



SLOVENSKI STANDARD
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Sistem storitev podatkovnih povezav (DLS) - Specifikacija Skupnosti za izvajanje zahtev Uredbe o medobratovnosti na enotnem evropskem nebu EC 552/2004 za zemeljske sestavne dele in preskušanje sistema

Data Link Services (DLS) System - Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 requirements for ground constituents and system testing

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**Data Link Services (DLS) System;
Community Specification for application under the
Single European Sky Interoperability Regulation EC 552/2004;
Requirements for ground constituents and system testing**

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Foreword

This 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 has been produced by ETSI in response to European Commission mandate M/438 for the Interoperability of the European Air Traffic Management Network.

The present document has been developed in cooperation with Eurocae for compliance with the Essential Requirements of the Single European Sky Interoperability Regulation [i.2] and/or requirements given in implementing rules for interoperability based on the Single European Sky Interoperability Regulation.

The presumption of conformity which is linked to the full application of the present document can only be claimed after it has been listed in the Official Journal of the European Union as Community Specification.

General and specific requirements for presumption of conformity to SES Interoperability Regulation 552/2004 [i.6] are given in the normative annexes of the present document.

NOTE: Other requirements and other EU Regulations and/or Directives may be applicable to the product(s) falling within the scope of the present document.

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Introduction

The European Union launched the Legislation "Single European Sky" (SES) in 2002 which was adopted in 2004 and amended in 2009 [i.6].

The SES legislation is based on a framework of 4 regulations, which includes the Interoperability Regulation [i.6]. The objective of the Interoperability Regulation is to ensure interoperability of the European Air Traffic Management Network (EATMN) consistent with air navigation services. Under this regulation, the use of a European Standard referenced in the Official Journal of the European Union as Community Specification (CS) is a means of compliance to the essential requirements of the Regulation and/or the relevant implementing rules for interoperability.

The present document takes into account the Council Decision 2009/320/EC [i.8] endorsing the European Air Traffic Management Master Plan for the Single European Sky ATM Research (SESAR) project.

1 Scope

The present document is applicable to the ground implementation of data link services, derived from the ICAO standard Context Management (CM) and Controller Pilot Data Link Communication (CPDLC) applications, including test procedures.

Any software elements related to the software assurance level of data link ground implementation are outside of the scope of the present document. As such the essential requirements of the Interoperability Regulation are not considered for software elements within the present document.

The present document does not give presumption of conformity to any of the requirements stemming from the Regulation (EC) 216/2008 [i.9] as amended by Regulation (EC) 1108/2009 [i.10].

The present document does not give presumption of conformity related to the maintenance requirements, environmental constraints, effect of harmful interference and civil/military coordination.

NOTE: For these ERs, please refer to the Air Navigation Service Provider procedures.

Requirements in the present document which refer to "should" statements or recommendations in the normatively referenced material (clause 2.1) are to be interpreted as fully normative ("shall") for the purpose of compliance with the present document.

2 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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

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

2.1 Normative references

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

- [1] ICAO Convention on International Civil Aviation, Annex 10 - Aeronautical Telecommunications, Volume II: "Communication Procedures including those with PANS status", Sixth edition - October 2001, incorporating Amendments 70-85, Amendment 85 (applicable 18/11/2010).
- [2] ICAO Convention on International Civil Aviation, Annex 10 - Aeronautical Telecommunications, Volume III: "Communication Systems, Part I - Digital Data Communication Systems", Second Edition - July 2007, incorporating Amendments 70-85, Amendment 85 (applicable 18/11/2010), Chapter 6 - VHF Air-ground Digital Link (VDL).
- [3] ICAO Doc. 4444-ATM/501: "Procedures for Air Navigation Services - Air Traffic Management", Fifteenth Edition - 2007, incorporating Amendments 1 - 5. ISBN 978-92-92310-11-0.
- [4] ICAO Doc. 9705-AN/956: "Manual of Technical Provisions for the Aeronautical Telecommunications Network (ATN)", Second Edition, December 1999, including identified PDRs.
- [5] ICAO Doc. 9776/AN970: "Manual on VHF Digital Link (VDL) Mode 2", First Edition, 2001.
- [6] EUROCAE Document ED-110B / RTCA DO-280B: "Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1" (ATN B1 Interop Standard) December 2007.

- [7] EUROCAE Document ED-120 / RTCA DO-290: "Safety and Performance Requirements Standard for Initial Air Traffic DLS in Continental Airspace" (SPR IC), May 2004, including Change 1 (April 2007) and Change 2 (October 2007).
- [8] EUROCAE Document ED-111: "Functional Specifications for CNS/ATM Recording", July 2002 including Amendment 1 (30/07/2003).
- [9] EUROCONTROL-SPEC-0106: "EUROCONTROL Specification For On-Line Data Interchange (OLDI)", Edition 4.1, 16 January 2008 (Recognised as SES Community specification, OJ C 149, 14.6.2008, p.22).
- [10] ARINC Specification 631-5: "VHF Digital Link (VDL) Mode 2 Implementation Provisions" (Published 3 December 2008).
- [11] ICAO EUR Doc 011: "EUR Frequency Management Manual for Aeronautical Mobile and Aeronautical Radio Navigation Services" ICAO European and North Atlantic Office, Edition 2010.

