SLOVENSKI STANDARD
SIST EN 301 179 V1.1.1:2003

01-december-2003

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Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Frequency Hopping Code Division Multiple Access (FH-CDMA); Point-to-multipoint DRRS in the bands within the range 1 GHz to 3 GHz

Ta slovenski standard je istoveten z: **EN 301 179 Version 1.1.1**

ICS:

33.040.20	Prenosni sistem	Transmission systems
33.060.30	Radiorelejni in fiksni satelitski komunikacijski sistemi	Radio relay and fixed satellite communications systems

SIST EN 301 179 V1.1.1:2003   **en**

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ETSI EN 301 179 V1.1.1 (1999-09)

European Standard (Telecommunications series)

Transmission and Multiplexing (TM);
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ETSI

Reference
DEN/TM-04058 (ax000ico.PDF)

Keywords
CDMA, DRRS, multipoint, radio, RLL,
transmission

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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:	10 September 1999
Date of latest announcement of this EN (doa):	31 December 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2000
Date of withdrawal of any conflicting National Standard (dow):	30 June 2000

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 Network (PSTN), Private Data Network (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).

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 to several thousand, 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 DAMA 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 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 better use to be made of the available frequency spectrum and at a lower equipment cost. The term "multi-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 scope of the present document covers the following typical P-MP applications, delivered directly or indirectly, or in any superimposed transport network layer:

- voice;

- fax;

- voiceband data;

- telex;

- data up to 64 kbit/s;

- ISDN;

- Internet Access.

1.2   Frequency bands and channel arrangements

The present document covers Fixed Service bands at 1,5 GHz, 2,2 GHz, 2,4 GHz and 2,6 GHz.

The frequency plans for the 1,5 GHz, 2,2 GHz and 2,6 GHz bands are given in CEPT T/R 13-01 [6] and ITU-R Recommendation F.1098-1 [19]. For the 2,4 GHz band, the ITU-R Recommendation F.701-2 [7] is applicable.

The present document may cover equipment which uses either Frequency Division Duplexing or Time Division Duplexing.

NOTE: As with other point-to-multipoint standards, attention should be given to assigning spectrum so as to allow different systems to operate in adjacent assigned frequencies without unacceptable mutual interference. This is the responsibility of the regulatory authorities who are advised to note any guidelines produced by CEPT, particularly those with reference to spectrum where unlike duplex methods are to be used.

1.3   Access method

The present document covers Frequency Hopping - Code Division Multiple Access (FH-CDMA) systems.

NOTE: The method described in the present document applies slow frequency hopping TR 101 274 [25], with a hopping period up to 400 ms. During the dwell time, several different links in the same area may operate on different sub-channels in a manner which resembles the characteristics and properties of FDMA systems. The sub-channel supporting each link may be further subdivided using frequency division, time division or a combination of both techniques. (The terms "hopping period", "dwell time" and "sub-channel" are defined in subclause 3.1).

1.4   Compatibility

The present document is not intended to ensure that a Central Station (CS) from one manufacturer will inter-operate with a Terminal Station (TS) or Repeater Station (RS) from another manufacturer.

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, 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: "Integrated Services Digital Network (ISDN); Basic user-network interface; Layer 1 specification and test principles".

[2]   ITU-T Recommendation Q.553 (1996): "Transmission characteristics at 4-wire analogue interfaces of digital exchanges".

[3]   ITU-T Recommendation Q.552 (1996): "Transmission characteristics at 2-wire analogue interfaces of digital exchanges".

[4]   ITU-T Recommendation G.821 (1996): "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".

[5]   ITU-T Recommendation R.20 and V-series: "Telegraph modem for subscriber lines".

[6]   CEPT T/R 13-01 (1993): "Preferred channel arrangements for fixed services in the range 1-3 GHz".

[7]   ITU-R Recommendation F.701-2 (1997): "Radio-frequency channel arrangements for analogue and digital point-to-multipoint radio systems operating in frequency bands in the range 1.350 to 2.690 GHz (1.5, 1.8, 2.0, 2.2, 2.4 and 2.6 GHz)".

[8]   ETS 300 019: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".

[9]   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 (dc) sources; Part 2: Operated by direct current (dc)".

[10]   ITU-T Recommendation G.773 (1993): "Protocol suites for Q-interfaces for management of transmission systems".

[11]   ETS 300 385: "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for digital fixed radio links and ancillary equipment with data rate around 2 Mbit/s and above".

[12]   ITU-T Recommendation G.711 (1988): "Pulse code modulation (PCM) of voice frequencies".

[13]   ITU-T Recommendation G.726 (1990): "40, 32, 24, 16 kbit/s adaptive differential pulse code modulation (ADPCM)".

[14]   ITU-T Recommendation G.728 (1992): "Coding of speech at 16 kbit/s using low-delay code excited linear prediction".

[15]   ITU-T Recommendation G.729 (1996): "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction".

[16] ITU-R Recommendation F.697-2 (1997): "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".

[17] ETS 300 324: "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Networks (AN)".

[18] ETS 300 347: "V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Networks (AN)".

[19] ITU-R Recommendation F.1098-1 (1995): "Radio-frequency channel arrangements for radio-relay systems in the 1 900 - 2 300 MHz band".

[20] ITU-T Recommendation G.723: "Speech coders".

[21] ITU-T Recommendation G.131 (1996): "Control of talker echo".

[22] IEC 60169-1: "Radio-frequency connectors - Part 1: General requirements and measuring methods".

[23] IEC 60339-1: "General purpose rigid coaxial transmission lines and their associated flange connectors - Part 1: General requirements and measuring methods".

[24] IEC 60339-2: "General purpose rigid coaxial transmission lines and their associated flange connectors - Part 2: Detail specifications"

[25] TR 101 274: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Point-to-multipoint DRRS in the access network: Overview of different access techniques".

[26] ITU-R Recommendation F.1189-1 (1997): "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".

[27] ITU-R Recommendation F.557-4 (1997): "Availability objective for radio-relay systems over a hypothetical reference circuit and a hypothetical reference digital path".

[28] ITU-T Recommendation G.827 (1996): "Availability parameters and objectives for path elements of international constant bit-rate digital paths at or above the primary rate".

[29] ISO/IEC 8802-3 (1996): "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".

[30] CEPT/ERC/Recommendation 74-01: "Spurious emissions".

[31] ITU-T Recommendation G.703 (1998): "Physical/electrical characteristics of hierarchic digital interfaces".