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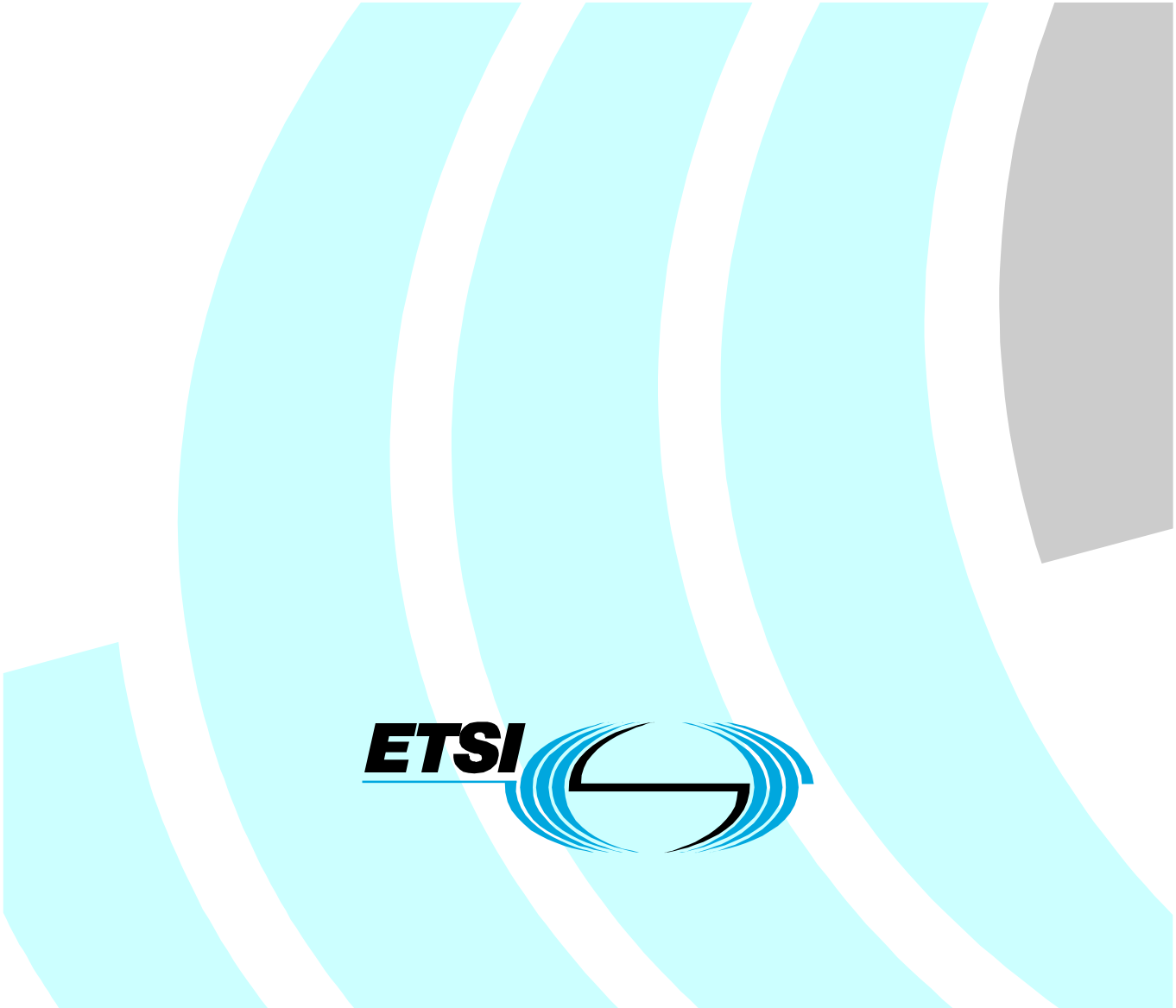
European Standard (Telecommunications series)

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



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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 1, of a multipart deliverable covering "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 "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for digital systems operating in frequency bands where frequency co-ordination is applied".

Part 3: "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for equipment operating in frequency bands where no frequency co-ordination is applied".

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

Part 4-2: "Harmonized EN covering essential requirements of Article 3.2 of R&TTE Directive for antennas".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	24 months after doa

Introduction

Generality

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

Previous documents, to be replaced by this multipart En 302 217, contained both essential requirements, cross-referenced in EN 301 751 V1.2, and other requirements that, even if not considered essential under the 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 (hereafter mentioned as the R&TTE Directive) [1], may be applicable.

Existing standards for point-to-point systems, including antennas, cover a very large range of traffic capacities, channel separations, 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 58 GHz
Traffic capacities	from 9,6 kbit/s to 622 Mbit/s
Channel separations	from 25 kHz to 112 MHz
Modulation formats	from 2 to 512 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/BFWA 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 new regulatory framework for placing radio systems on the market, established by the R&TTE Directive [1] also require the availability of Harmonized ENs covering the essential requirements under article 3.2 of the R&TTE Directive [1]. This was achieved in the first instance by the harmonized EN 301 751 V1.2, which cross-references to the relevant clauses of the ENs in table 2, dealing with those essential requirements. However, as a long-term solution, a multipart EN including stand-alone harmonized ENs containing all necessary information and avoiding as much as is practical cross-references, better suit regulatory and market requirements.

