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Radio Equipment and Systems (RES); Wide band audio links; Technical characteristics and test methods

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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Every ETS prepared by ETSI is a voluntary standard. This ETS contains text concerning conformance testing of the equipment to which it relates. This text should be considered only as guidance and does not make this ETS mandatory.

Annex A provides normative specifications concerning radiated measurements.

Annex B provides the test method for measurement of Necessary Bandwidth (BN).

Transposition dates	
Date of adoption of this ETS:	17 November 1995
Date of latest announcement of this ETS (doa):	31 March 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 September 1996
Date of withdrawal of any conflicting National Standard (dow):	30 September 1996

Annex C presents a graphical representation of the equipment and frequencies for the testing of single and multi-frequency equipment.

Introduction

I-ETS 300 422 [1] has been a frame which led to many national prescriptions which differed, sometimes substantially, between European countries and did not directly refer to wide band audio links. The rapidly increasing use of wireless microphones with increased power for bridging longer distances (hereafter referred to as wide band audio links) in several European countries with different specifications, and the way forward to a Europe without borders, makes it necessary to set up common specifications.

This ETS provides the necessary parameters for equipment to obtain common approval throughout Europe. It should also make it easier for the frequency management authorities to find harmonized frequency allocations which, together with common technical specifications, will greatly reduce the present problems of multi-national use.

In preparing this ETS, much attention has been given to assure a low interference probability, while at the same time allowing a maximum flexibility and service to the end-user. The close relationship between radio microphones and wide band audio links has led to many identical characteristics. Nevertheless it was found to be better to create a separate ETS due to the higher power and the many extra facilities which were developed during recent years for this special use. This ETS does not include performance characteristics that may be required by the user or requirements for interfacing equipment.

Type test measurements should be performed in one of the accredited test laboratories, accepted by the various National regulatory authorities in order to grant type approval, provided the National regulatory requirements are met. This is in compliance with CEPT Recommendation T/R 71-03 [2].

In addition, national administrations may accept a "certificate of conformity" based on a type test report. If equipment available on the market is required to be checked it should be tested in accordance with the methods of measurement specified in this ETS.

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1 Scope

This ETS specifies the minimum performance and the methods of measurement of wide band audio links.

This ETS covers the minimum characteristics considered necessary in order to make the best use of the available frequencies. It does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable.

This ETS applies to modulation systems operating on radio frequencies between 25 MHz and 3 GHz. Although analogue FM is at present used for the majority of wide band audio links, this ETS does not preclude any other constant carrier modulation technique, e.g. Gaussian Filtered Minimum Shift Keying (GMSK) or Generalised Tamed Frequency Modulation (GTFM), provided that the modulation spectrum lies within the specified spectral mask.

This ETS does not cover wide band audio links employing Time Division Multiple Access (TDMA), frequency hopping and spread spectrum or similar forms of modulation.

This ETS does not cover radiated emissions below 25 MHz. Specifications related to Electro-Magnetic Compatibility (EMC) are contained within prETS 300 445 [3].

This ETS has been developed from CEPT Recommendation T/R 20-06 [4].

Additional standards or specifications may be required for equipment intended to interface with the Public Switched Telephone Network (PSTN). This facility may be submitted to regulatory conditions.

This ETS may be used by accredited test laboratories for type testing of the equipment. The performance of the equipment submitted for type testing should be representative for the performance of the corresponding production models.

This ETS also contains instructions for the presentation of equipment for type testing purposes.

The types of equipment covered by this ETS are as follows (see clause 4):

- professional wide band audio links for one-way transmission;
- professional wide band audio links for two-way transmission;
- professional wide band audio links with extra facilities.

2 Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition or the publication referred to applies.

[1] I-ETS 300 422: "Radio Equipment and Systems (RES); Technical characteristics and test methods for wireless microphones in the 25 MHz to 3 GHz frequency range".

[2] CEPT Recommendation T/R 71-03: "Procedures for type testing and approval for radio equipment intended for non-public systems".

[3] Final draft prETS 300 445: "Radio Equipment and Systems (RES); Electro-Magnetic Compatibility (EMC) standard for wireless microphones and similar Radio Frequency (RF) audio link equipment".

[4] CEPT Recommendation T/R 20-06: "Transmitters and receivers for low power cordless microphone systems".

