



ED-141A

MINIMUM TECHNICAL SPECIFICATIONS FOR AIRPORT COLLABORATIVE DECISION MAKING (A-CDM) SYSTEMS

LEGAL NOTICE

This document is the exclusive intellectual and commercial property of EUROCAE. It is presently commercialised by EUROCAE. This electronic copy is delivered to your company/organisation for internal use exclusively. In no case it may be re-sold, hired, lent or exchanged outside your company. It may not be reproduced, in whole or in parts, without prior written permission by EUROCAE.

FEBRUARY 2025
SUPERSEDES ED-141

FOREWORD

1. This document was developed by EUROCAE Working Group 111 'Airport Collaborative Decision Making (A-CDM)' and was approved by the Council of EUROCAE on 29 January 2025.
2. This document supersedes ED-141 Minimum Technical Specifications for Airport Collaborative Decision Making (A-CDM) Systems (2008).
3. The following steps were taken to update the EUROCAE ED-141 document:
 - Reviewing the existing requirements for A-CDM using the ED-141 documentation and comparing them with the contents of the Airport CDM Specification published by EUROCONTROL.
 - During the review and the update of this document, coordination took place with the EUROCONTROL Airport Integration Coordination and Harmonization WG (AICH WG). It was agreed to focus the content of the requirements in the ED-141A on the technical and non-functional requirements and to reference the EUROCONTROL Airport CDM Specification for the procedural and functional A-CDM requirements.
 - Finally, the chapters of ED-141A were restructured and relevant technical requirements were adapted or added.
4. EUROCAE, an international non-profit organisation, is the European leader in the development of worldwide recognised standards for aviation. This is achieved by utilising the expertise from our members and stakeholders across the global aviation community.
5. EUROCAE standards are developed following an open, transparent and consensus-based process, governed by process and quality management principles, which are clearly documented and is in line with the World Trade Organisation (WTO) Technical Barriers to Trade (TBT) Agreement, Annex 3 "Code of Good Practice for the Preparation, Adoption and Application of Standards".
6. EUROCAE standards and other deliverables are recommendations and best industry practices. EUROCAE is not an official body of the European governments. EUROCAE standards are intended to complement and support the regulatory and certification framework.
7. Whilst efforts are made during the standards-development process to avoid the inclusion of proprietary information and material, some of the elements of this document may be the subject of patent, copyright or other proprietary rights. EUROCAE shall not be held responsible for identifying any such rights. Trade names and similar terms used within this document do not constitute an endorsement by EUROCAE thereof.
8. Copies of this document may be obtained from:

EUROCAE

9 – 23 rue Paul Lafargue

93200 Saint-Denis

France

Telephone: +33 1 49 46 19 65

Email: eurocae@eurocae.net

Website: www.eurocae.net

TABLE OF CONTENTS

FOREWORD	i
TABLE OF CONTENTS	ii
TABLE OF FIGURES	iii
TABLE OF TABLES	iii
CHAPTER 1 GENERAL	1
1.1 INTRODUCTION	1
1.2 A-CDM DOCUMENTS.....	1
1.3 PURPOSE, SCOPE, APPLICABILITY	2
1.4 TERMINOLOGY	3
1.5 GLOSSARY OF DEFINED TERMS	3
1.5.1 A-CDM Definitions.....	3
1.5.2 General Definitions.....	3
1.5.3 A-CDM Abbreviations.....	3
1.6 REFERENCE DOCUMENTS	4
CHAPTER 2 SYSTEM DESCRIPTION.....	5
2.1 OPERATIONAL CONTEXT.....	5
2.1.1 A-CDM System Goals	5
2.1.2 A-CDM Elements, Roles, Responsibilities and Procedures.....	5
2.2 THE A-CDM SYSTEM.....	6
2.3 TECHNICAL ROLES	6
2.3.1 Operational Supervision.....	6
2.3.2 Technical Supervision	6
CHAPTER 3 SYSTEM TECHNICAL REQUIREMENTS.....	7
3.1 DATA MANAGEMENT	7
3.2 ACCOUNT MANAGEMENT	7
3.3 CONFIGURATION MANAGEMENT	9
3.4 USER INTERFACE	10
3.5 DATA EXCHANGE AND INTEROPERABILITY.....	11
3.6 SYSTEM MONITORING AND CONTROL	12
3.7 SYSTEM RELIABILITY, ROBUSTNESS AND PERFORMANCE.....	13
3.8 RECORDING & REPLAY INCLUDING LOGGING	15
3.9 SECURITY.....	16
APPENDIX A SUMMARY OF REQUIREMENTS AND RECOMMENDATIONS.....	19
APPENDIX B CROSS-REFERENCE OF REQUIREMENTS FROM ED-141 TO ED-141A.....	27
APPENDIX C LIST OF CONTRIBUTORS AND WG-111 MEMBERS.....	29
IMPROVEMENT SUGGESTION FORM.....	31

