



# SLOVENSKI STANDARD

## SIST EN 301 124 V1.2.1:2003

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Fixed Radio Systems; Point-to-multipoint equipment; Direct Sequence Code Division Multiple Access (DS-SS) point-to-multipoint digital radio systems in frequency bands in the range 3 GHz to 11 GHz

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# ETSI EN 301 124 V1.2.1 (2001-02)

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*European Standard (Telecommunications series)*

**Fixed Radio Systems;  
Point-to-multipoint equipment;  
Direct Sequence Code Division Multiple Access (DS-CDMA)  
point-to-multipoint digital radio systems in frequency bands  
in the range 3 GHz to 11 GHz**

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DRRS**ETSI**

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650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

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## Foreword

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

The former title of the present document was: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division Multiple Access (DS-CDMA) point-to-multipoint DRRS in frequency bands in the range 3 GHz to 11 GHz".

National transposition dates	
Date of adoption of this EN:	16 February 2001
Date of latest announcement of this EN (doa):	31 May 2001
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Date of withdrawal of any conflicting National Standard (dow):	30 November 2001

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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 (PSTN, PDN, ...). By means of P-MP systems the network service area may be extended to cover both distant and scattered subscriber locations; and the systems may be applied to build new access networks covering both urban and rural areas.

Subscribers are offered the full range of services by the particular public or private network. Subscribers have access to these services by means of the various standardized user network interfaces (2-wire loop, new data services and ISDN).

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

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

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

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

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

Concentration means that  $m$  subscribers 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 "multiple-access" means that every subscriber has access to every channel (instead of a fixed assignment as in most multiplex systems). When a call is initiated an available channel is allocated to it. When the call is terminated, the channel is released for another call.

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 exchange and the subscriber equipment communicate with each other without being aware of the radio link.

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# 1 Scope

## 1.1 Applications

The present document covers the following typical point-to-multipoint applications:

- voice;
- fax;
- voiceband data;
- telex;
- data up to 2 Mbit/s;
- ISDN.

## 1.2 Frequencies

The present document covers fixed service allocations in the 3 GHz to 11 GHz band. Bands identified by CEPT for P-MP applications between 3 GHz and 11 GHz are:

- 3 410 MHz to 3 600 MHz see ERC Recommendation T/R 14-03 [20];
- 3 600 MHz to 3 800 MHz see ERC Recommendation T/R 12-08 [21]; and
- 10,15 GHz to 10,3 GHz paired with 10,5 to 10,65 GHz see ERC Recommendation T/R 12-05 [22].

## 1.3 Access method

The present document covers Direct Sequence Code Division Multiple Access (DS-CDMA) systems.

## 1.4 Compatibility

There is no requirement to operate Central Station (CS) equipment from one manufacturer with Terminal Station (TS) or Repeater Station (RS) equipment from another manufacturer.

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# 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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.

[1] ETSI ETS 300 012: "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: "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".
- [4] ITU-T Recommendation Q.552: "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".
- [6] ITU-T Recommendation R.20 "Telegraph modem for subscriber lines"; and  
ITU-T Recommendation V-series: "Data communication over the telephone network"
- [7] ETSI ETS 300 019 (all parts): "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".
- [8] ITU-T Recommendation G.773: "Protocol suites for Q-interfaces for management of transmission systems".
- [9] ETSI EN 300 385: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment".
- [10] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [11] ITU-T Recommendation G.726: "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".
- [12] ITU-T Recommendation G.728: "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".
- [13] ITU-T Recommendation G.729: "C source code and test vectors for implementation verification of the G.729 8 kbit/s CS-ACELP speech coder".
- [14] 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".
- [15] Void: "Empty".
- [16] ITU-T Recommendation G.131: "Control of talker echo".
- [17] ETSI ETS 300 132 (all parts): "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment".
- [18] ITU-T Radio Regulation 831: "ITU Radio Regulations Part 1".
- [19] ETSI EN 300 339: "Electromagnetic compatibility and Radio spectrum Matters (ERM); General ElectroMagnetic Compatibility (EMC) for radio communications equipment".
- [20] ERC Recommendation T/R 14-03: "Harmonized radio frequency channel arrangements for low and medium capacity systems in the band 3400 MHz to 3600 MHz".
- [21] ERC Recommendation T/R 12-08: "Harmonized radio frequency channel arrangements and block allocations for low, medium and high capacity systems in the band 3600 MHz to 4200 MHz".
- [22] ERC Recommendation T/R 12-05: "Harmonized radio frequency channel arrangements for digital terrestrial fixed systems operating in the band 10.0 - 10.68 GHz".
- [23] ETSI ETS 300 324 (all parts): "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN)".
- [24] ETSI ETS 300 347: "V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN)".

- [25] ETSI EN 301 055: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division Multiple Access (DS-CDMA); Point-to-multipoint DRRS in frequency bands in the range 1 GHz to 3 GHz".
- [26] CEPT/ERC Recommendation 74-01: "Spurious Emissions".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

**chip:** A unit of modulation used in Direct Sequence Spread Spectrum (DSSS) modulation.

**chip rate:** The number of chips per second, e.g. Mchip/s.

**chip sequence:** A sequence of chips with defined length and chip polarities.

**DSSS modulation:** A form of modulation whereby a combination of data to be transmitted and a fixed code sequence (chip sequence) is used to directly modulate a carrier, e.g. by phase shift keying.

**single DS-CDMA signal:** A single traffic channel and any associated signalling and synchronization overhead.

**system loading:** The number of simultaneous traffic channels at 64 kbit/s in a given radio channel.

**maximum system loading:** The number of simultaneous 64 kbit/s traffic channels in a given radio channel for the class of operation declared by the manufacturer.

**round trip delay:** The sum of the delays between points F to G and G to F in figure 1, including any repeaters if appropriate.

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### 3.2 Symbols

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

dB	decibel
dBm	decibels relative to one milliwatt

### 3.3 Abbreviations

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

ADPCM	Adaptive Differential Pulse Code Modulation
ATPC	Automatic Transmit Power Control
BER	Bit Error Ratio
BW	BandWidth
CCS	Central Controller Station
CRS	Central Radio Station
CS	Central Station
CS-ACELP	Conjugate Structure Algebraic-Code-Excited Linear-Prediction
CSmin	minimum practical Channel Separation (for a given radio-frequency channel arrangement)
CW	Continuous Wave
DAMA	Demand-Assigned Multiple Access
DS-CDMA	Direct Sequence Code Division Multiple Access
DSSS	Direct Sequence Spread Spectrum
EMC	ElectroMagnetic Compatibility
ISDN	Integrated Services Digital Network
MOS	Mean Opinion Score
MSL	Maximum System Loading