[5] ITU-R Recommendation 559-2: "Objective measurement of radio-frequency protection ratios in LF, MF and HF broadcasting".

[6] IEC 244: "Methods of measurement for radio transmitters".

[7] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

carrier grid: An evenly spaced raster in a given frequency band for the allocation of carrier frequencies. The minimum distance of two carriers in use is a multiple of the raster dependent on type and usage of the equipment.

channel bandwidth: A frequency band of defined width (as a multiple of the carrier grid) including safety margin for operation on adjacent channels, located symmetrically around a carrier frequency in the carrier grid.

conducted measurements: Those measurements which are made using a direct 50 Ω connection to the equipment under test.

integral antenna: An antenna, with or without a connector, designed as, and declared as by the manufacturer, an indispensable part of the equipment.

integral microphone: A microphone, designed as, and declared as by the manufacturer, an indispensable fixed part of the equipment.

limiter threshold: The audio input (output) level at which the transmitter audio limiter action may be said to commence. It is specified with any accessible variable gain controls set according to the manufacturer's instructions, with a sinusoidal input signal of 500 Hz.

occupied bandwidth: That part of the channel bandwidth which is required for the modulated signal. The occupied bandwidth has to be smaller than the channel bandwidth following standardized limits.

port: A port is any connection point on or within the Equipment Under Test (EUT) intended for the connection of cables to or from that equipment.

radiated measurements: Those measurements which involve measurement of a radiated field.

Radio Frequency (RF) port: An RF port is any connection point on or within EUT intended for the connection of RF cable. The RF port will be treated as a 50 Ω connection point unless otherwise specified by the manufacturer.

wide band audio link: A radio microphone of sufficient power to allow wireless (sometimes referred to as link radio microphone) connection over greater distances mainly for portable use. It may include in one mechanical unit more transmitting and receiving facilities than only for high quality audio application.

3.2 Symbols

For the purposes of this ETS, the following symbols apply:

E	Field strength
Eo	Reference field strength, annex A
R	Distance, annex A
Ro	Reference distance, annex A

3.3 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AR1	Alignment Range category 1 (subclause 5.1.3)
AR2	Alignment Range category 2 (subclause 5.1.3)
B	declared channel Bandwidth (see table 1)
erp	effective radiated power
EMC	Electro-Magnetic Compatibility
EUT	Equipment Under Test
GMSK	Gaussian Filtered Minimum Shift Keying
GTFM	Generalised Tamed Frequency Modulation
PSTN	Public Switched Telephone Network
RBW	Resolution BandWidth
RF	Radio Frequency
TDMA	Time Division Multiple Access
Tx	Transmitter
VBW	Video BandWidth
µPa	micro Pascal

4 Functional characteristics

4.1 Wide band audio link descriptions

Wide band audio links covered by this ETS are privately owned, and operated, communications systems for high quality reproduction of the audio input and/or related data or control signals. The equipment operates on a continuous carrier basis and will often be in operation for many hours. A wide band audio link system will at least consist of one transmitter and the corresponding receiver. The number depends on the application, e.g. live news contributions from a widespread area of an actual event may make it necessary to use several systems on separate simultaneous frequencies.

The radio part of the transmitter and receiver are made up exclusively from equipment that has been approved according to this ETS. When radio equipment or parts covered by other standards are included in the wide band audio link these shall fulfil the specifications of the applicable standards. As an example modular solutions may include, beside the main wide band transmitter, an additional receiver for narrow band communication and/or a monitor receiver for foldback signals. At the receiver end of this link, a wide band receiver, coupled with a narrow band transmitter, would be required.

Other equipment that may be connected to it shall fulfil the standards applicable to that equipment (if any).

Wide band audio links normally use wide band frequency modulation to achieve the necessary audio performance. For the majority of applications the modulated transmitter signal covers a bandwidth allowing channel spacing of 200 kHz. This allows for the use of stereo multiplex encoded signals to transmit without the need for two separate wide band channels.

5 General

5.1 Presentation of equipment for testing purposes

Each equipment submitted for type testing shall fulfil the requirements of this ETS on all channels over which it is intended to operate.

The applicant shall complete the appropriate application form when submitting equipment for type testing.