



SLOVENSKI STANDARD

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ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Land Mobile Service;
Rules for Access and the Sharing of common used channels by equipment complying
with EN 300 113; Part 1: Technical characteristics and methods of measurement

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**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Land Mobile Service;
Rules for Access and the Sharing of common used channels
by equipment complying with EN 300 113;
Part 1: Technical characteristics and methods of measurement**

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ETSI

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
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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction.....	5
1 Scope.....	6
2 References.....	6
3 Definitions.....	7
4 General.....	7
4.1 Sharing speech/data.....	7
4.2 Sharing data/data.....	7
4.3 Conformity to this EN.....	8
4.4 Interpretation of the measurement results.....	8
5 Technical characteristics of the equipment	8
6 Access protocol	8
6.1 General	8
6.2 Principles	9
6.3 Procedure.....	9
6.4 Carrier sensing	10
6.5 Observation time.....	10
6.6 Initiation of the transmitter	11
6.7 Duration of the RF channel occupation (time interval).....	11
6.7.1 Transmissions of data packets exceeding 300 ms.....	11
6.7.2 Transmissions of data packets not exceeding 300 ms (speech/data channels).....	11
7 Examples of sharing situations.....	11
8 Methods of measurement for receiver delays.....	16
8.1 Carrier sense delay	16
8.1.1 Definition	16
8.1.2 Method of measurement.....	16
8.1.3 Limit	17
8.2 Receiver opening delay.....	17
8.2.1 Definition	17
8.2.2 Method of measurement.....	17
8.2.3 Limit	18
9 Measurement uncertainty	18
Annex A (normative): General arrangements for measurements involving the use of radiated fields	19
A.1 Test fixture	19
A.1.1 Description.....	19
A.1.2 Calibration	20
A.1.3 Mode of use	20
A.2 Acoustic coupler.....	20
A.2.1 General	20
A.2.2 Description.....	21
A.2.3 Calibration	21

Annex B (informative):	Comments concerning the random part of the observation time	22
Annex C (informative):	Comments concerning the traffic loading of shared channels.....	23
Annex D (informative):	Bibliography.....	24
History		25

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[SIST EN 300 471-1 V1.2.1:2003](https://standards.iteh.ai/catalog/standards/sist/8ef8e845-5a88-41f9-b733-3f5fcd017566/sist-en-300-471-1-v1-2-1-2003)

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering the Land Mobile Service; Rules for Access and the Sharing of common used channels by equipment complying with 300 113, as identified below:

Part 1: "Technical characteristics and methods of measurement";

Part 2: "Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".

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Date of adoption of this EN:	27 April 2001
Date of latest announcement of this EN (doa):	31 July 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2002
Date of withdrawal of any conflicting National Standard (dow):	31 January 2002

Introduction

The present document specifies an access protocol and occupation rules for data communications on radio channels shared by different users, as identified in the Scope.

It is based on the access protocol published as annex F of I-ETS 300 113 [3].

This access protocol may be used for data communications over channels originally intended for speech use.

The requirements of the present document can be implemented in equipment meeting the requirements of ETSI standards such as EN 300 113 or EN 300 390.

The present document gives freedom for the use of any bit rate, any constant envelope modulation or any type of communications protocol which fulfils the normative parameters provided by the present document, in order to access a shared radio channel.

1 Scope

The present document applies to equipment designed to operate within the professional mobile radio service and to the associated frequency planning. It applies to equipment designed for the transmission of data on shared channels.

The present document specifies an access protocol and occupation rules for data communications on radio channels shared by different users; it also contains two methods of measurement used for the assessment of receiver timing parameters (characteristics required for the implementation of the protocol).

This access protocol may be used for data communications over channels originally intended for speech use.

This access protocol also permits the sharing of a channel between several independent users of data communications.

More precisely, this access protocol applies to single frequency simplex operation (and two frequency repeater operations with the repeater in duplex mode and the mobile units in simplex mode). This access protocol is applicable for:

- multiple data only users, independent of each other, which do not share a common central control facility, but may share a common single or two frequency radio channel;
- multiple mixed analogue speech and data users, independent from each other, which do not share a common central control facility, but may share a common single, or two frequency, radio channel and where speech is to have priority over data transmissions.

In the case of analogue transmissions, the corresponding access protocol is known as the "radio-discipline" of the users.

The present document gives freedom for the use of any bit rate, any constant envelope modulation or any type of communications protocol which fulfils the normative parameters provided by the present document, in order to access a shared radio channel; within the limits set out in the present document, each group of users may use its own communication protocol.

This access protocol is not applicable for data users with common central control facilities or for trunked systems operating on dedicated non-shared channels.