EN 302 217 meets this requirement 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, EN 302 217-2-3 and EN 302 217-4-2 relevant to essential requirements under article 3.2 of the R&TTE Directive [1] replicate, within the scope and applicability of the R&TTE Directive [1], the requirements set out in harmomized EN 301 751 V1.2.

NOTE 1: It is proposed that the date of cessation of presumption of conformity to the R&TTE Directive [1] with reference to harmomized EN 301 751 V1.2 be kept two years after the date of publication in the OJ EC of the present document.

EN 302 217 introduces, for systems (equipment and antennas) already covered by EN 301 751, only technically equivalent or less stringent requirements (See note 2). Care has been taken so that such variations will not affect any frequency planning assumption for already deployed networks. Therefore, from a strictly technical point of view, it is expected that equipment already conforming to EN 301 751, would not need a new test report for re-assessment of essential requirements according EN 302 217 (see note 1). Legal implications with respect to declaration of conformity and equipment labelling are outside the scope of the present document.

NOTE 2: The only exception is with respect to class 5A equipments for system D.7 (see annex D of EN 302 217-2-2) and for systems E.1, E.2 and E.3 (see annex E of part 2-2) for which a previous design objective has here been transformed into a more stringent RSL versus BER. In this case a supplementary test report might be required (e.g. in case the technical construction file, made for declaration of conformity to EN 301 751, does not give evidence of enough margin to fulfil the requirements of the present document).

In the present document, the equipment subject of the former standards 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 and EN 302 217-2-2, 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 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;
- F transmission of Packet Data and combination of other signals.

Cross references to previous relevant ENs

EN 302 217 will replace and supersede, after a suitable transition period, the standards that are listed in table 2 (sorted by ascending EN number). Table 2 provides also an overview of the correspondence between equipment considered in those ENs and part/annexes in the present document.

Requirements in the previous ENs have been rationalized and redistributed in the present document according to a logic subdivision dictated by the coming into force of the R&TTE Directive [1]:

- requirements considered essential under article 3.2 of the R&TTE Directive [1] have been placed in the relevant harmonized ENs EN 302 217-2-2, EN 302 217-2-3 and EN 302 217-4-2;
- other requirements that, even if not considered essential under the R&TTE Directive [1] may be applicable, on a voluntary basis, as a common basis for maintaining performance and operability of DFRS in typical deployment, have been placed in the relevant ENs, EN 302 217-1, EN 302 217-2-1 and EN 302 217-4-1.

Table 2: List of ETSI standards that will be replaced and superseded by the present multipart

Equipment and antenna standards					
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 (see note 2)**
EN 300 197	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 and EN 302 217-2-2
EN 300 198	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 and EN 302 217-2-2
EN 300 234	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 the 4 GHz to the 15 GHz	28 to 30	Annexes B and D EN 302 217-2-1 and EN 302 217-2-2
EN 300 407	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 and EN 302 217-2-2
EN 300 408	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	EN 302 217-3
EN 300 430	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 and EN 302 217-2-2
EN 300 431	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 and EN 302 217-2-2
EN 300 630	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 and EN 302 217-2-2
EN 300 631	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 and EN 302 217-4-2
EN 300 633	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 the 2,1 GHz to the 2,6 GHz	0,5 to 14	Annex A EN 302 217-2-1 and EN 302 217-2-2
EN 300 639	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 and EN 302 217-2-2

Equipment and antenna standards					
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 (see note 2)**
EN 300 786	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 and EN 302 217-2-2
EN 300 833	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 and EN 302 217-4-2
EN 301 127	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 the 4 GHz to the 15 GHz	28 to 30	Annexes B and D EN 302 217-2-1 and EN 302 217-2-2
EN 301 128	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 and EN 302 217-2-2
EN 301 216	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 and EN 302 217-2-2
EN 301 277	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 the 4 GHz to the 11 GHz	40	Annex C EN 302 217-2-1 and EN 302 217-2-2
EN 301 387	V1.2.x	PDH low and medium capacity digital radio systems operating in the frequency band 48,5GHz to 50,2 GHz	50 GHz	3,5 to 28	Annex E EN 302 217-2-1 and EN 302 217-2-2
EN 301 461	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 the 4 GHz to the 11 GHz	40	Annex C EN 302 217-2-1 and EN 302 217-2-2
EN 301 669	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 the 4 GHz to the 11 GHz	40	Annex C EN 302 217-2-1 and EN 302 217-2-2
EN 301 785	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	3,5 to 56	Annex F EN 302 217-2-1 and EN 302 217-2-2
EN 301 786	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 and EN 302 217-2-2
EN 301 787	V1.1.x	Parameters for radio systems for the transmission of Sub-STM-0 digital signals operating in the 18 GHz frequency band	18GHz	3,5	Annex D EN 302 217-2-1 and EN 302 217-2-2

Equipment and antenna standards					
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 (see note 2)**
EN 302 062	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	Annexes D and E EN 302 217-2-1 and EN 302 217-2-2
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 and EN 302 217-2-2, respectively.					

