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Transmission and Multiplexing (TM); Multipoint equipment; Radio Equipment for use in Multimedia Wireless Systems (MWS) in the frequency band 40,5 GHz to 43,5 GHz; Part 1: General requirements

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in the frequency band 40,5 GHz to 43,5 GHz;
Part 1: General requirements**

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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction	5
1 Scope	6
2 References	6
3 Definitions, symbols and abbreviations	10
3.1 Definitions	10
3.2 Symbols.....	10
3.3 Abbreviations	10
4 General characteristics	11
4.1 General system architecture	11
4.2 Frequency bands and channel arrangements	12
4.2.1 Frequency plan.....	12
4.2.2 Channel arrangements.....	13
4.3 Compatibility requirements	13
4.4 Environmental conditions.....	13
4.4.1 Equipment within weather protected locations (indoor locations).....	13
4.4.2 Equipment for non-weather protected locations (outdoor locations)	13
4.5 Power supply	13
4.6 EMC conditions.....	13
4.7 Synchronization of interface bit rates.....	14
4.8 Antenna/feeder/branching requirements.....	14
4.8.1 Antenna requirements	14
4.8.2 Return loss	14
4.8.3 Intermodulation products	14
5 System parameters.....	14
5.1 System capacity	14
5.2 Round Trip Delay	14
5.3 Voice Coding.....	15
5.4 RF Block Diagram.....	15
5.5 Transmitter characteristics.....	15
5.5.1 Output power	16
5.5.2 Power control.....	16
5.5.2.1 Automatic Transmit Power Control (ATPC)	16
5.5.2.2 Remote Transmit Power Control (RTPC)	16
5.5.3 Remote Frequency Control (RFC).....	16
5.5.3.1 Out of block emissions caused by RFC setting	16
5.5.3.2 Emissions caused by RFC setting inside the block	16
5.5.4 RF spectrum mask	17
5.5.4.1 Channel spectrum mask	17
5.5.4.2 Transmitter block edge mask	17
5.5.5 Spurious emissions (external)	17
5.5.6 RF tolerance.....	17
5.6 Receiver characteristics	18
5.6.1 Spurious emissions (external)	18
5.7 System performances	18
6 Types of interface	18
Annex A (normative): Intra-block minimum requirements	20
A.1 Channel spectrum mask.....	20
A.2 BER as a function of Receiver input Signal Level (RSL).....	20

A.3	Co-channel interference	20
A.4	Adjacent channel interference	21
Annex B (informative): CEPT/ERC regulatory considerations on EIRP and block edge mask		22
B.1	General considerations	22
B.2	Transmitter maximum EIRP limits	22
B.3	Transmitter EIRP spectral density block mask	23
Annex C (informative): Matched receiver block-edge selectivity mask		25
C.1	Receiver block-edge selectivity mask	25
Annex D (informative): Example of a method for Automatic Transmit Power Control (ATPC) in the uplink direction.....		27
History		29

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document is part 1 of a multi-part deliverable covering Transmission and Multiplexing (TM); Multipoint equipment; Radio Equipment for use in Multimedia Wireless Systems (MWS) in the frequency band 40,5 GHz to 43,5 GHz, as identified below:

Part 1: "General requirements";

Part 2: "Essential requirements under article 3.2 of the Directive 1999/5/EC"

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Introduction

The 40 GHz band has been identified and designated within CEPT with a CEPT/ERC/DEC(99)15 [5] on the designation of the harmonized frequency band 40,5 GHz to 43,5 GHz for the introduction of Multimedia Wireless Systems (MWS), including MVDS. The term "Multimedia Wireless Systems" has been introduced to cater for the phenomenon of convergence between terrestrial Fixed Service (FS) and Broadcasting Service (BS) applications, whereby distributors of entertainment services (broadcasters) are wishing to provide interactive services and telecommunications operators are wishing to supply broader band two-way services to wider markets.

Multimedia Wireless Systems are wireless systems, which support information exchange of more than one type, such as text, graphics, voice, sound, image, data and video. They are also defined as terrestrial multipoint systems which have their origin in telecommunication and/or broadcasting, and which provide fixed wireless access direct to the end user for multimedia services. These MWS may offer different degrees of interactivity, including purely distribution systems, such as digital MVDS.

1 Scope

The present document specifies the minimum requirements for equipment and system parameters, including parameters necessary to plan co-existence, of MWS (Multimedia Wireless Systems) operating in the 40,5 GHz to 43,5 GHz frequency band and used for a range of applications including telecommunication and entertainment services. When MWS equipment is not intended for telecommunication purposes (e.g. for entertainment services), different requirements related to, for example, environmental conditions (see clause 4.4), power supply (see clause 4.5) and synchronization interfaces (see clause 4.7), may be applied, provided that guaranteed values of parameters necessary for co-existence with other MWS systems are met.