NOTE: Available at http://www.paris.icao.int/documents_open/files.php?subcategory_id=96.

- [12] ETSI EN 301 841-1 (V1.3.1): "VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground -based equipment; Part 1: Physical layer and MAC sub-layer".
- [13] ETSI EN 301 841-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground -based equipment; Part 2: Upper layers".
- [14] Commission Regulation (EC) No 1702/2003 of 24 September 2003 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations, OJ L 243, 27.09.2003, p.6-79.

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2.2 Informative references

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] ICAO Convention on International Civil Aviation, Annex 1 - Personnel Licensing, 10th edition, incorporating Amendments 1-167, July 2006. ISBN 92-9194-750-4.
- [i.2] Commission Regulation (EC) No. 29/2009, of 16 January 2009, laying down requirements on data link services for the single European sky, OJ L 13/3 (17.1.2009), including Corrigendum published in the EU Official Journal L104/58 at 24.04.2009.
- [i.3] Commission Regulation (EC) No 30/2009 of 16 January 2009 amending Regulation (EC) No 1032/2006 as far as the requirements for automatic systems for the exchange of flight data supporting data link services are concerned, OJ L 13/20 (17.1.2009).
- [i.4] ICAO Draft Doc. 9880-AN/466 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI standards and protocols, Part I - Air-Ground Applications, 1st edition (draft v1.1), November 2006.
- [i.5] Regulation (EC) No 549/2004 of the European Parliament and of the Council of 10 March 2004 laying down the framework for creation of the single European sky (the framework Regulation), OJ L 96, 31.03.2004, p. 1 as amended by Regulation (EC) No 1070/2009, OJ L 300, 14.11.2009, p. 34.
- [i.6] Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (interoperability Regulation), OJ L 96, 31.03.2004, p. 26 as amended by Regulation (EC) No 1070/2009, OJ L 300, 14.11.2009, p. 34.
- [i.7] ARINC Characteristic 750-4, VHF Data Radio (2004).

- [i.8] Council Decision 2009/320/EC of 30 March 2009 endorsing the European Air Traffic Management Master Plan of the Single European Sky ATM Research (SESAR) project.
- [i.9] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC, OJ L 79, 19.03.2008, p. 1-49.
- [i.10] Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation services and repealing Directive 2006/23/EC, OJ L 309, 24.11.2009, p. 51-70.
- [i.11] EUROCONTROL Specification on Data Link Services, Eurocontrol -Spec-0116, Edition 2.1 (Edition date 28 January 2009).

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Framework Regulation [i.5], Interoperability Regulation [i.6] and the Implementing Rule [i.2] apply.

3.2 Abbreviations

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

| | |
|-------|--|
| ACL | ATC Clearances service |
| ACM | ATC Communications Management service |
| ADEP | Departure Aerodrome |
| ADES | Destination Aerodrome |
| AE | Application Entities |
| AIP | Aeronautical Information Publication |
| AMC | ATC Microphone Check service |
| ANSP | Air Navigation Service Provider |
| ARS | Administrative Region Selector field (of NSAP address) |
| ATC | Air Traffic Control |
| ATM | Air Traffic Management |
| ATN | Aeronautical Telecommunication Network |
| ATS | Air Traffic Services |
| ATSC | Air Traffic Services Communication |
| ATSP | Air Traffic Service Provider |
| C | Conditional |
| CDA | Current Data Authority |
| CLNP | Connectionless Network Protocol |
| CLTP | Connectionless Transport Protocol |
| CM | Context Management |
| CNS | Communications, Navigation, Surveillance |
| CP | Presentation Connect PPDU |
| CPA | Presentation Connect Accept PPDU |
| CPDLC | Controller Pilot Data Link Communication |
| CPR | Presentation Connect Reject PPDU |
| CS | Community Specification |
| CSP | Communication Service Provider |
| DLIC | Data Link Initiation Capability service |
| DLS | Data Link Service(s) |
| DM | Downlink Message |
| EASA | European Aviation Safety Agency |
| EATMN | European Air Traffic Management Network |
| EC | European Commission |