TABLE OF FIGURES

Figure 1-1: A-CDM Document Relationships	2
--	---

TABLE OF TABLES

Table 3-1: Example Response Times	14
Table A-1: Summary of Requirements	19
Table A-2: Summary of Recommendations	25
Table B-1: Cross Reference of Requirements from ED-141 to ED-141A	27

CHAPTER 1

GENERAL

1.1 INTRODUCTION

Airport Collaborative Decision Making (A-CDM) is an important enabler of Air Traffic Management (ATM) capacity and efficiency. A-CDM is a set of processes to enhance common situational awareness and operational decision making. This concept is supported by integration of enabling functions and automation of data exchange.

The concept of A-CDM does not imply any particular system or architecture since the concept may be implemented independently of any specific technology. Rather, A-CDM is therefore an approach to using aeronautical data, based on sharing data between all partners, ensuring a common view of the ATM and airport environment on all levels. A-CDM also addresses the need for operational decisions to be made collaboratively thus providing a substantial contribution to maximising capacity and efficiency. The implementation of A-CDM may use a variety of architectures and technologies; this document aims to set minimum technical specifications that would enable a successful implementation of the concept.

A-CDM is about improving aircraft operations at airports and the alignment with the European ATM or regional network, at an operational level.

A-CDM enables an A-CDM partner to make the optimal operational decisions with other A-CDM partners, knowing their preferences and constraints and actual status and predicted situation. The decision making by the A-CDM partners is dependent on sharing of accurate and timely information and adapted start-up procedures, defined in an operations manual and automated in various functions.

While the implementation of A-CDM operations requires an organisation and operational change of the way flight planning data is used and decisions are made, it nevertheless requires that the A-CDM partners possess certain capabilities or systems that enable them to share data and make and implement decisions collaboratively.

The EUROCONTROL Airport CDM Implementation Manual [2] points out that:

“To enable the operational use of Airport CDM, partners’ existing systems will have to be adapted at least to a level where they can seamlessly communicate with each other”.

1.2 A-CDM DOCUMENTS

Much of the key development work in the A-CDM field has been conducted by EUROCONTROL in cooperation with operational experts from airports and Air Navigation Service Providers (ANSPs) within Europe already operating A-CDM at their airports. This document therefore builds upon the key outputs of the EUROCONTROL Airport Integration Coordination and Harmonization WG (AICH WG), namely the EUROCONTROL Specification for Airport Collaborative Decision Making [1] and the EUROCONTROL Airport CDM Implementation Manual [2] to derive an updated set of EUROCAE standards (comprising this document, ED-145A¹ and ED-146A).

The first document of the updated EUROCAE A-CDM set is the ‘Minimum Technical Specifications for Airport Collaborative Decision Making (A-CDM) systems’ (ED-141A). It describes the minimum requirements on the technical aspects of A-CDM systems.

The second document of the EUROCAE A-CDM set is the ‘Airport CDM Interface Specification’ (ED-145). It describes the minimum requirements on the data exchanged

¹ At the time of publication of this document, ED-145A is not published, but is being developed by EUROCAE WG-111

with an A-CDM system. This document will be updated to the Airport Collaborative Decision Making (A-CDM) Data Model Specification (ED-145A), to be published later.

The final document of the updated EUROCAE A-CDM set is the 'Guidelines for Test and Validation Related to Airport CDM Interoperability' (ED-146A) that provides a basis from which an A-CDM implementer can develop testing specifications to ensure his/her installation is compliant with ED-141A.

The relationship between the relevant documents described above is captured in the figure below.