The characteristics of equipment considered in those ENs have also been rationalized, recompacted and resubdivided into different annexes and sub-annexes/systems in the various sub parts of the multipart EN 302 217.

Table 3 summarizes the relevant cross-reference between radio frequency and other requirements of equipment in various Fixed Service frequency bands and the relevant sub-parts and annexes in the present multipart EN 302 217.

Table 3: Cross reference of equipment requirements, parts, sub-parts and annexes

EN 302 217																					
System independent common characteristics	**Part 1**																				
Antenna characteristics	**Part 4-1 and part 4-2**																				
Sub-systems in relevant annexes and EN parts	**Sub-systems in annexes A of part 2-1 and 2-2**		**Sub-systems in annexes B and C of part 2-1 and 2-2**							**Sub-systems in annexes D of part 2-1 and 2-2**			**Sub-systems in annexes E of part 2-1 and 2-2**								**Part 3**
Frequency band (GHz)	1,5	2/2,5	3,5/4	5	L6	U6	7/8	10,5	11	13	15	18	23	26/28	31	32	38	48	52	55	58
System capacity (payloads) ↓																					
PDH systems	A.1	A.2	B.3		B.3	B.3	B.3	B.3	–	D.4	D.4	D.4	E.2	E.4	E.1	E.1	E.1	E.5	E.6	E.3	
STM-0	–	–	B.3		B.3	B.3	B.3	B.3	–	D.2 D.3	D.2 D.3	D.2 D.3	E.2	E.4	E.1	E.1	E.1		E.6	E.3	
SubSTM-0	–	–	–	–	–	–	–	–	–	–	–	D.5	–	–	–	–	–	–	–	–	Any
STM-1 NxSTM-1 STM-4	–	–	B.1 B.2 C.1 C.2 C.3	C.1 C.2 C.3	B.1 B.2	C.1 C.2 C.3	B.1 B.2	B.1 B.2	C.1 C.2 C.3	D.7 D.8	D.6 D.7 D.8	D.1 D.6	E.2 E.7	E.4 E.7	E.1 E.7	E.1 E.7	E.1 E.7		E.6	E.3	
Packet data and mixed interfaces	Annex F of part 2-1 and 2-2																				

User's guide

With reference to the former standards listed in table 2, the present multipart EN provides the same set of characteristics and requirements, with the same values. However, this information is presented differently, spread across six parts corresponding to three categories.

The first category (the present document) corresponds to characteristics which are either common to the whole family of equipment or are provided in a comprehensive list, 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 whole multipart EN 302 217, are listed in the present document.
EN 302 217-1 defines those requirements and characteristics set out in the other parts of this multipart EN.

The second category (EN 302 217-2-1and EN 302 217-4-1) corresponds to characteristics and requirements, which are not relevant to article 3.2 of the R&TTE Directive [1]. Nevertheless, compliance to all or some of these requirements is mandatory in order to claim compliance with the relevant part of the multipart EN. Requirements are either "main requirements" or "complementary requirements". Even though compliance to these parts is not mandatory for the R&TTE Directive [1] conformity, compliance may be claimed to all or some requirements of these parts.

EN 302 217-2-1 and En 302 217-4-1 provides a 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] are further detailed in EN 302 217-2-2 and EN 302 217-4-2 of this multipart EN; for equipment operating in co-ordinated frequency bands (part 2-2) and for antennas (part 4-2), respectively.

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 limiting values for main and complementary requirements that are not common to all of the equipment covered by one part, but specific to one frequency range, one hierarchy (PDH or SDH), one capacity, etc, are located in annexes which may be further divided into sub-annexes. A sub-annex, when created, is dedicated to one system, described by the association of the range of capacities, the range of frequencies and the range of channel separations.

The third category (parts 2-2, 3 and 4-2) corresponds to essential phenomena, with respect to article 3.2 of the R&TTE Directive [1] and are consequently candidate-harmonized standards. The requirements are provided in the same way as in parts 2-1and 4-1. 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 hierarchy (PDH or SDH), one capacity, etc, are located in annexes which may be further divided into sub-annexes. Reference to each annex is the same for part 2-1 as in part 2-2. An EN-RT (requirements table) summarizes those requirements to be addressed in order to claim compliance.

To conclude, this multipart EN shall be used as a decision tree, from part 1 down to the relevant annexes/sub-annexes of parts X-1 and X-2. At every level, a check of compliance shall be performed.

