



**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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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction	6
1 Scope	7
2 References	8
2.1 Normative references	8
2.2 Informative references.....	9
3 Definitions and abbreviations.....	9
3.1 Definitions.....	9
3.1.1 Basic reference model definitions.....	9
3.1.2 Service conventions definitions	9
3.1.3 General definitions.....	10
3.1.4 Definition of bit order	10
3.2 Abbreviations	10
4 General description of VDL Mode 4 broadcast services.....	12
4.1 General	12
4.2 Automatic Dependent Surveillance-Broadcast (ADS-B)	12
4.3 Traffic Information Service-Broadcast (TIS-B).....	13
4.4 Flight Information Service-Broadcast (FIS-B).....	14
4.5 GNSS Augmentation Service-Broadcast (GNS-B).....	15
5 Minimum performance specification under standard test conditions.....	16
5.1 Requirements for ADS-B	16
5.1.1 Information Field Formats	16
5.1.2 ADS-B Request	26
5.1.2.1 ADS-B request format.....	26
5.1.2.2 Sleep Mode	26
5.1.2.3 Automatic Selection of Variable Information Fields	27
5.1.3 Default ADS-B Reporting	29
5.1.4 ADS-B Procedures.....	29
5.1.5 CTRL Parameters	31
5.1.5.1 Directory of Service (DOS) message	31
5.1.5.2 Channel Management Parameter	32
5.1.6 Definitions for Compact Position Reporting	42
5.1.6.1 Information Field Offset Encoding	42
5.1.6.2 Information Field Offset Decoding.....	44
5.1.6.3 Patch ID Encoding	45
5.1.6.4 Patch Id Decoding.....	45
5.1.7 Encoding of UDATA (udid)	46
5.2 Requirements for TIS-B	46
5.2.1 Traffic Information Volume (TIV)	46
5.2.2 Void	47
5.2.3 Message format.....	47
5.2.4 Management message	48
5.2.5 Aircraft target messages (airborne TIV)	49
5.2.6 Aircraft target messages (ground TIV)	51
5.2.7 Ground vehicle target messages (ground TIV)	52
5.2.8 TIS-B offset encoding.....	53
5.3 Requirements for FIS-B	56
5.3.1 Message format for received FIS-B messages.....	56
5.3.2 Meteorological Aerodrome Report (METAR) message	57
5.3.3 Special Observations and Reports (SPECI) message.....	64
5.3.4 Automatic Terminal Information Service (ATIS) message	65
5.3.5 Runway Condition (RCN) message.....	67

5.3.6	SIGNificant METeorological Information (SIGMET) message.....	71
5.3.7	Temporary Segregated Areas (TSA) message	72
5.3.8	FIS-B report request message	75
5.3.9	Void	76
5.3.9a	Airborne system functions	76
5.3.9a.1	Transmission of requests	76
5.3.9a.2	Differentiation between reports.....	76
5.4	Requirements for GNSS Augmentation Service Broadcast (GNS-B) message	77
5.4.1	Message format.....	77
5.4.2	Message Type 1	78
5.4.3	Message Type 2	81
5.4.4	Message Type 4	84
5.4.5	CRC Calculation.....	90
5.4.5.1	GNS-B CRC.....	90
5.4.5.2	FAS CRC	90
5.4.5.3	Ephemeris CRC.....	91
6	General design requirements	91
7	Protocol test procedures	91
7.1	General	91
7.2	Required test rig	92
7.3	Protocol test-suite description methodology	92
7.4	Detailed protocol test procedures	92
7.4.1	Test-suite overview.....	92
7.4.2	Declarations	95
7.4.3	Constraints	96
7.4.3.1	Abbreviations	96
7.4.3.1.1	Subfield mnemonics	96
7.4.3.1.2	Station addresses and positions	99
7.4.3.1.3	Tables of values for use in CPR test cases	100
7.4.3.1.4	Tables of values for use in content checking test cases	110
7.4.3.1.5	VDL4 Burst formats	144
7.4.3.2	Test cases	179
7.4.3.2.1	Test case macros.....	180
7.4.3.2.2	Test case descriptions.....	181
Annex A (informative):	Cross reference matrix	260
Annex B (informative):	Bibliography	270
History		277

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Aeronautics (AERO).

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's WG/M (Bangkok, February 2011), it remains to be seen if ICAO Annex 10 Vol III will be amended changing the recommended tuning frequency range from 108-117,975 MHz to 112-117,975 MHz. The present document will be updated accordingly if the amendment is accepted and made publicly available.

National transposition dates

Date of adoption of this EN:	20 September 2011
Date of latest announcement of this EN (doa):	31 December 2011
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2012
Date of withdrawal of any conflicting National Standard (dow):	30 June 2012

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;