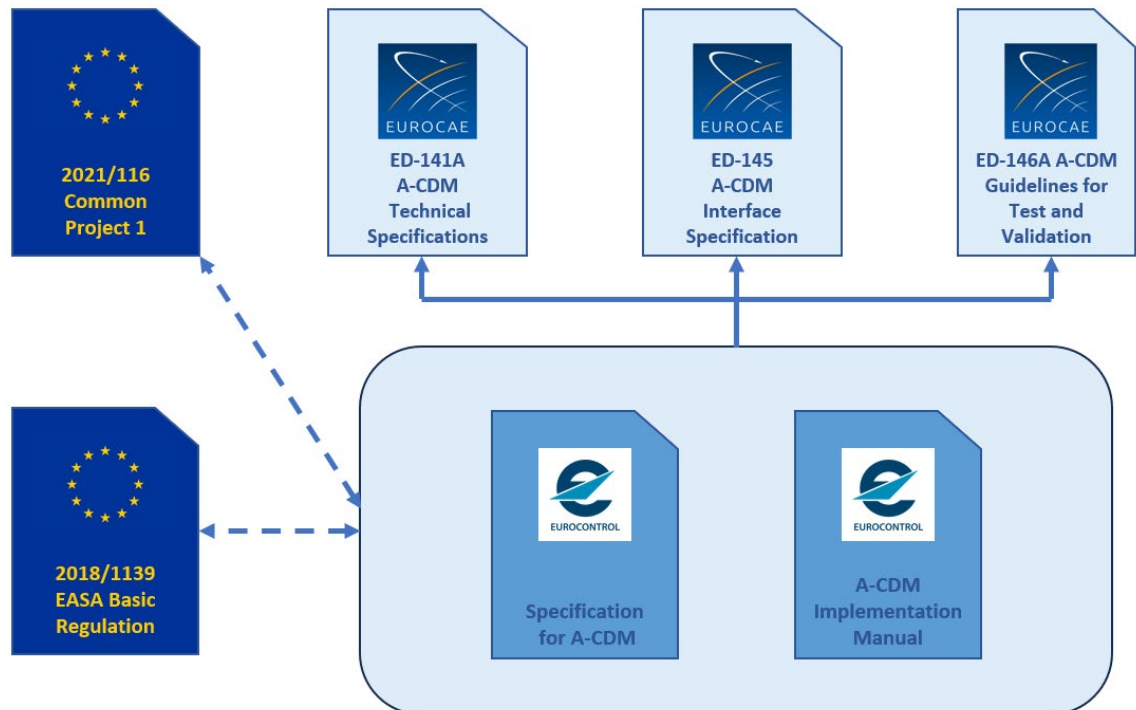


FIGURE 1-1: A-CDM DOCUMENT RELATIONSHIPS

1.3 PURPOSE, SCOPE, APPLICABILITY

No two airports are alike as they vary in terms of geography, capacity, and other attributes. Nevertheless, there is a need to provide a common approach to A-CDM implementation to ensure system interoperability.

This document contains the Minimum Technical Specifications for A-CDM systems. It specifies system characteristics that need to be used by designers, installers, manufacturers, service providers and users of systems intended for operational use at A-CDM airports. Adherence to these specifications is intended to enable the implementation of a system at an airport in accordance with the A-CDM operational requirements.

The intended audience includes developers of generic A-CDM systems (industry) and developers of specific implementations for A-CDM at airports: designers, installers, manufacturers, service providers, and users. This document assumes knowledge of A-CDM.

CHAPTER 1 presents this document, the terminology, terms, conventions, and references used.

CHAPTER 2 presents the A-CDM system, proposes a high level operational context, refers to the A-CDM system goals, the A-CDM functional elements, and presents the additional technical roles.

CHAPTER 3 presents the system technical requirements, introduces technical clusters of technical requirements like data management, account management, configuration

management, user interface, interoperability, system monitoring and control, system reliability, robustness and performance, recording and replay, and security.

APPENDIX A provides a summary of requirements and recommendations.

APPENDIX B provides a cross reference of ED-141 numbered requirements to the updated schema in ED-141A.

APPENDIX C provides a list of WG-111 members.

The requirements identified in this document are prefixed by the requirement ID (e.g. [REQ:ED-141-XY-001] refers to the requirement number 001 in Section XY in the ED-141 (Minimum Technical Specifications for Airport Collaborative Decision Making (Airport-CDM) Systems) document.

It is to be noted that only technical/non-functional requirements are addressed by this document.

1.4 TERMINOLOGY

When used in this document, the following words have the meaning specified hereunder:

Shall – Denotes a mandatory requirement that must be met in order to comply with this standard. Requirements are prefixed REQ:

Should – means that this constitutes good practice and is therefore recommended but is not necessary for compliance with this standard. Recommendations are prefixed REC:

NOTE: *Denotes explanatory text that supports the requirement or recommendation to which it belongs but is not part of the requirement or recommendation.*

1.5 GLOSSARY OF DEFINED TERMS

1.5.1 A-CDM Definitions

Refer to EUROCONTROL Specification for Airport Collaborative Decision Making definitions [1].