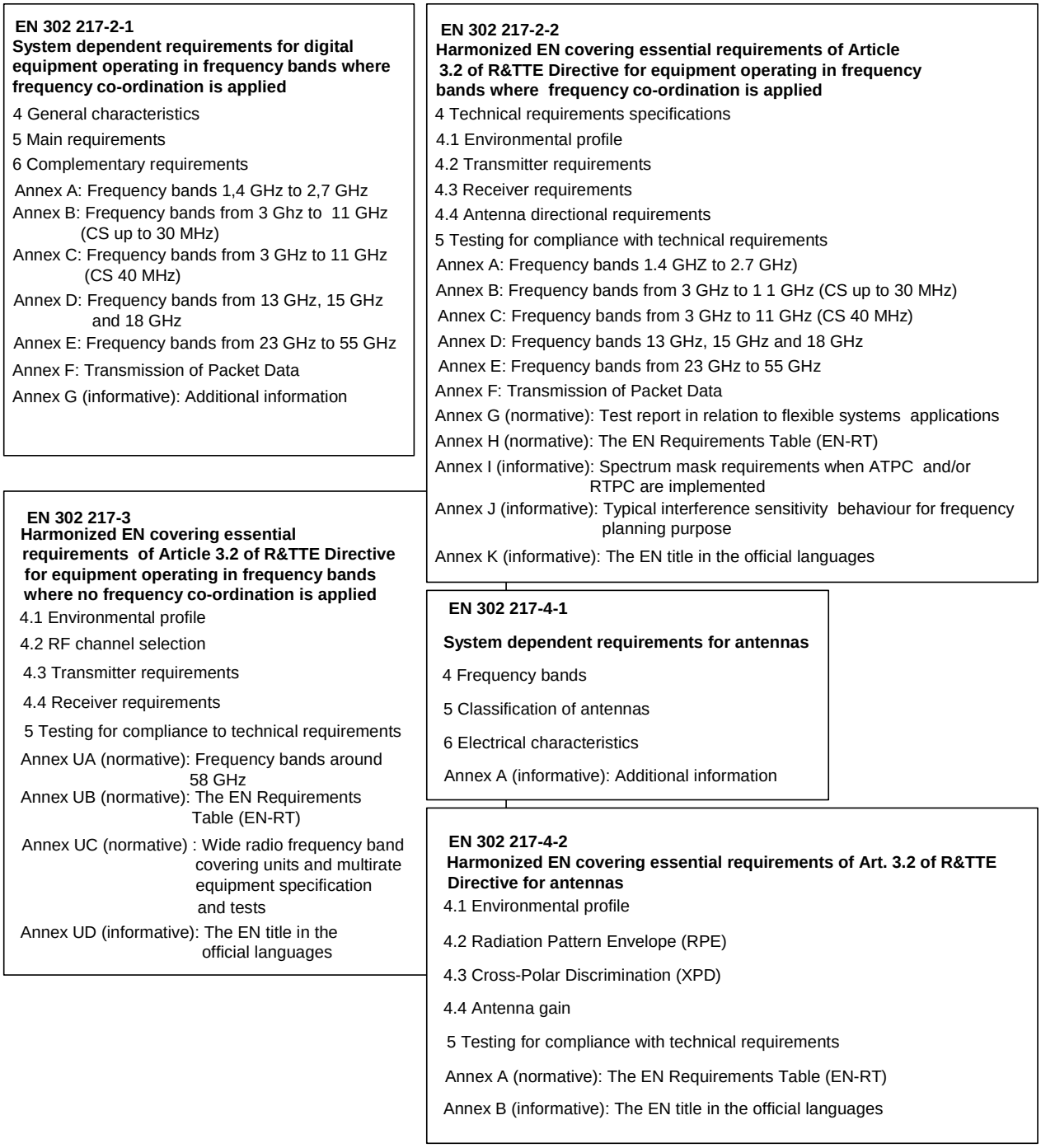


Figure 0: Structure of a multipart standard

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 and definitions that are common to all P-P equipment and antennas, EN 302 217-2-1and EN 302 217-4-1 summarize the other system dependent characteristics and include limits for "non-essential" requirements, parts 2-2, 3 and 4-2 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 multipart EN.

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 multipart EN.

However, for reader information, EG 201 752 [Bibliography] gives guidance in the selection of other ETSI and CENELEC standards for the assessment of essential requirements under article 3.1 of the R&TTE Directive [1] for any Fixed Radio System.

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

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

NOTE: Only the two first digits of the ETSI EN version number are specified. The third digit is not considered essential for dated reference purposes because the ETSI Technical Working Procedures reserves this digit for editorially changed versions thereby not affecting the essential requirements within that version.

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

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

[4] ETSI EN 301 126-3-1 (V1.1): "Fixed Radio Systems; Conformance testing; Part 3-1: Point-to-Point antennas; Definitions, general requirements and test procedures".

[5] ITU-R Recommendation F.557: "Availability objective for radio-relay systems over a hypothetical reference circuit and a hypothetical reference digital path".

[6] ITU-R Recommendation F.1397: "Error performance objectives for real digital radio links used in the international portion of a 27 500 km hypothetical reference path at or above the primary rate".

[7] ITU-R Recommendation F.1491: "Error performance objectives for real digital radio links used in the national portion of a 27 500 km hypothetical reference path at or above the primary rate".

[8] ITU-R Recommendation F.1492: "Availability objectives for real digital radio-relay links forming part of international portion constant bit rate digital path at or above the primary rate".

[9] ITU-R Recommendation F.1493: "Availability objectives for real digital radio-relay links forming part of national portion constant bit rate digital path at or above the primary rate".

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

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

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

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

[14] ITU-T Recommendation G.821: "Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network".

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

[16] ITU-R Recommendation F.634: "Error performance objectives for real digital radio-relay links forming part of the high-grade portion of international digital connections at a bit rate below the primary rate within an integrated services digital network".

[17] ITU-R Recommendation F.696: "Error performance and availability objectives for hypothetical reference digital sections forming part or all of the medium-grade portion of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".

