



SLOVENSKI STANDARD SIST EN 301 021:1999

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Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Time Division Multiple Access (TDMA); Point-to-multipoint DRRS in Frequency Division Duplex (FDD) bands in the range 3 GHz to 11 GHz

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European Standard (Telecommunications series)

**Transmission and Multiplexing (TM);
Digital Radio Relay Systems (DRRS);
Time Division Multiple Access (TDMA);
Point-to-multipoint DRRS in
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Foreword

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

National transposition dates	
Date of adoption of this EN:	3 July 1998
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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 x 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

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;
- 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], which is under preparation.

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 and having the frequency plans as given in ERC Recommendations 14-03 [7], 12-08 [23] and 12-05 [8], respectively.

1.3 Access method

The present document covers Time Division Multiple Access (TDMA) systems.

2 Normative references

References may be made to either:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETS 300 012 (1992): "Integrated Services Digital Network (ISDN); Basic user-network interface Layer 1 specification and test principles".
- [2] ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".
- [3] ITU-T Recommendation Q.553 (1994): "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".
- [4] ITU-T Recommendation Q.552 (1994): "Transmission characteristics at 2-wire analogue interfaces of digital exchanges".
- [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".
<https://standards.iteh.ai/catalog/standards/sist/fbe1e79f-818f-4868-807e-364e222c2e1c/itu-t-recommendation-g-821-1999>
- [6] ITU-T Recommendation R.20: "Telegraph modem for subscriber lines".
- [7] ERC Recommendation 14-03: "Harmonized radio frequency channel arrangements for low and medium capacity systems in the band 3 400 MHz to 3 600 MHz".
- [8] ERC Recommendation 12-05: "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.0 - 10.68 GHz".
- [9] ETS 300 019, Parts 1 and 2 (1994): "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; sub-parts 1-1 to 1-7: Classification of environmental conditions; sub-parts 2-1 to 2-7: Specification of environmental tests".
- [10] ETS 300 132: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current sources; and Part 2: Operated by direct current (dc)".
- [11] ITU-T Recommendation G.773 (1993): "Protocol suites for Q-interfaces for management of transmission systems".
- [12] ETS 300 385: "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for digital fixed radio links and ancillary equipment with data rates at around 2 Mbit/s and above".
- [13] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [14] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".
- [15] ITU-T Recommendation G.728: "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".

- [16] ITU-R Recommendation F.697-1: "Error performance and availability objectives for the local-grade portion at each end of an ISDN connection utilizing digital radio-relay systems".
- [17] ETS 300 339: "Radio Equipment and Systems (RES); General Electro-Magnetic Compatibility (EMC) for radio equipment".
- [18] ITU-T Recommendation G.729: "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction".
- [19] ETS 300 324 (1995): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE) V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification, Part 5: Structure and Test Purposes (TSS&TP) specification for the network layer (LE side) and Part 7: Structure and Test Purposes (TSS&TP) specification for the data link layer".
- [20] ETS 300 347 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE) V5.2 interface for the support of Access Network (AN) Part 1: V5.2 interface specification and Part 2: Protocol Implementation Conformance Statement (PICS) proforma".
- [21] ITU-R Recommendation F.1191: "Bandwidths and unwanted emissions of digital radio-relay systems".
- [22] EN 301 126-1 and -2: "Conformance testing for Radio Relay Systems; Part 1: Point to Point Equipment Parameters; Part 2: Additional Parameters for P-MP Equipment".
- [23] ERC Recommendation 12-08: "Harmonized radio frequency channel arrangements and blocks allocations for medium and high capacity systems in the band 3 600 MHz to 4 200 MHz".
- [24] ITU-T Recommendation G.131: "Control of talker echo".
- [25] ITU-T Recommendation G.962: "Access digital line section for ISDN primary rate at 2 048 kbit/s".

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3 Symbols and abbreviations

3.1 Symbols

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

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

3.2 Abbreviations

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

BER	Bit Error Ratio
BWe	evaluation Bandwidth
BWr	reference Bandwidth
CCS	Central Controller Station
CS	Central Station
CRS	Central Radio Station
EMC	Electromagnetic Compatibility
ERC	European Radiocommunications Committee
ISDN	Integrated Services Digital Network
PRBS	Pseudo-Random Binary Sequence
RS	Repeater Station
TDMA	Time Division Multiple Access
TMN	Telecommunications Management Network
TS	Terminal Station
LD CELP	Low Delay Code Excited Linear Prediction
MOS	Mean Opinion Score
QDU	Quantization Distortion Unit
TSH	Terminal Station High frequency
TSL	Terminal Station Low frequency
RS	Repeater Station
RSC	Repeater Station Crossband
TE	Terminal Equipment
TX	Transmitter