| | |
|---------|--|
| ED | EUROCAE Document |
| ER | Essential Requirement |
| ES | End System |
| EUROCAE | European Organisation for Civil Aviation Equipment |
| HMI | Human-Machine Interface |
| ICAO | International Civil Aviation Organisation |
| ICS | ATN Internet Communications Service |
| IDRP | Inter-Domain Routing Protocol |
| IEC | International Electrotechnical Commission |
| IFPS | Initial Flight Plan Processing System |
| IP | Internet Protocol |
| ISO | International Organisation for Standardisation |
| ITU-T | International Telecommunication Union - Standardization Sector |
| LACK | Logical Acknowledgement |
| LOC | Location field (of NSAP address) |
| LOF | Log On Forwarding (OLDI Message) |
| N | No Response |
| NAN | Next Authority Notified (OLDI Message) |
| NDA | Next Data Authority |
| NPDU | Network Protocol Data Unit |
| NSAP | Network Service Access Point |
| NSEL | Network Selector |
| OICS | Operational Implementation Conformance Statement |
| OLDI | On-Line Data Interchange |
| OSI | Open Systems Interconnection |
| PANS | Procedures for Air Navigation Services |
| PDR | Proposed Defect Report (to ICAO Doc 9705) |
| PER | Packed Encoding Rules (of Abstract Syntax Notation One) |
| PICS | Protocol Implementation Conformance Statement |
| PPDU | Presentation Protocol Data Unit |
| R-ATSU | Receiving Air Traffic Services Unit |
| RTCA | Radio Technical Commission for Aeronautics, Inc. |
| SAC | Short Accept SPDU |
| SACC | Short Accept Continue SPDU |
| SARPs | ICAO Standards and Recommended Practices |
| SCN | Short Connect SPDU |
| SES | Single European Sky |
| SNDCF | Sub-Network Dependent Convergence Function |
| SO | Safety Objective |
| SPDU | Session Protocol Data Unit |
| SPR | Safety and Performance Requirements |
| SQP | Signal Quality Parameter |
| SR | Safety Requirement |
| SRF | Short Refuse SPDU |
| SRFC | Short Refuse Continue SPDU |
| SYS | System Identifier field (of NSAP address) |
| T-ATSU | Transferring Air Traffic Services Unit |
| TC | Transport Connection |
| TP4 | Transport Protocol Class 4 |
| TSEL | Transport Selector |
| U | Unconditional |
| ULCS | ATN Upper Layer Communications Service |
| UM | Uplink Message |
| VDL | Very High Frequency Digital Link |
| VHF | Very High Frequency |
| WAN | Wide Area Network |
| X.25 | ITU-T Packet Switching standard |
| XID | eXchange IDentifier |

4 Requirements for implementing Data Link Services

4.0 Precedence

In the event of a conflict between the interoperability requirements expressed in ED-110B [6] and the requirements in the present document, the latter shall take precedence.

NOTE: This requirement is equivalent to Eurocontrol DLS Specification [i.11], clause A.2.1.10.

