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Fixed Radio Systems; Point-to-multipoint equipment; Time Division Multiple Access (TDMA); Point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz

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European Standard (Telecommunications series)

**Fixed Radio Systems;
Point-to-multipoint equipment;
Time Division Multiple Access (TDMA);
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in frequency bands in the range 3 GHz to 11 GHz**

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Foreword

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

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Date of adoption of this EN:	8 February 2002
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Introduction

The main field of application of Point-to-Multipoint (P-MP) systems is to provide access to both public and private networks (Public Switched Telephone Networks (PSTN), Private Data Networks (PDN)). By means of P-MP systems the network service area may be extended to cover both distant and scattered user locations; and the systems may be applied to build new access networks covering both urban and rural areas.

Users are offered the full range of services by the particular public or private network. Users have access to these services by means of the various standardized user network interfaces (2 wire loop, new data services and Integrated Services Digital Network (ISDN) ranging from basic rate to $n \times$ primary rate).

P-MP systems provide standard network interfaces and transparently connect users to the appropriate network node. These systems allow a service to be connected to a number of users ranging from a few to several thousands and over a wide range of distances.

P-MP systems are generally configured as Pre-Assigned Multiple Access (PAMA) radio systems or as Demand Assigned Multiple Access (DAMA) radio systems.

The essential features of a typical P-MP radio system are:

- efficient use of the radio spectrum;
- concentration;
- transparency.

Radio is often the ideal way of obtaining communications at low cost and almost independent of distance, and over difficult topography. Moreover, a small number of sites are required for these installations, thus facilitating rapid implementation and minimizing maintenance requirements of the systems.

Concentration means that "m" users can share "n" radio channels (m being larger than n), allowing a better use to be made of the available frequency spectrum and at a lower equipment cost. The term "multi-access" derives from the fact that every user has access to every channel (instead of a fixed assignment as in most multiplex systems). When a demand arises an available channel (or channels) is allocated to it. When the demand is terminated, the channel is released for other use.

Concentration requires the use of distributed intelligent control, which in turn allows many other operation and maintenance functions to be added.

Transparency means that the network node and the user terminal communicate with each other without being aware of the radio path.

Efficient use of the radio spectrum is generally achieved by reusing frequency sets at base stations in a cellular pattern.

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1 Scope

The present document covers equipment, which may operate in frequency bands that have paired frequencies, which can be used by either equipment employing Frequency Division Duplex (FDD) or Time Division Duplex (TDD) techniques. For use with Time Division Duplex only one frequency of the frequency pair will be used and for the purpose of the present document the tx/rx separation will be zero.

The present document contains a revision to allow flexible channel spacings where block assignments have been made in accordance with ERC P-MP recommendations. Nevertheless, the channel spacing is intended be the same in down-link and up-link directions.

1.1 Applications

The present document specifies the minimum and optional requirements for system parameters of Time Division Multiple Access (TDMA) Point-to-Multipoint (P-MP) Radio Systems in the terrestrial Fixed Service operating in frequency bands in the range 3 GHz to 11 GHz.

The present document covers the following typical Point-to-Multipoint (P-MP) applications:

- voice;
- fax;
- voice-band data;
- telex, related to analogue interfaces;
- data up to 64 kbit/s or beyond with optional interfaces;
- ISDN;
- digital video; <https://standards.iteh.ai/catalog/standards/sist/2d66f45c-4e7e-4361-8742-dabf135b907c/sist-en-301-021-v1-5-1-2003>
- digital audio, related to digital interfaces.

Radio terminals from different manufacturers are not intended to inter-work at radio frequency (i.e. no common air interface).

The present document defines the requirements of radio terminal and radio-relay equipment including the interfaces. The requirements for multiplex, network management and antenna/feeder equipment may be addressed elsewhere.

Testing to the present document will be undertaken with the guidance of a generic test methods document EN 301 126 [22], [23] and [24].

1.2 Frequencies

The present document covers fixed P-MP services operating in the 3,5 GHz, 3,7 GHz and 10,5 GHz bands, having the frequency plans as given in ERC Recommendations 14-03 [7], 12-08 [25], 12-05 [8] and in ITU-R Recommendation F.1189-1 [34].