1.5.2 General Definitions

Refer to the EUROCONTROL Airport CDM Implementation Manual [2] and relevant ICAO documents.

1.5.3 A-CDM Abbreviations

For a complete listing of abbreviations used in A-CDM, refer to the EUROCONTROL Specification for Airport Collaborative Decision Making [1]. Abbreviations used in this document are described below.

A-CDM	Airport Collaborative Decision Making
ADEXP	ATS Data Exchange Presentation
AICH WG	Airport Integration Coordination and Harmonisation Working Group
ANSP	Air Navigation Service Provider
AODB	Airport Operational Data Base
API	Application Planning Interface
ATC	Air Traffic Control
ATS	Air Traffic Services
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management

CDM	Collaborative Decision Making
DPI	Departure Planning Information message
FUM	Flight Update Message
GDPR	General Data Protection Regulation
ICAO	International Civil Aviation Organisation
IP	Internet Protocol
IT	Information Technology
NM	Network Manager
SLA	Service Level Agreement
TOBT	Target Off Block Time
TSAT	Target Start Approval Time
UTC	Universal Coordinated Time
VPN	Virtual Private Network
VTT	Variable Taxi Time
2FA	Two Factor Authentication

1.6

REFERENCE DOCUMENTS

- [1] EUROCONTROL Specification for Airport Collaborative Decision Making (A-CDM) v1.0, EUROCONTROL-SPEC-198 (31 January 2025).
- [2] EUROCONTROL Airport CDM Implementation Manual, v5 (31 March 2017).
- [3] Regulation (EC) 552/2004 the Interoperability Regulation (10 March 2004), as repealed by Regulation (EU) 2018/1139 EASA Basic Regulation (4th July 2018).
- [4] Commission Implementing Regulation (EU) 2021/116 of 1 February 2021 on the establishment of the Common Project 1 (CP1) supporting the implementation of the European ATM Master Plan provided for in Regulation (EC) 550/2004 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) 409/2013 and repealing Commission Implementing Regulation (EU) 716/2014.
- [5] EUROCAE ED-145 Airport CDM Interface Specification, 2008.
- [6] EUROCAE ED-146A Guidelines for Test and Validation related to Airport CDM Interoperability, February 2025.
- [7] Network Manager Business to Business Services Manual v4 (30 May 2023).
- [8] EUROCONTROL Specification for SWIM Service Description: EUROCONTROL-SPEC-168, v2.0 (15 March 2022).

CHAPTER 2

SYSTEM DESCRIPTION

2.1 OPERATIONAL CONTEXT

The efficiency of the Air Traffic Management is highly dependent on traffic predictability and the ability to take tactical decisions based on a common understanding of partners' needs. There must be an effective flow of information between the different partners (airport operator, aircraft operators, ATC, ground handlers, de-icing companies and ATFM) if the delays and alterations occurring during one phase of flight are to be successfully managed during subsequent phases.

A-CDM ensures the sharing of consistent data and collaborative decisions among airport partners, greatly enhancing traffic predictability and overall efficiency.

Without A-CDM, the knock-on effect that deviations from the plan produce on Air Traffic Management are not anticipated downstream. This results in missed ATFM slots or non-compliance with the slot allocation requirements and inefficient use of the available en-route and airport network capacity.

2.1.1 A-CDM System Goals

The goals of the A-CDM system are to support A-CDM partners executing their tasks and supporting their decision making as defined in the EUROCONTROL Specification for Airport Collaborative Decision Making [1] to:

- Improve predictability, resilience, and efficiency.
- For the airport partners:
 - Predictability of operations due to common situational awareness and accurate and timely information sharing.
 - Resource allocation such as stand and gate management.
 - Savings in taxi-out time per departure.
 - Improved ATFM slot adherence despite increased traffic demand and ATFM regulation.
 - Ground handling resource utilisation.
 - Management of and recovery from periods of adverse conditions.
- For the network:
 - Improved take-off time predictability.
 - Improved accuracy for traffic predictability.
 - Reduced ATFM slot wastage.
 - Reduction in ATFM delay.