[18] ITU-R Recommendation F.697: "Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".

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

[20] ITU-R Recommendation F.752: "Diversity techniques for radio-relays systems".

[21] ITU-R Recommendation F.1101: "Characteristics of digital radio-relays systems below about 17 GHz".

[22] ITU-R Recommendation F.1102: "Characteristics of digital radio-relays systems above about 17 GHz".

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

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

[25] Void.

[26] ETSI EN 300 132-1: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources".

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

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

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

[30] ITU-R Recommendation F.695: "Availability objectives for real digital radio-relays links forming part of a high grade circuit within an integrated services digital network".

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

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

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

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

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

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

[37] IEEE 802.3: "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".

[38] 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".

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

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

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

[42] 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".

[43] 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".

[44] 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".

[45] 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".

[46] 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".

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

[48] 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".

[49] 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".

[50] 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".

[51] 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".

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

3 Definitions, symbols and abbreviations

3.1 Definitions

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

allocated radio frequency band: allocation (of a frequency band): 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 shall also be applied to the frequency band concerned (Radio Regulations, Geneva 1998 article S1.16). 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): this function is 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. When this function is used, the transmit power is dynamically changed with respect 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: 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 prediction are usually made with the maximum "available power";

conformity assessment procedure: described in the R&TTE Directive [1] annexes II, III, IV and 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 signal 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 multipart EN is required to comply with the provisions of the multipart EN

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

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 was radiated isotropically. Value measured in dBi.

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

harmonized radio frequency band: commonly referred to as a portion of the frequency spectrum that CEPT/ECC (formerly CEPT/ERC) allocates to a specific service through a CEPT/ECC Decision (proper definition is currently under study by CEPT/ECC).

NOTE: Presently, radio frequency bands allocated to the Fixed Service are not harmonized

input port(s): flange(s) or connector(s) through which access to the antenna system is provided. these are shown in the following figure 1 at points D and D'

NOTE: 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 multipart EN could be done separately by the actual supplier(s).

inter port isolation (XPI) (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)

national radio frequency channel arrangement: predefined (centre frequencies raster) for a number of radio frequency channels, covered by a national regulation in a non harmonized frequency band and used on a national basis (may all or in part overlap with other national or recommended radio frequency channel arrangements)

network Interface Capacity: sum of the maximum bit rates of the implemented base band interfaces at reference point X/X"

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

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 shall fit; 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. 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: (as defined in the R&TTE Directive [1**]):** 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

radio frequency channel arrangement: predefined (centre frequencies) raster for a number of radio frequency channels, as defined by ITU-R Recommendation F.746 used by administrations for co-ordination in the same geographical area

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

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

radio interface capacity: maximum user capacity, defined at reference point X/X" of figure 1 of EN 302 217-1, that can be transmitted over the radio interface, defined at reference point C". It 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)

recommended radio frequency channel arrangement: predefined centre frequencies raster for a number of radio frequency channels, covered by a CEPT/ECC Recommendation in a non harmonized frequency band (not used for the same purpose by all administrations) that is recommended to the member countries where they use the relevant frequency band for the Fixed Service

Remote Frequency Control (RFC): many fixed digital radio systems offer this functionality as a qualifying aid to deployment. 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 to 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. When this function is used, the transmit power can be set either by a local control unit connected to the system control unit or to a 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.

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 ITU-T Recommendation G.707 and ITU-R Recommendation F.750

sub-STM-0: a set of SDH transmission interfaces, defined in ITU-T Recommendation G.708 which transport one or more TU Group(s)-2 (sSTM-2n interface) or one or more TU-12 (sSTM-1k interface) as defined by ITU-T Recommendation G.707, with Section overhead (9 bytes per frame). 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 ITU-T Recommendation G.708 is limited to k = 1, 2, 4, 8 and 16

3.2 Symbols

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

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
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, the following abbreviations apply:

AC	Alternating Current
ACAP	Adjacent Channel Alternate Polarization
ACCP	Adjacent Channel Co-Polarization
ACDP	Adjacent Channel Dual Polarized

ATPC	Automatic Transmit Power Control
AU	Administrative Unit
BB	Base Band
BBER	Background Block Error Ratio
BER	Bit Error Ratio
BFWA	Broadband Fixed Wireless Access
BW	equivalent noise BandWidth
BWe	evaluation BandWidth (resolution bandwidth in which spectrum components are measured)
C/I	Carrier to Interference ratio
CCDP	Co-Channel Dual Polarized
CEPT	Conférence des administrations Européennes des Postes et Télécommunications
CMI	Coded Mark Inversion
CS	Channel Separation, sometimes referred as Channel Spacing
CSmin	Minimum practical channel separation (for a 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
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.
ESR	Errored Second Ratio
EUT	Equipment Under Test
Fc	Cut-off Frequency
FDD	Frequency Division Duplex
FER	Frame Error Ratio
FRS	Fixed Radio Systems
FS	Fixed Service
Fs	Symbol Rate
FSK	Frequency-Shift Keying (modulation)
FSS	Fixed Satellite Service
FWA	Fixed Wireless Access
GMSK	Gaussian Minimum Shift Keying (modulation)
HDFS	High Density Fixed Service
HEN	Harmonized European Standard
IEC	International Electrotechnical Committee
IF	Intermediate Frequency
IPI	Inter-Port Isolation
ISDN	Integrated Services Digital Network
ITU-R	International Telecommunication Union-Radiocommunications standardization sector
ITU-T	International Telecommunication Union-Telecommunications standardization sector
L6	Lower 6 (GHz frequency band)
LO	Local Oscillator
n.a.	not applicable
NFD	Net Filter Discrimination
NIC	Network Interface Capacity
NNI	Network Node Interface
NRZ	Non Return to Zero
OJEC	Official Journal of the European Community
PDH	Plesiochronous Digital Hierarchy
Pi	Interference Power
P-P	Point-to-Point
PRBS	Pseudo Random Binary Sequence
PSD	Power Spectral Density
PSTN	Public Switched Telecommunication Network
QAM	Quadrature Amplitude Modulation
R&TTE	Radio equipment and Telecommunications Terminal Equipment
RBER	Residual BER
RCSOH	Radio Complementary Section Overhead
RES	Radio Equipment and Systems (ETSI Technical Committee)