4.1 Constituents of a DLS System

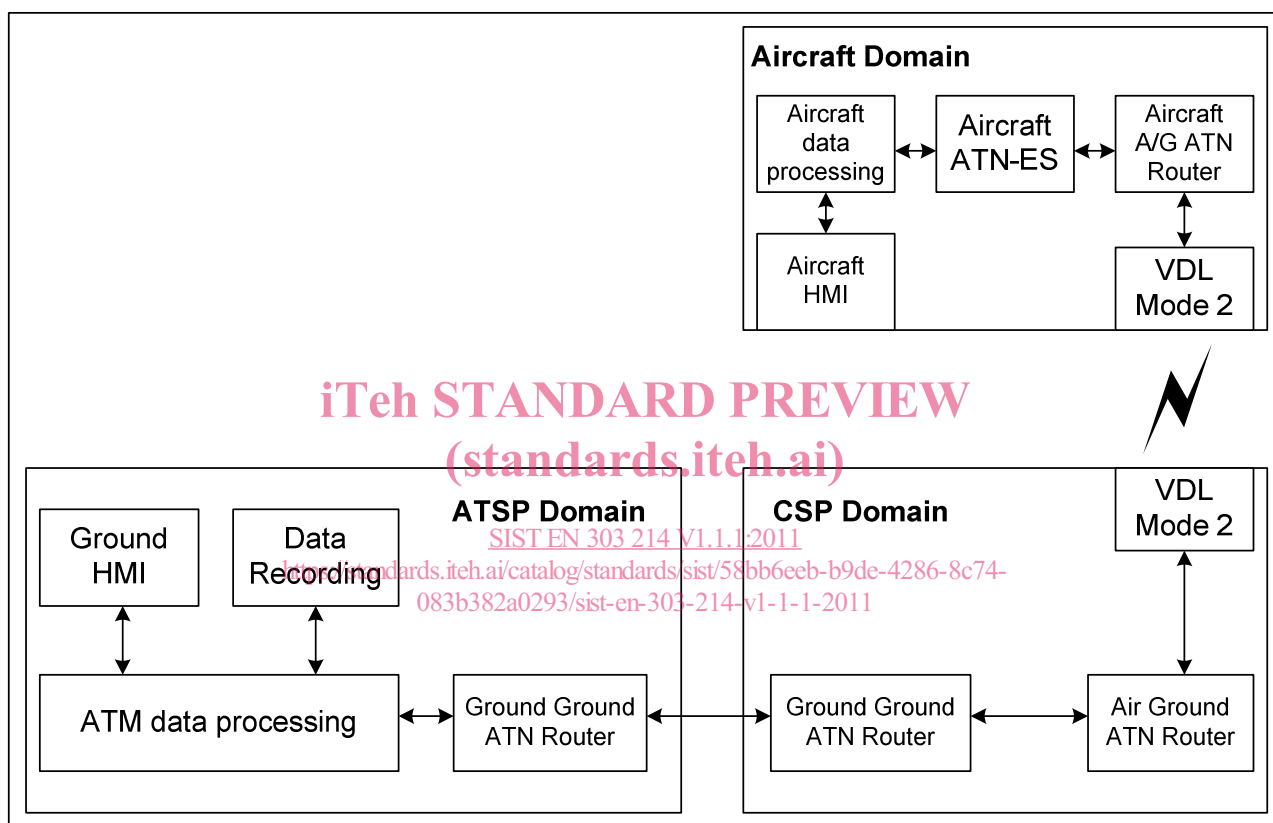


Figure 1: ATN Data Link System Architecture

The DLS System as depicted in figure 1 consists of the constituents relevant for end-to-end data link communications within the following domains:

- Aircraft domain.
- CSP domain.
- ATSP domain.

The present document provides a CS for the Air Traffic Service Provider (ATSP) and Air/Ground Communications Service Provider (CSP) domain only. Description of airborne domain will be published by EASA.

An ATSP has to at least implement the following constituents:

- Ground Ground ATN Router.
- ATM Data Processing.
- Ground HMI.

- Data Recording.

Therefore these constituents are called "unconditional constituents" within the present document.

A CSP has to implement at least the following constituents:

- Ground Ground ATN Router.
- Air Ground Router.
- VDL Mode 2.

For an ATSP it is not required to implement the constituents Air Ground Router and VDL Mode 2 when interconnected to an external CSP. Therefore these constituents are called "conditional constituents" within the present document.

In a ground installation it is possible to merge the ATSP and CSP domains. In such a case one Ground Ground Router might be sufficient.

In a real implementation one can combine the functionalities of several constituents such as Ground Ground Router and Air Ground Router, or Data Recording and ATM Data Processing as appropriate.

4.1.1 Unconditional Constituent - Ground Ground ATN Routers

NOTE: The Ground Ground Router can be part of the Air Ground Router.

4.1.1.1 Eurocontrol DLS Specification, clause B.2.1.1

CSPs and ATSPs shall operate Ground-Ground ATN Routers, as defined by ICAO Doc 9705 [4], in order to support interoperations with each other.

NOTE: ATN Ground-Ground Routers will have local interfaces to ground networks, such as X.25 and Ethernet. These interfaces are outside of the scope of the specifications outlined in the present document.

4.1.1.2 Eurocontrol DLS Specification, clause B.2.1.2

ATN Routers shall comply with the requirements of ED-110B [6], chapters 2 and 3 that are applicable to ATN communications services (ICS and ULCS), CM Application and CPDLC Applications, and amended as described in the present document.

4.1.1.3 Eurocontrol DLS Specification, clause B.2.1.3

In addition to the Doc 9705 [4] updates specified in ED-110B [6], chapter 2.4, implementations shall additionally incorporate all defect resolutions listed in table 1.

Table 1: Modifications to ICAO Doc 9705 [4] - General

| PDR ref | PDR Description (Ed 2) | Requirements Conditionality | |
|---|--|-----------------------------|--|
| | | C/U | Condition |
| 99070001 | ICAO 9705 [4] Edition 2 - Editorial Errors | C | It is up to the implementation to use it or not. |
| M1050001 | Correction of CLNP Priority | C | It is up to the implementation to use it or not. Documents restriction of CLNP priorities on VHF data links. |
| M0060001 | ICAO 9705 [4] Edition 2 - Editorial Errors | C | It is up to the implementation to use it or not. |
| NOTE: "U" stands for "unconditional" means that it has to be supported. "C" stands for "conditional" means that it has to be supported under certain conditions as outlined in table 1. | | | |

4.1.1.4 Eurocontrol DLS Specification, clause B.2.5.1

ICS implementations shall conform to the requirements of ED-110B [6] (which refers to ICAO Doc. 9705 [4], Sub-Volume V), except where indicated otherwise in the present document.