The present document is applicable to system and equipment parameters required to be able to plan the radio inter-operator co-existence of a number of possible solutions for implementing MWS in the 40 GHz frequency band according to the CEPT/ERC regulatory frame based on CEPT/ERC/DEC(99)15 [5] and CEPT/ECC/REC 01-04 [55]. Besides specifically designed multipoint Fixed Digital Radio Systems (FDRS) like that in the scope of ETSI Project (EP) BRAN, some other solutions, derived from standardized technology, are already documented, and include systems that align with:

- EN 300 748 [1];
- EN 301 199 [2];
- ITU-R Recommendation F.1499 [3];
- IEEE 802.16 [56].

It is likely that the frequency assignment criteria in this band will be based on "frequency blocks" according to CEPT/ECC/REC 01-04 [55], therefore the radio frequency co-ordination parameters specified in the present document may be subdivided into two categories:

- those detailed in the present document, related to the minimum requirements for frequency co-ordination of various systems deployed by an operator inside the same block of frequency. Although these are not all regarded as "essential R&TTE requirements", they are specified as ETSI "minimum voluntary parameters" for all MWS systems which will co-exist in this band. Their relationship with the "essential R&TTE requirements" will be detailed in part 2 of the present document;
- those related to adjacent "block-edge" interference control; these will be considered as "essential requirements" for the application of Directive 1999/5/EC (R&TTE Directive) [4] and detailed in part 2 of the present document.

The parameters specified in the present document apply to both FDD (both half and full duplex) and TDD systems.

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.

- [1] ETSI EN 300 748: "Digital Video Broadcasting (DVB); Multipoint Video Distribution Systems (MVDS) at 10 GHz and above".
- [2] ETSI EN 301 199: "Digital Video Broadcasting (DVB); Interaction channel for Local Multi-point Distribution Systems (LMDS)".
- [3] ITU-R Recommendation F.1499: "Radio transmission systems for fixed broadband wireless access based on cable modem standard".

- [4] 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)".
- [5] CEPT/ERC/DEC (99)15: "ERC Decision of 1 June 1999 on the designation of the harmonised frequency band 40.5 to 43.5 GHz for the introduction of Multimedia Wireless Systems (MWS) including Multipoint Video Distribution Systems (MVDS)".
- [6] ETSI EN 301 215-3: "Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 3: Multipoint Multimedia Wireless system in 40,5 GHz to 43,5 GHz".
- [7] ETSI EN 300 019: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".
- [8] ETSI EN 300 385: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment".
- [9] ITU-T Recommendation G.810: "Definitions and terminology for synchronization networks".
- [10] ITU-T Recommendation G.812: "Timing requirements of slave clocks suitable for use as node clocks in synchronization networks".
- [11] ITU-T Recommendation G.823: "The control of jitter and wander within digital networks which are based on the 2 048 kbit/s hierarchy".
- [12] ITU-T Recommendation G.813: "Timing characteristics of SDH equipment slave clocks (SEC)".
- [13] ITU-T Recommendation G.825: "The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)".
- [14] ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".
- [15] ITU-T Recommendation G.131: "Control of talker echo".
- [16] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [17] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM)".
- [18] ITU-T Recommendation G.728: "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".
- [19] ITU-T Recommendation G.729: "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code- excited linear-prediction (CS-ACELP)".
- [20] ITU-T Recommendation Q.552: "Transmission characteristics at 2-wire analogue interfaces of digital exchange".
- [21] ITU-T Recommendation Q.553: "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".
- [22] ITU-T Recommendation V series: "Data communication over the telephone network".
- [23] ITU-T Recommendation X series: "Data networks and open system communication".
- [24] ITU-T Recommendation G.961: "Digital transmission system on metallic local lines for ISDN basic rate access".
- [25] ETSI ETS 300 012: "Integrated Services Digital Network (ISDN); Basic user-network interface; Layer 1 specification and test principles".
- [26] ETSI ETS 300 011: "Integrated Services Digital Network (ISDN); Primary rate user-network interface; Layer 1 specification and test principles".
- [27] ITU-T Recommendation G.962: "Access digital section for ISDN primary rate at 2 048 kbit/s".

- [28] ITU-T Recommendation G.707: "Network node interface for the synchronous digital hierarchy (SDH)".
- [29] ITU-T Recommendation G.964: "V-Interfaces at the digital local exchange (LE) - V5.1 interface (Based on 2 048 kbit/s) for the support of access network (AN)".
- [30] ITU-T Recommendation G.965: "V-Interfaces at the digital local exchange (LE) - V5.2 interface (based on 2 048 kbit/s) for the support of access network (AN)".
- [31] ITU-T Recommendation G.957: "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".
- [32] ETSI EN 300 324: "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN)".
- [33] ETSI EN 300 347: "V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN)".
- [34] ETSI ETS 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".
- [35] ETSI EN 300 132-2: "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".
- [36] CEPT/ERC/REC 74-01: "Spurious emissions".
- [37] EN 60950: "Safety of information technology equipment".
- [38] ITU-T Recommendation G.704: "Synchronous frame structures used at 1 544, 6 312, 2 048, 8 448 and 44 736 kbit/s hierarchical levels".
- [39] ANSI/ IEEE 802.3: "Information Technology - Telecommunication & Information Exchange Between Systems - LAN/MAN - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications".
- [40] ITU-T Recommendation G.966: "Access digital section for B-ISDN".
- [41] ITU-T Recommendation I.610: "B-ISDN operation and maintenance principles and functions".
- [42] ITU-T Recommendation I.732: "Functional characteristics of ATM equipment".
- [43] ETSI EG 202 306: "Transmission and Multiplexing (TM); Access networks for residential customers".
- [44] ETSI EN 301 390: "Fixed Radio Systems; Point-to-point and Point-to-Multipoint Systems Spurious emissions and receiver immunity at equipment/antenna port of Digital Fixed Radio Systems".
- [45] ITU-T Recommendation G.723.1: "Speech coders: Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s".
- [46] 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".
- [47] 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 and services".
- [48] ITU-R Recommendation F.1399-1: "Vocabulary of terms for wireless access".
- [49] ETSI EN 301 213-1: "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 1: Basic parameters".