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
RSL	Receive Signal Level
RTPC	Remote Transmit Power Control
Rx	Receive or Receiver
S/I	Signal to Interference 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
SRL	Spectrum Reference Level
sSTM-1k	Synchronous Transport Module of k times VC-12 equivalent payload (k=1, 2, 4, 8, 16)
sSTM-2n	Synchronous Transport Module of n times VC2 equivalent payload (n=1, 2, 4)
STM	Synchronous Transfer Module
STM-0	Synchronous Transport Module Level 0 (51,840 Mbit/s AU-3 equivalent payload)
STM-1	Synchronous Transport Module Level 1 (155,520 Mbit/s)
STM-4	Synchronous Transport Module Level 4 (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 (sSTM-1kor sSTM-2n) defined by ITU-T Recommendation G.708
Sub-STM-1	Old terminology for STM-0 module before its formal adoption in ITU-T Recommendation G.707
t.c.	telephony channel
TC	ETSI Technical Committee
TDD	Time Division Duplex
TM	ETSI TC-Transmission and Multiplexing
TMN	Telecommunications Management Network
TU	Tributary Unit
TUG	Tributary Unit Group
Tx	Transmit or Transmitter
U6	Upper 6 (GHz frequency band)
VC	Virtual Container
VC-n	Virtual Container n
VSWR	Voltage Standing Wave Ratio
W/U	Wanted to Unwanted signal ratio
WG	Working Group
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 ITU-T Recommendations G.821 [14], for capacities below the primary rate, G.826 [15] and G.828 [2] for capacities at or above the primary rate, by I.356 [39] and I.357 [40] for ATM transmission and Y.1540 [41] for IP transmission. For transmission of Ethernet frames, network performance requirements of ISO/IEC 8802-3 [38] for 10 Mbit/s Medium Attachment Units and IEEE 802.3 [37] 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 ITU-T Recommendation G.829 [32].

The performance and availability objectives for any overall radio connection operating at capacities below the primary rate, in the high, medium or local grade portions of the network, have to be based on the criteria defined in ITU-R Recommendations F.634 [16], F.695 [30], F.696 [17], F.697 [18] and F.557 [5].

The performance and availability objectives for any overall radio connections operating at capacities at or above the primary rate, used in the international or national portion of the digital path, have to be based on the criteria defined in ITU-R Recommendations F.1397 [6], F.1491 [7], F.1492 [8] and F.1493 [9].

The effect of the link design on performance is recognized and the general design criteria specified in ITU-R Recommendations F.752 [20], F.1093 [24], F.1101 [21] and F.1102 [22] are to be applied to the digital connection with respect to the propagation scenarios set out in ITU-R Recommendation P.530 [23].

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;
- 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, EN 302 217-3-2 and EN 302 217-4-2 apply under the environmental profile for intended operation of the equipment and antennas, which shall be declared by the manufacturer.

4.2.2 Voluntary ETSI environmental profile

The radio equipment shall be required to meet the environmental conditions set out in the appropriate part(s) of the multipart standard EN 300 019 [42] to [51] mentioned below, which defines weather protected and non-weather protected locations, classes and test severity.

Environmental conditions for antennas are not generally included in EN 300 019 [42] to [51] scope, environmental profiles are left to supplier declaration only; however annex A of EN 302 217-4-1 of this multipart EN gives some generic guidance.

The equipment shall comply with all of the requirements of the present multi-part document at all times when operating within the boundary limits of the operational environmental profile of the equipment.

The fulfilment of and the selection of a class of EN 300 019 [42] to [51] environmental profiles is voluntary and not essential from the point of view of the R&TTE Directive [1].

4.2.2.1 Equipment within weather-protected locations (indoor locations)

Equipment intended for operation within temperature controlled locations or partially temperature controlled locations should meet the requirements of EN 300 019 [42] to [51] classes 3.1 and 3.2 respectively.

Optionally, the more stringent requirements of EN 300 019 [42] to [51] classes 3.3 (non-temperature controlled locations), 3.4 (sites with heat trap) and 3.5 (sheltered locations) may be applied.