1.3 Access method

The present document covers Time Division Multiple Access (TDMA) 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 ETS 300 012 (1992): "Integrated Services Digital Network (ISDN); Basic user-network interface Layer 1 specification and test principles".
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- [3] ITU-T Recommendation Q.553 (1996): "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".
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- [5] 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".
- [6] ITU-T Recommendation R.20: "Telegraph modem for subscriber lines".
- [7] CEPT/ERC Recommendation 14-03: "Harmonised radio frequency channel arrangements for low and medium capacity systems in the band 3 400 MHz to 3 600 MHz".
- [8] CEPT/ERC Recommendation 12-05: "Harmonised radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.0 - 10.68 GHz".
- [9] ETSI ETS 300 019-1 (1994): "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; sub-parts 1-1 to 1-7: Classification of environmental conditions".
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- [12] 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".
- [13] 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".
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- [16] ITU-T Recommendation G.728: "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".

- [17] ITU-R Recommendation F.697-2: "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".
- [18] ITU-T Recommendation G.729: "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction (CS-ACELP)".
- [19] ETSI EN 300 324: "V interfaces at the digital Local Exchange (LE); V5.1 interfaces for the support of Access Network (AN)".
- [20] ETSI ETS 300 347: "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE) V5.2 interface for the support of Access Network (AN)".
- [21] ITU-R Recommendation F.1191: "Bandwidths and unwanted emissions of digital fixed service systems".
- [22] ETSI EN 301 126-2-1: "Fixed Radio Systems; Conformance testing; Part 2-1: Point-to-Multipoint equipment; Definitions and general requirements".
- [23] ETSI EN 301 126-2-3: "Fixed Radio Systems; Conformance testing; Part 2-3: Point-to-Multipoint equipment; Test procedures for TDMA systems".
- [24] ETSI EN 301 126-3-2: "Fixed Radio Systems; Conformance testing; Part 3-2: Point-to-Multipoint antennas - Definitions, general requirements and test procedures".
- [25] CEPT/ERC Recommendation 12-08: "Harmonized radio frequency channel arrangements and blocks allocations for low, medium and high capacity systems in the band 3 600 MHz to 4 200 MHz".
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- [32] ITU-T Recommendation G.826: "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".
- [33] ITU-T Recommendation G.827: "Availability parameters and objectives for path elements of international constant bit-rate digital paths at or above the primary rate".
- [34] ITU-R Recommendation F.1189-1: "Error performance objectives for constant bit rate digital paths at or above the primary rate carried by digital radio-relay systems which may form part or all of the national portion of a 27 500 km hypothetical reference path".
- [35] ITU-R Recommendation F.557-4: "Availability objective for radio-relay systems over a hypothetical reference circuit and a hypothetical reference digital path".
- [36] ITU-T Recommendation G.723.1: "Speech coders: Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s".
- [37] ETSI EG 202 306 (V1.2.1): "Transmission and Multiplexing (TM); Access networks for residential customers".
- [38] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

- [39] ITU-T Recommendation G.957: "Optical interfaces for equipments and systems relating to the synchronous digital hierarchy".
- [40] ITU-R Radio Regulations: "Frequency allocations".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following term and definition apply:

gross bit rate: defined as the transmission bit rate over the air

NOTE: In case of a transmitter working in burst mode the gross bit rate is the instantaneous maximum transmission bit rate during the burst. The gross bit rate has a unique relationship to the symbol rate through the implemented modulation format.

3.2 Symbols

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

ΔF	Channel Spacing
dB	decibel
dBm	decibel relative to 1 milliwatt
GHz	GigaHertz
Hz	Hertz
kbit/s	kilobits per second
kHz	kiloHertz
Mbit/s	Megabits per second
MHz	MegaHertz
ms	millisecond

3.3 Abbreviations

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

BER	Bit Error Rate
CCS	Central Controller Station
CRS	Central Radio Station
CS	Central Station
EMC	ElectroMagnetic Compatibility
ERC	European Radiocommunications Committee
HC	High Coexistence
ISDN	Integrated Services Digital Network
LD CELP	Low Delay Code Excited Linear Prediction
MGBR	Minimum Gross Bit Rate
MOS	Mean Opinion Score
OFDM	Orthogonal Frequency Division Multiplexing
PRBS	Pseudo-Random Binary Sequence
QDU	Quantization Distortion Unit
RBBER	Residual BER
RS	Repeater Station
rx	Receiver
TDMA	Time Division Multiple Access
TE	Terminal Equipment
TS	Terminal Station
tx	Transmitter