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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 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] ETSI EN 300 113-1 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land mobile service; Radio equipment intended for the transmission of data (and speech) and having an antenna connector; Part 1: Technical characteristics and methods of measurement".
- [2] ETSI EN 300 390-1 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment intended for the transmission of data (and speech) and using an integral antenna; Part 1: Technical characteristics and test conditions".
- [3] ETSI I-ETS 300 113 (1992): "Radio Equipment and Systems (RES); Land mobile service Technical characteristics and test conditions for non-speech and combined analogue speech/non-speech equipment with an internal or external antenna connector, intended for the transmission of data".
- [4] ETSI ETR 028 (1994): "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions

For the purpose of the present document, the following terms and definitions apply:

bit: binary digit

block: the smallest quantity of information sent over the radio channel. A constant number of useful bits are always sent together with the corresponding redundancy bits.

packet: one block or a contiguous stream of blocks sent by one (logical) transmitter to one particular receiver or one particular group of receivers

burst (physical): transmission of a small number of consecutive packets within a period not exceeding 300 ms in accordance with this access protocol

transmission (physical): one or several packets transmitted between power on and power off of a particular transmitter

window: set of inter-related transmissions resulting from the action of the "initiating transmitter", and limited in time by the access protocol and corresponding occupation rules to a duration of $t_i + \Delta t_i$.

session: set of inter-related exchanges of packets occupying one or several windows or parts thereof (if applicable). It corresponds to a complete interactive procedure for interchanging data between users, comprising initiation, data transmission and termination procedures. The session can be short (e.g. 2 packets) or long (e.g. one full page of text).

message: user data to be transferred in one or more packets in a session

initiating transmitter: the initiating transmitter is the station that has completed the "observation time" (see clause 6.5) and therefore starts a transmission. This initiates a window and triggers the timer t_i .

reply: transmission by a station as an answer to the "initiating transmitter". This reply can be an acknowledge ("ACK") or a negative acknowledge ("NACK") or a longer packet of useful information.

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4 General

4.1 Sharing speech/data

This access protocol gives speech priority over data on mixed speech/data channels. In order to limit annoyance to speech users, the duration of data transmissions shall be limited in accordance with clause 6.7.

4.2 Sharing data/data

On frequencies assigned only to data communication users (without common central control facilities) the access protocol provides access to independent users with equal priority.

4.3 Conformity to this EN

- a) A signed declaration shall be provided as a confirmation that the equipment meets the requirements of this access protocol.
- b) This may be submitted by the manufacturer with the application form for tests.
- c) In the case where the controlling software for the equipment has not been engineered by the manufacturer of the radio equipment, the party responsible for engineering the controlling software shall provide a signed declaration that the equipment meets the requirements of this access protocol.
- d) Measurements of receiver carrier sense delay and opening delay shall be performed, possibly together with the tests corresponding to EN 300 113 (or EN 300 390).

4.4 Interpretation of the measurement results

The interpretation of the results (e.g. results recorded in a test report) for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit shall be used to decide whether an equipment meets the requirements for that parameter of the present document;
- the value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures given in clause 9 (maximum acceptable values of the measurement uncertainties);
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the corresponding test report (if any).

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with ETR 028 [4] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterising the actual measurement uncertainties are normal (Gaussian)).

The particular expansion factor used for the evaluation of the measurement uncertainty shall be stated.

5 Technical characteristics of the equipment

The timing requirements that the equipment shall fulfil in order to operate correctly and efficiently can be found in EN 300 113-1 [1], clauses 5.1.7 and 5.1.8, EN 300 390-1 [2], clauses 5.1.5 and 5.1.6 and clauses 8.1.3 and 8.2.3 of the present document.

The corresponding methods of measurement can be found in EN 300 113-1 [1], clauses 8.8 and 8.9, EN 300 390-1 [2], clauses 8.5 and 8.6 and in clauses 8.1 and 8.2, of the present document.

6 Access protocol

6.1 General

The access protocol shall be used for each occupation of the Radio Frequency (RF) channel for sharing data/data and for sharing speech/data with automatic channel access.

6.2 Principles

The equipment determines whether or not the channel is, and has been, idle for a certain period (the observation time) by means of carrier sensing.

The observation time consists of a fixed part and a randomly selected part. When the channel still appears to be idle at the end of the observation time, the transmitter is initiated and powered up within a specified time.

The duration of the emission is limited (see clause 6.7).

6.3 Procedure

The equipment shall determine whether or not the channel is, and has been, idle for a certain period (the observation time t_o), by means of carrier sensing (see clause 6.4). The observation time t_o consists of a fixed part t_f and a randomly selected part t_r .

If the channel is occupied during part of the observation time, the process shall be repeated without changing m (see clause 6.5).

If the channel appears to be idle throughout the observation time, the transmitter shall be initiated and powered up within the specified time (attack time; see EN 300 113-1 [1], clause 8.8 or EN 300 390-1 [2], clause 8.5). The channel can then be seized for the duration of one time interval. The maximum length t_i of this interval depends on the frequency sharing category (data/speech, data/data).

If a re transmission is required (due, for example, to a "collision", i.e. a simultaneous channel access by several users), the observation process shall be repeated and the channel shall be detected as idle prior to a repetition of a transmission.

Within one time interval, the following radio traffic may take place:

- a) from a base station to one or several mobiles;
- b) from a mobile to a base station;
- c) between mobiles.

To ensure that no other user can access the channel during a time interval, the reversion time t_c , the time between transmission of a message and reception of the corresponding acknowledgement and/or reply, shall not exceed 50 ms. The reversion time t_c is the time between the switch off of one transmitter and the switch on of the other. The points of switch off and switch on are considered to be the points at which the transmitter power is 50 % of the rated carrier power.