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

Equipment intended for operation within not-weather protected locations should meet the requirements of EN 300 019 [42] to [51], class 4.1 or 4.1E.

Class 4.1 applies to many European countries and class 4.1E applies to all European countries.

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 [3]. Requirements for testing at reference or extreme conditions, specified in relevant clauses of the present multipart EN, are set out according to the principles for similar requirements in EN 301 126-1 [3].

In the case of voluntary ETSI environmental profiles, the technical requirements of the present multipart EN 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 [3].

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 part 4-2 of the present EN), shall be carried-out at reference environmental conditions at the test field according to clause 4.1 of EN 301 126-3-1 [4].

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

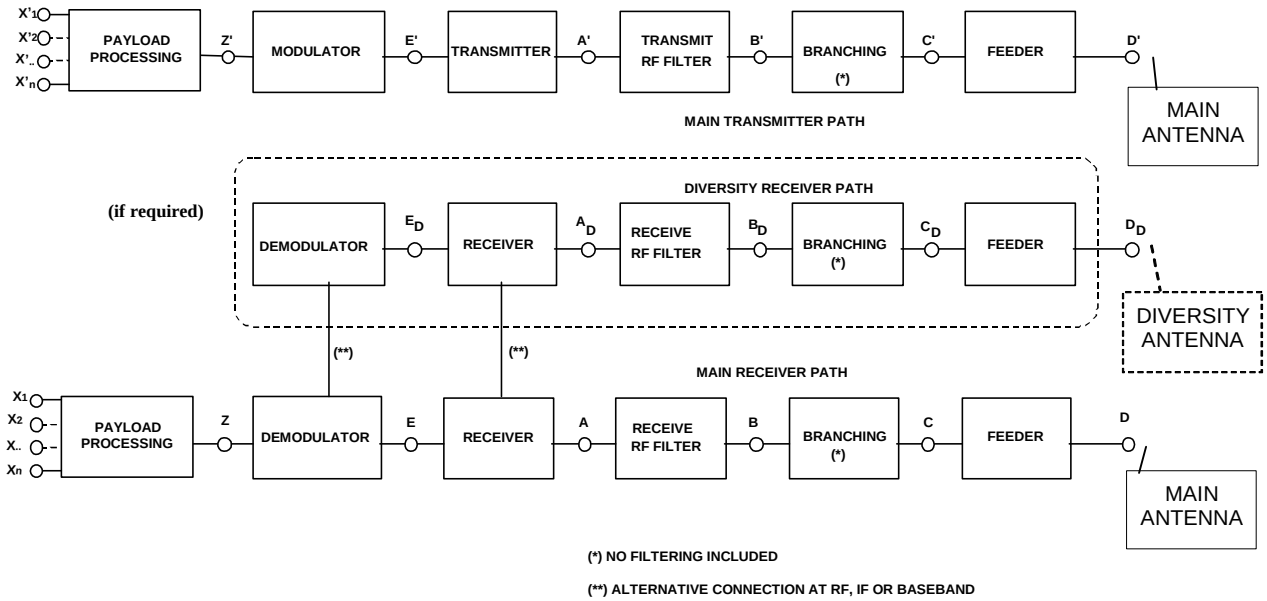
4.3 Power supply

The power supply interface shall be in accordance with the characteristics of one or more of the secondary voltages specified in EN 300 132-1 [26] and EN 300 132-2 [27].

NOTE: Other secondary voltages are not subject of standardization; however EMC and safety requirements according to the R&TTE Directive [1] article 3.1, not in the scope of EN 302 217, still applies.

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.



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 and EN 302 217-2-2 of this multipart EN shall be defined.

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 multipart EN.

One or more of the following clauses will be applicable.

5.1 Plesiochronous interfaces

If applicable, Plesiochronous interfaces at 2 Mbit/s, 8 Mbit/s, 34 Mbit/s and 140 Mbit/s shall comply with ITU-T Recommendation G.703 [10]. Parameters for service channels and wayside traffic channels are outside the scope of this multipart EN.

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 ITU-T Recommendations G.703 [10], G.704 [13], I.412 [29] and ETS 300 233 [31].

5.3 Synchronous digital hierarchy interfaces

If applicable, the SDH baseband interface shall be in accordance with ITU-T Recommendations G.703 [10], G.707 [11], G.708 [12], G.783 [Bibliography], G.784 [Bibliography] and G.957 [28].

The following STM-N physical interfaces are possible:

- sSTM-1k (ITU-T Recommendation G.708 [12]);
- STM-0 CMI, HdB2, HdB3 electrical (ITU-T Recommendation G.703 [10]);
- STM-1 CMI electrical (ITU-T Recommendation G.703 [10]);
- STM-N optical (ITU-T Recommendation G.957 [28]).

The use of reserved bytes contained in the Section OverHead (SOH), and their termination shall be in accordance with ITU-R Recommendation F.750 [19]. Further details on the possible use of the SOH bytes including additional RFCOH or RSCOH are given in ETSI TR 101 035 [36].

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 parts 2-1 and 2-2 of this multipart EN. Those annex provides the conditions under which current PDH/SDH specifications can be used for systems with traffic interface combinations other then those mentioned in the PDH/SDH specifications.