- [50] ETSI EN 301 213-2: "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; part 2: Frequency Division Multiple Access (FDMA) methods".
- [51] ETSI EN 301 213-3: "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 3: Time Division Multiple Access (TDMA) methods".
- [52] ETSI EN 301 213-4: "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 4: Direct Sequence Code Division Multiple Access (DS-CDMA) methods".
- [53] ETSI EN 301 213-5: "Fixed Radio Systems; Point-to-multipoint equipment; Point-to-multipoint digital radio systems in frequency bands in the range 24,25 GHz to 29,5 GHz using different access methods; Part 5: Multi-Carrier Time Division Multiple Access (MC-TDMA) methods".
- [54] ETSI EN 301 785: "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".
- [55] CEPT/ECC/REC 01-04: "Recommended guidelines for the accommodation and assignment of Multimedia Wireless Systems (MWS) in the frequency band 40.5 - 43.5 GHz".
- [56] IEEE 802.16: "Local and Metropolitan Area Networks - Part 16: Standard Air Interface for fixed Broadband Wireless Access Systems".
- [57] ITU-T Recommendation I.432.1: "B-ISDN user-network interface - Physical layer specification: General characteristics".
- [58] ITU-T Recommendation I.432.2: "B-ISDN user-network interface - Physical layer specification: 155 520 kbit/s and 622 080 kbit/s operation".
- [59] ITU-T Recommendation I.432.3: "B-ISDN user-network interface - Physical layer specification: 1 544 kbit/s and 2 048 kbit/s operation".
- [60] ITU-T Recommendation I.432.4: "B-ISDN user-network interface - Physical layer specification: 51 840 kbit/s operation".
- [61] ITU-T Recommendation I.432.5: "B-ISDN user-network interface - Physical layer specification: 25 600 kbit/s operation".
- [62] ITU-T Recommendation I.413: "B-ISDN user-network interface".
- [63] af-uni-0010.002: "ATM User-Network Interface (UNI) Specification".
- [64] af-phy-0040.000: "Physical Interface Specification for 25.6 Mb/s over Twisted Pair Cable".
- [65] ITU-T Recommendation G.967.1: "V-interfaces at the service node (SN): VB5.1 reference point specification".
- [66] ITU-T Recommendation G.967.2: "V-interfaces at the service node (SN): VB5.2 reference point specification".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

block-edge: frequency borderline with a contiguous frequency block assigned to a different operator or not yet assigned

Full Capacity Load (FCL): defined by the maximum number of 64 kbit/s signals or the equivalent which can be transmitted and received by a single CRS within a specified RF bandwidth, fulfilling given performance and availability objectives in respect to fading conditions

frequency block: contiguous portion of spectrum within a sub-band or frequency band, typically assigned to a single operator (see ITU-R Recommendation F.1399-1)

round trip delay: defined as the sum of the delay between point SNI to UNI plus UNI to SNI in figure 1, including any repeaters as appropriate

3.2 Symbols

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

dB	deciBel
dBm	deciBel relative to 1mW
GHz	GigaHertz
kbit/s	kilobit per second
Mbit/s	Megabit per second
MHz	MegaHertz
ms	millisecond
ppm	parts per million

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3.3 Abbreviations

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

ATM	Asynchronous Transfer Mode
ATPC	Automatic Transmit Power Control
BER	Bit Error Ratio
BS	Broadcasting Service
CBR	Constant Bit Rate
CCS	Central Control Station
CEPT	European Conference of Postal and Telecommunications Administrations
CER	Cell Error Ratio
ChS	Channel Separation
CRS	Central Radio Station
CS	Central Station
CW	Continuous Wave
EMC	ElectroMagnetic Compatibility
FCL	Full Capacity Load
FDD	Frequency Division Duplex
FER	Frame Error Ratio
FS	Fixed Service
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LMDS	Local Multipoint Distribution System
MP	MultiPoint
MP-MP	MultiPoint-to-MultiPoint
MVDS	Multipoint Video Distribution System
MWS	Multimedia Wireless System