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Digital Audio Broadcasting (DAB);
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Minimum requirements and test specifications for receivers

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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 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

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Foreword

This Technical Specification (TS) has been produced by Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECtrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE 1: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

European Broadcasting Union
CH-1218 GRAND SACONNEX (Geneva)
Switzerland
Tel: +41 22 717 21 11
Fax: +41 22 717 24 81

The Eureka Project 147 was established in 1987, with funding from the European Commission, to develop a system for the broadcasting of audio and data to fixed, portable or mobile receivers. Their work resulted in the publication of European Standard, ETSI EN 300 401 [i.1], for DAB® (see note 2) which now has worldwide acceptance.

NOTE 2: DAB® is a registered trademark owned by one of the Eureka Project 147 partners.

The DAB® family of standards is supported by World DAB®, an organization with members drawn from broadcasting organizations and telecommunication providers together with companies from the professional and consumer electronics industry.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document describes the requirements for consumer receivers designed to be used with an Emergency Warning System (EWS) based on DAB, and the necessary test methods that lead to compliance with the requirements. It may be used as the technical basis for an EWS Certification Mark scheme. An EWS Certification Mark is designed to be used on product packaging and provides an easily recognized mark to correspond to public information campaigns on the necessary features and benefits of an EWS based on DAB. Manufacturers are, of course, free to include additional features or increased performance compared to the requirements specified in the present document.

A DAB based EWS may also be used to deliver information to public signage and specialized receivers. Such devices may have additional features, such as addressability, which are not applicable to consumer receivers and are not within the scope of the present document.

In addition to receivers with a minimum set of features and performance, an EWS also requires appropriate transmission infrastructure and authorization mechanisms. These latter are not within the scope of the present document.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 103 461: "Digital Audio Broadcasting (DAB); Domestic and in-vehicle digital radio receivers; Minimum requirements and Test specifications for technologies and products".

[2] ETSI TS 104 089: "Digital Audio Broadcasting (DAB); Emergency Warning System (EWS); Definition and rules of behaviour".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EN 300 401 (V2.1.1): "Radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

band scan: function to scan the whole of the tuning range to update the stored service list when required

EWS ensemble: DAB ensemble with FIG 0/7 and FIG 0/15

receiver: any device designed to receive digital radio signals

tuning memory: stored information for previously tuned ensembles and services

3.2 Symbols

Void.

3.3 Abbreviations

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

AAC	Advanced Audio Coding
DAB	Digital Audio Broadcasting
DUT	Device Under Test
EEP	Equal Error Protection
EId	Ensemble Identifier
ETI	Ensemble Transport Interface
EWS	Emergency Warning System
FIB	Fast Information Block
FIC	Fast Information Channel
FIG	Fast Information Group
FM	Frequency Modulation
GNSS	Global Navigation Satellite System
MP2	MPEG layer 2
NI	Network Independent
OE	Other Ensemble
RF	Radio Frequency
UEP	Unequal Error Protection
UI	User Interface

4 EWS Certification Mark

The present document comprises the requirements and test specifications by which radio receivers can qualify to carry an Emergency Warning System (EWS) Certification Mark ("the Mark") for emergency warnings. The purpose of the Mark is to ensure that consumers can readily identify products which are suitable for reception of an Emergency Warning System using DAB and which provide features at a sufficiently high level of performance to ensure that the product meets the relevant criteria to provide dependable information to the general public in case of emergencies.

In order to qualify for use of the Mark, products shall meet the requirements set out for the type of product, either:

- minimum requirements for domestic Emergency Warning System receivers (see clause 5); or
- minimum requirements for in-vehicle Emergency Warning System receivers (see clause 6).

In order to prove compliance against the requirements, products shall pass the test specifications, below:

- test specification for domestic products meeting minimum requirements for Emergency Warning System receivers (see clause 7); or
- test specification for in-vehicle products meeting minimum requirements for Emergency Warning System receivers (see clause 8).

The test specifications are designed to complement the testing described in ETSI TS 103 461 [1].

The process for applying for certification to use the Mark is beyond the scope of the present document, but national and international schemes are expected to be in place.

5 Minimum requirements for domestic Emergency Warning System receivers

5.1 Introduction

The minimum requirements for domestic EWS receivers are set out in this clause 5. The minimum requirements for in-vehicle EWS receivers are the subject of clause 6.

Domestic products comprise many types of receiver, including portable and larger devices. Domestic products may be mains or battery powered, or both. They may have a telescopic antenna, a flexible wire antenna, an earphone antenna, an antenna integrated into the receiver, or they may be supplied without an antenna.

A key feature of domestic products is the ability to automatically play alert messages even when the product is not playing audio.

Products may include additional features beyond the minimum requirements, or capabilities beyond the minimum requirements. However, such additional features or capabilities shall not prevent the requirements stated being met.

5.2 Basic requirements

Domestic products shall comply with the requirements set out in ETSI TS 103 461 [1], clause 5.

5.3 Initialization

Domestic products shall provide an initialization mechanism which identifies all receivable EWS ensembles. This shall be carried out as a complete band scan and ensembles carrying FIG 0/15 shall be identified and recorded. As long as at least one EWS ensemble is identified, the initialization mechanism shall invite the user to enter the receiver location code using the presentation format specified in ETSI TS 104 089 [2], annex A. The checksum shall be calculated and if in error, the user shall be invited to check and re-enter until successful. The product shall select an EWS ensemble to monitor based on criteria as recommended in ETSI TS 104 089 [2], clause 7.2.3. If no EWS ensembles are identified, the product shall indicate via the user interface that the EWS function is not available.

The user manual for the product shall include an instruction to reinitialize the product whenever it is moved to a different building.

