33/66) (FDD/TDD)	Annex UB EN 302 217-3 [i.35] (V1.3.1)
TS 102 524 [i.41] (withdrawn in 2009)	V1.1.x	Radio equipment and antennas for use in Point-to-Point Millimeter Wave applications in the Fixed Services (mmwFS) frequency bands 71 GHz to 76 GHz and 81 GHz to 86 GHz	71÷76 GHz 81÷86 GHz	N*250 MHz (N=1÷19) (FDD/TDD)	Annex UC EN 302 217-3 [i.35] (V1.3.1) Annex Ea EN 302 217-2-2 [i.34] (V2.1.1)

NOTE 1: The frequency band identification is taken from the approximate centre frequency as commonly used in Fixed Service ITU-R Recommendations; it also includes national frequency bands that may slightly differ from each other but are commonly referred to by the same term.
NOTE 2: The reference of the annex where system specific requirements and characteristics are introduced is the same for EN 302 217-2-1 [i.33] and EN 302 217-2-2 [i.34], respectively.
NOTE 3: All references in this table are found in the clause 2.2.

History

Document history				
V1.1.3	December 2004	Publication		
V1.1.4	November 2005	Publication		
V1.2.1	June 2007	Publication		
V1.3.1	January 2010	Publication		
V2.0.0	September 2012	Public Enquiry	PE 20130116:	2012-09-18 to 2013-01-16
V2.1.0	April 2013	Vote	V 20130625:	2013-04-26 to 2013-06-25
V2.1.1	July 2013	Publication		