Examples of most common such interfaces are:

- low speed data interfaces in accordance to ITU-T Recommendations V.11 [33], V.24 [34] and/or V.28 [35];
- ethernet data interface: 10 Mbit/s, 100 Mbit/s and 1 000 Mbit/s interfaces in accordance with the OSI physical layer requirements of ISO/IEC 8802-3 [38] and IEEE 802.3 [37] 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 ITU-T Recommendations G.773 and G.784.

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

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

- ETSI: Multipart EN 300 417-x-y, EN 301 167, ETS 300 635 and EN 300 645;
- ITU-T Recommendations G.784 and G.773;
- ITU-R Recommendations F.750 [19] and F.751.

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

A.2 Mechanical characteristics

The mechanical dimensions for indoor installations should be in agreement with ETS 300 119.

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): Bibliography

- ETSI EG 201 752: "Fixed Radio Systems; Point-to-Point and Point-to-Multipoint Equipments and Antennas; Identification of European standards (EN), applicable to fixed radio systems, for the essential requirements under the article 3.1 of the 99/05/EC Directive".
- ETSI EN 300 197 (V1.6): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio systems for the transmission of digital signals operating at 38 GHz".
- ETSI EN 300 198 (V1.5): "Fixed Radio Systems; Point-to-point equipment; Parameters for radio systems for the transmission of digital signals operating at 23 GHz".
- ETSI EN 300 234 (V1.3): "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); High capacity DRRS carrying 1 x STM-1 signals and operating in frequency bands with about 30 MHz channel spacing and alternated arrangements".
- ETSI EN 300 407 (V1.3): "Fixed Radio Systems; Point-to-point equipment; Parameters for DRRS for the transmission of digital signals and analogue video signals operating around 55 GHz".
- ETSI EN 300 408 (V1.3): "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".
- ETSI EN 300 417-x-y: Multipart EN on "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment".
- ETSI EN 300 430 (V1.4): "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".
- ETSI EN 300 431 (V1.4): "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".
- ETSI EN 300 630 (V1.3): "Fixed Radio Systems; Point-to-point equipment; Low capacity point-to-point digital radio systems operating in the 1,4 GHz frequency band".
- ETSI EN 300 631 (V1.2): "Fixed Radio Systems; Point-to-Point Antennas; Antennas for Point-to-Point fixed radio systems in the 1 GHz to 3 GHz band".
- ETSI EN 300 633 (V1.3): "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".
- ETSI EN 300 639 (V1.3): "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".
- ETSI EN 300 786 (V1.3): "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".
- ETSI EN 300 833 (V1.4): "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".
- ETSI EN 301 127 (V1.3): "Fixed Radio Systems Point-to-point equipment; 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".
- ETSI EN 301 128 (V1.2): "Fixed Radio Systems Point-to-point equipment; Digital Radio Relay Systems (DRRS); Plesiochronous Digital Hierarchy (PDH); Low and medium capacity digital radio systems operating in the 13 GHz, 15 GHz and 18 GHz frequency bands".

- ETSI EN 301 216 (V1.2): "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".
- ETSI EN 301 277 (V1.2): "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".
- ETSI EN 301 387 (V1.2): "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".
- ETSI EN 301 461 (V1.3): "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".
- ETSI EN 301 669 (V1.2): "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".
- ETSI Harmonized EN 301 751 V1.2.1 (2002-07): "Generic harmonized standard for Point-to-Point digital fixed radio systems and antennas covering the essential requirements under article 3.2 of the 1999/5/EC Directive".
- ETSI EN 301 785 (V1.2): "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".
- ETSI EN 301 786 (V1.2): "Fixed Radio Systems; Point-to-point equipment; Parameters for digital radio systems for the transmission of digital signals operating at 52 GHz"
- ETSI EN 301 787 (V1.1): "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"
- ETSI EN 302 062 (V1.1): "High capacity digital radio relay systems carrying STM-4, 4 x STM-1, 2 x STM-1, 4 x STM-1 or STM-4 or 2 x STM-1 signals in bands with 55/56 MHz channel spacing".
- ETSI ETS 300 119-x: Multipart ETS on "Equipment Engineering (EE); European telecommunication standard for equipment practice".
- ETSI ETS 300 635: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH) radio specific functional blocks for transmission of M-times STM-N".
- ETSI ETS 300 645: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH) radio relay equipment; Information model for use on Q-interfaces".
- ETSI EN 301 167: "Transmission and Multiplexing (TM); Management of Synchronous Digital Hierarchy (SDH) transmission equipment; Fault management and performance monitoring; Functional description".
- ETSI TR 101 506: "Fixed Radio Systems; Generic definitions, terminology and applicability of essential requirements under the article 3.2 of 99/05/EC Directive to Fixed Radio Systems".
- ITU-R Recommendation F.746: "Radio-frequency channel arrangements for radio-relay systems".
- ITU-R Recommendation F.751: "Transmission characteristics and performance requirements of radio-relay systems for SDH-based networks".
- ITU-T Recommendation G.773: "Protocol suites for Q interfaces for management of transmission systems".
- ITU-T Recommendation G.783: "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".
- ITU-T Recommendation G.784: "Synchronous digital hierarchy (SDH) management".

History

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