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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

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European Standard (Telecommunications series)

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Foreword

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

The present document contains the minimum technical requirements to ensure compatibility of products and conformance with radio regulations across ETSI member states. Radio equipment from different manufacturers are not required to interwork at radio frequency (i.e. no common air interface).

The present document defines the requirements for radio-relay equipment and associated interfaces.

The present document is intended to cover a variety of systems designed for a variety of services, applications, performance objectives and deployment conditions. Therefore it is necessary if applicable to include in the present document different sets of system parameters. In the present document these sets of parameters are referred to as "system types".

The present document is part 1 of a multipart deliverable covering the 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, as identified below:

> **Part 1:** **"Basic parameters";**
>
> Part 2: "Frequency Division Multiple Access (FDMA) methods";
>
> Part 3: "Time Division Multiple Access (TDMA) methods";
>
> Part 4: "Direct Sequence Code Division Multiple Access (DS-CDMA) methods";
>
> Part 5: "Multi-Carrier Time Division Multiple Access (MC-TDMA) methods".

Parts 2, 3, 4 and 5 are intended to be used in conjunction with the present document, describing the basic parameters common to all access methods.

References in EN 301 213 parts 2 [4], 3 [5], 4 [6] and 5 [7] to technical parameters for P-MP systems apply equally to MP-MP systems.

A basic description of the different access methods and a comparison among them are provided in TR 101 274 [8].

The present version differs from the previous one for editorial up-dating consequent to the publication of new ERC Recommendations for FWA in these bands, to publication of EN 301 213-4 [6] and EN 301 213-5 [7] and to recent terminology used in the other parts of the present document. Moreover, alignment to the recent status of EMC ENs harmonized under R&TTE Directive [57] has been introduced without specific technical requirements change.

National transposition dates	
Date of adoption of this EN:	8 February 2002
Date of latest announcement of this EN (doa):	31 May 2002
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2002
Date of withdrawal of any conflicting National Standard (dow):	30 November 2002

Introduction

The main field of application of Multipoint (MP) systems using the Fixed Service (FS) is to provide access to both public and private networks (PSTN, PDN, etc.). By means of MP systems the network service area may cover scattered subscriber locations. The systems may be applied to build new access networks by means of a multi cellular architecture, covering both suburban, urban and regional 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 (e.g. 2-wire loop and ISDN ranging from basic rate to n × primary rate).

Point-to-multipoint 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 Systems (PAMA) or as Demand Assigned Multiple Access (DAMA) Radio Systems.

The essential features of a typical MP Radio Systems 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 are 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 "multi-access" derives from the fact that every subscriber has access to every channel (instead of a fixed assignment as in most multiplex systems). When a call is initiated one of the available channels 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 operations and maintenance functions to be added.

Transparency means that the exchange (service node) and the subscriber equipment communicate with each other without being aware of the radio link.

1 Scope

The present document specifies the minimum requirements for system parameters of Point-to-Multipoint (P-MP) Radio and Multipoint-to-Multipoint (MP-MP) Systems in the terrestrial Fixed Services (FS) operating in the bands 24,5 GHz to 29,5 GHz.

Multipoint (MP) Radio-Relay Systems use in principle three different access methods, taking into account the basic physical parameters of the frequency, the code and the time. This leads to the three basic access methods of:

- Frequency Division Multiple Access (FDMA);

- Code Division Multiple Access (CDMA);

- Time Division Multiple Access (TDMA).

In addition, in particular for wide-band applications, a multi-carrier transmission implementation may be applied, where each sub-carrier uses one of the above access methodologies.

It should be noted that MP-MP systems differ from P-MP systems in that Terminal Stations may be connected directly to one another in a series of short links and generally act as repeaters for traffic carried on to other stations. The arrangement of links varies over time to accommodate changes in propagation characteristics and changes in the subscriber base.

The MP system in the band 24,5 GHz to 29,5 GHz (ERC/REC T/R 13-02 [1]) will provide access to both public and private networks (PSTN, PDN, etc.) by means of the various standardized network interfaces (e.g. 2-wire loop and ISDN ranging from basic rate to $n \times 2$ Mbit/s as well as local area to wide area data networks interfaces).

The system may be applied to build new access networks by means of a multi cellular architecture, covering urban and suburban areas.

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

The present document covers the following MP applications:

- voice;

- fax;

- voice band data;

- telex;

related to analogue interfaces; and

- 64 kbit/s;

- ISDN;

- digital video;

- digital audio;

- Internet access;

related to digital interfaces;

- further applications like ATM, Frame Relay, LAN, WAN may also be provided.

The equipment covered by EN 301 213 should be designed to be able to meet the network performance requirements foreseen by ITU-R Recommendations F.696-2 [9] and F.697-2 [10], for medium and local grade portion or ITU-R Recommendation F.1189-1 [11] for the national portion (access or short haul) of the digital connection following the criteria defined in ITU-T Recommendation(s) G.821 [12] and/or G.826 [13].

The availability requirements are under further study by the relevant bodies.

Network operators may choose different performance and availability requirements in order to extend the possible area of application thus fitting to their network needs.

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

Regulatory bodies should take into account the inband coexistence between MP systems using differing access methods.

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.

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]   ERC/REC T/R 13-02, annex B and annex C: "Preferred channel arrangements for fixed services in the range 22,0 - 29,5 GHz".

[2]   ERC/REC 00-05: "Use of the band 24.5 - 26.5 GHz for fixed wireless access".

[3]   ERC/REC 01-03: "Use of parts of the band 27.5 - 29.5 GHz for Fixed Wireless Access (FWA)".

[4]   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".

[5]   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".

[6]   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".

[7]   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".

[8]   ETSI 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".

[9]   ITU-R Recommendation F.696-2: "Error performance and availability objectives for hypothetical reference digital sections forming part or all of the medium-grade portion of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".

[10]   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".

[11]   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 the national portion of a 27 500 km hypothetical reference path".

[12]   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".

[13]   ITU-T Recommendation G.826: "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".

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

[15]   ETSI EN 300 385: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment".

[16]   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".

[17]   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".

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

[19]   ITU-T Recommendation G.810: "Definitions and terminology for synchronization networks".

[20]   ITU-T Recommendation G.812: "Timing requirements of slave clocks suitable for use as node clocks in synchronization networks".

[21]   ITU-T Recommendation G.823: "The control of jitter and wander within digital networks which are based on the 2 048 kbit/s hierarchy".

[22]   ITU-T Recommendation G.813: "Timing characteristics of SDH equipment slave clocks (SEC)".

[23]   ITU-T Recommendation G.825: "The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)".

[24]   ETSI ETS 300 833: "Fixed Radio Systems; Point to Point Antennas; Antennas for point-to-point fixed radio systems operating in the frequency band 3 GHz to 60 GHz".

[25]   ETSI EN 301 215-1: "Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 1: General aspects".

[26]   ETSI EN 301 215-2: "Fixed Radio Systems; Point to Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 11 GHz to 60 GHz band; Part 2: 24 GHz to 30 GHz".

[27]   IEC 60154-2: "Flanges for waveguides. Part 2: Relevant specifications for flanges for ordinary rectangular waveguides".

[28]   ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".

[29]   ITU-T Recommendation G.131: "Control of talker echo".

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

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

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

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