

**VHF air-ground and air-air Digital Link (VDL);
Mode 4 radio equipment;
Technical characteristics and methods of measurement
for aeronautical mobile (airborne) equipment;
Part 3: Additional broadcast aspects**

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Foreword

This final draft European Standard (EN) has been produced by ETSI Technical Committee Aeronautics (AERO), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document is part 3 of a multi-part deliverable covering the VHF air-ground and air-air Digital Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for aeronautical mobile (airborne) equipment, as identified below:

Part 1: "Physical layer";

Part 2: "General description and data link layer";

Part 3: "Additional broadcast aspects";

Part 4: "Point-to-point functions";

The present document is accompanied by an equivalent ground-based standard, EN 301 842 [4], [5], [6] and [7], parts 1 to 4 covering the VHF air-ground Data Link (VDL) Mode 4 radio equipment; Technical characteristics and methods of measurement for ground-based equipment.

NOTE 1: Minimum Operational Performance Specifications (MOPS) are also being developed for VDL Mode 4. EUROCAE have previously published Interim MOPS for VDL Mode 4 [i.6] which are a sub set of EN 302 842-1 [1], EN 302 842-2 [2], EN 302 842-3 (the present document) and EN 302 842-4 [3]. EN 302 842-1 [1], EN 302 842-2 [2], EN 302 842-3 (the present document) and EN 302 842-4 [3] comply with the requirements of CEC Mandate M/318.

NOTE 2: Following the decision taken at the ICAO Aeronautical Communication Panel (Bangkok, February 2011), it is expected that ICAO Annex 10 will be amended in 2012 changing the frequency range from 108-137.975 MHz to 112-137.975 MHz. The present deliverable will be updated accordingly once the amendment is publicly available.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Introduction

The present document states the technical specifications for Very High Frequency (VHF) Digital Link (VDL) Mode 4 aeronautical mobile (airborne) radio transmitters, transceivers and receivers for air-ground and air-air communications operating in the VHF band, using Gaussian Filtered Frequency Shift Keying (GFSK) modulation with 25 kHz channel spacing and capable of tuning to any of the 25 kHz channels from 118,000 MHz to 136,975 MHz as defined in ICAO VDL SARPs [i.2].

The present document may be used to produce tests for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing should be representative of the performance of the corresponding production model.

The present document has been written on the assumption that:

- the type test measurements will be performed only once, in an accredited test laboratory and the measurements accepted by the various authorities in order to grant type approval;
- if equipment available on the market is required to be checked it will be tested in accordance with the methods of measurement specified in the present document or a documented alternative approved by the certifying authority;
- equipment comply with EN 302 842-1 [1] and EN 302 842-2 [2].

NOTE: The present document has been produced with a view to maintaining consistency of numbering with the equivalent standard for ground equipment (EN 301 842 [4], [5], [6] and [7]). Where requirements are the same, they have been given the same number. Some new airborne requirements have been inserted between requirements that were sequential in EN 301 842 [4], [5], [6] and [7]. This has led to a non-standard form of numbering for new requirements in some places.

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1 Scope

The present document applies to the following radio equipment types:

- Very High Frequency (VHF) Digital Link (VDL) Mode 4 aeronautical mobile (airborne) radio transmitters, transceivers and receivers for air-ground and air-air communications operating in the VHF band, using Gaussian Filtered Frequency Shift Keying (GFSK) modulation with 25 kHz channel spacing and capable of tuning to any of the 25 kHz channels from 118,000 MHz to 136,975 MHz as defined in ICAO VDL SARPs 130 [i.2].

The present technical document provides part 3 of the technical specifications.

The present document is designed to ensure that equipment certified to it will be compatible with the relevant ICAO VDL SARPs [i.2] and ICAO VDL4 Technical Manual [i.1].

Manufacturers should note that in future the tuning range for the transmitter may also cover any 25 kHz channel from 112,000 MHz to 117,975 MHz and the receiver(s) may cover any 25 kHz channel from 108,000 MHz to 117,975 MHz.

The present document applies to "aeronautical mobile (airborne and in some cases ground vehicles)" equipment which will hereinafter be referred to as "mobile" equipment.

The scope of the present document is limited to mobile stations. The equivalent specification for ground stations is EN 301 842 [4], [5], [6] and [7].

A description of the scope of the VDL Mode 4 system is provided in part 2 of these technical specifications (see EN 302 842-2 [2], clause 1).

EN 302 842-1 [1] deals with tests of the physical layer. EN 302 842-2 [2] deals with tests of the link layer sufficient to support broadcast functionality including requirements and tests sufficient to recognize and respond to transmissions associated with point-to-point communication. The present document provides technical specifications for a VDL Mode 4 mobile transceiver supporting a full Automatic Dependent Surveillance-Broadcast (ADS-B) capability and, optionally, the additional functionality of either, or a combination of, the following services:

- Traffic Information Service-Broadcast (TIS-B);
- Flight Information Service-Broadcast (FIS-B);
- GNSS Augmentation Service-Broadcast (GNS-B).

The TIS-B, FIS-B, or GNS-B reception processing functionality in the airborne equipment is expected to be provided by a TIS-B, FIS-B or GNS-B processor, which could be contained within the VDL Mode 4 transceiver, but could also be housed in a separate physical unit. Therefore to support TIS-B, FIS-B or GNS-B message reception, the minimum functionality demanded of a basic VDL Mode 4 airborne transceiver unit (i.e. one that does not have a TIS-B, FIS-B or GNS-B processor housed within it) is to pass to the TIS-B, FIS-B or GNS-B processor, all TIS-B, FIS-B or GNS-B messages received.

As the measured values of equipment performance may be a function of the method of measurement, standard test conditions and methods of test are recommended in the present document.

The present document is organized as follows:

- clause 2 provides references to relevant documents;
- clause 3 provides general definitions, abbreviations and symbols used;
- clause 4 describes the VDL Mode 4 mobile station functionality to support ADS-B, TIS-B, FIS-B and GNS-B;
- clause 5 provides performance specifications for the VDL Mode 4 mobile station supporting ADS-B, TIS-B, FIS-B and GNS-B Services;
- clause 6 provides general design requirements;