5.4 EWS ensembles

The receiver shall provide a facility to keep the tuning memory aligned with EWS signals on-air.

Domestic products shall perform a full band scan at regular intervals, whilst the product is not tuned to a specific service. It is recommended to perform a band scan at a minimum once per week. Ensembles carrying FIG 0/15 shall be identified and recorded.

5.5 Operational modes

5.5.1 Sleep/monitor duty cycle

Products shall implement a sleep/monitor duty cycle, synchronized to the time provided in FIG 0/10, that shall be operational whenever the product is not outputting audio. The sleep mode shall be according to ETSI TS 104 089 [2], clause 7.2.2.2. The monitor mode shall be fully operational and able to decode the FIC of the chosen EWS ensemble immediately prior to the minute's edge. The product shall react according to ETSI TS 104 089 [2], clause 7.2.2.3.

5.5.2 Audio mode

Domestic products, when put into operation, shall tune to an EWS ensemble and select a service (this may be the last tuned service, a service allocated to a preset, or some other service that the user has shown previous interest in).

Products shall react according to ETSI TS 104 089 [2], clause 7.2.2.4.

6 Minimum requirements for in-vehicle Emergency Warning System receivers

6.1 Introduction

The minimum requirements for in-vehicle EWS receivers are set out in this clause 6. The minimum requirements for domestic EWS receivers are the subject of clause 5.

In-vehicle products are those products designed specifically for use within a vehicle.

In-vehicle products comprise many types of receiver, including those integrated into the dashboard, and aftermarket products mounted in the dashboard, behind the dashboard, to the vehicle windscreen or elsewhere. Aftermarket products designed to be self-installed by the consumer should ensure that proper consideration is given to ensuring that power adapters, etc., do not cause interference in the FM and DAB broadcast bands.

In-vehicle products may be supplied with or without an antenna.

Products may include additional features beyond the minimum requirements, or capabilities beyond the minimum requirements. However, such additional features or capabilities shall not prevent the requirements stated being met.

6.2 Basic requirements

In-vehicle products shall comply with the requirements set out in ETSI TS 103 461 [1], clause 6.

6.3 Tuner capability

In-vehicle products shall have a minimum of two DAB tuners. This allows them to play out audio and at the same time monitor other DAB ensembles for alert signalling and to determine whether a matched alert message is receivable.

6.4 Location awareness

In-vehicle products shall have the means to know their geographical location to a precision of at least 100 m. Typically, a GNSS receiver will be suitable.

6.5 Operation

In-vehicle products shall behave according to ETSI TS 104 089 [2], clause 7.3.3.

7 Test specification for domestic EWS receivers

7.1 Introduction

Clause 7 provides the test specifications for domestic receivers to comply with EWS requirements. Domestic receivers shall comply with all tests in clause 7.

The Device Under Test (DUT) will be exposed to the test streams and the behaviour of the DUT will be verified.

The test streams described in annex A are used for these tests.

The following equipment is needed:

- Two Ensemble Transport Interface (ETI) file players and signal generators suitable for playing ETI files and for generating an RF output of -50 dBm.
- Suitable means to couple the output of the signal generators to the input of the DUT; direct cable or antenna.
- A timing device showing minutes and seconds **(m:ss)** which can be started when an ETI file starts playing.

The tests are performed using a conducted or radiated method as the receiver allows. The test setup is shown in Figure 1. Any band III channels may be used - three are needed. The signal level shall be set to -50 dBm unless otherwise specified. For radiated testing, the output of the R.F. combiner shall be connected to an antenna. The signal generators shall be set to different frequencies.

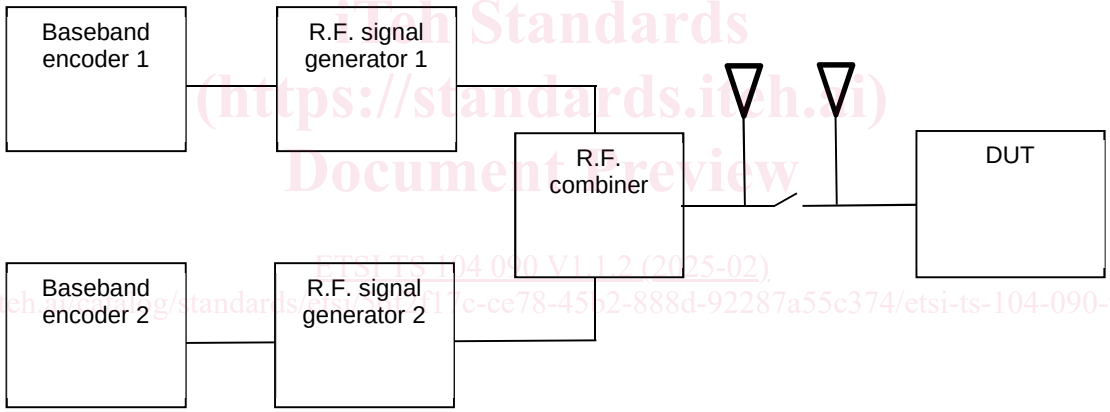

Figure 1: Test set-up

7.2 Basic checks

All EWS products are required to have been tested for compliance against ETSI TS 103 461 [1]. Therefore, the controls, display device and audio device are known to be working properly, and the selection mechanism delivers the right audio stream to the audio output.

7.3 Test 1 - Set-up behaviour

- Objective:
  - To check the behaviour of the DUT as delivered out-of-the-box before the user has entered the receiver location code.
- Method:
  - Set signal generator 1 to an unused DAB channel and the signal level to -50 dBm.
  - Signal generator 2 remains switched off.