These improvements and optimisations should not be regarded as a “one-off” activity. Continuous process improvement is a very important goal, particularly in the light of continuing upgrades to airport infrastructure and operating practices.

2.1.2 A-CDM Elements, Roles, Responsibilities and Procedures

In order to build an A-CDM system, implementors should understand the content of the functional elements, the intended A-CDM procedures and the roles and responsibilities in these operational A-CDM procedures.

The description of the individual aspects of these functional and process elements is described in detail in the referenced EUROCONTROL documents ([1] and [2]) and therefore will not further be focused in this documentation.

2.2 THE A-CDM SYSTEM

The A-CDM system shall reflect the need of the airport and should not introduce complexity that hinders implementation, adoption, and development. In its basic form A-CDM system needs to enable the following six functional elements (see [1]):

- A-CDM Information Sharing.
- Turn round Process (Milestones Approach).
- Variable Taxi Times.
- Pre-Departure Sequencing.
- Adverse Conditions.
- Collaborative Management of Flight Updates.

The system can be enhanced through to the federation of advanced applications such as Arrival Manager (AMAN) or Advanced Surface Movement Guidance and Control System (A-SMGCS) etc. A-CDM could be seen as a federation of information and applications of varying sophistication. It is therefore, in essence, a network of systems tailored to meet the specific needs of an individual airport.

2.3 TECHNICAL ROLES

2.3.1 Operational Supervision

The goal of the Operational Supervision is to:

- Supervise and modify the A-CDM operational parameters such as:
 - Data source priorities.
 - Sequencing priorities.
 - Publishing time of Target Times.
 - Alert parameters, alert text phrases and attributes.
- Manually recover inconsistencies detected by the A-CDM system.
- Acknowledge decision support advice from the A-CDM system in the event that automatic conflict resolution is given.
- Analyse metrics including studying data recorded previously by the A-CDM system (e.g., to establish the precise reasons for not meeting the Milestone requirement or to quantify the benefits of A-CDM).
- Generate “probes” to evaluate the impact, in the A-CDM situation, of a possible modification.

General requirements relating to Operational Supervision can be found in [Section 3.3](#).

2.3.2 Technical Supervision

The goal of the Technical Supervision is to supervise and modify the A-CDM technical parameters, the management of log-in access and the management of connection with other systems and management of various controls associated with the system, such as sanity checks on data input.

General requirements relating to Technical Supervision can be found in [Sections 3.2](#), [3.3](#) and [3.6](#).

CHAPTER 3

SYSTEM TECHNICAL REQUIREMENTS

A-CDM non-functional requirements are defined by those activities necessary to manage, operate and monitor the system, the associated system performance attributes or limitations necessary to assess acceptable system performance. They also cover the ability to integrate, tailor, and expand each A-CDM system as needed by airport stakeholders.

Requirements for these non-functional aspects of an A-CDM system are articulated in this chapter.

3.1 DATA MANAGEMENT

The goal of data management is to ensure that the data collected, processed and communicated in an A-CDM system is done so in a secure, timely and robust manner. An A-CDM system includes checks on data at various points of the data's lifecycle to validate its correctness.

[REQ:ED-141-DM-01] The A-CDM System shall perform syntactic and semantic checks of incoming data where possible.

[REQ:ED-141-DM-02] Manual inputs in the A-CDM System shall be checked for plausibility where possible, e.g. TOBT input more than 12 hours from the current time should trigger a confirmation to the user. The list of manual inputs that shall be checked for plausibility are subject to local decision.

[REC:ED-141-DM-01] The A-CDM System should propose only preset values as expected by the system. These pre-set values should be configurable.

Having regard to the purpose of the A-CDM system processing timestamps it is important that all components in the A-CDM system are synchronized to a standard time reference in order to maintain the consistency of data in the system.

[REQ:ED-141-DM-03] The A-CDM System shall synchronize dates and times with a defined time source.

NOTE: *The choice of a defined time source is a local implementation decision and would typically be UTC or local time.*

[REQ:ED-141-DM-04] Each network connected or non-network connected element of an A-CDM system shall maintain a local time clock to within 1 second of the defined time source.

[REQ:ED-141-DM-05] The A-CDM System shall process and display alert information described in the EUROCONTROL Specification for Airport Collaborative Decision Making Document [1].

[REQ:ED-141-DM-06] The A-CDM System shall keep data consistent between any two displays and shall be updated in a timely manner. A typical value for that refresh rate is below 1 second. Greater rates of data refreshing are recommended, in order for the system to tend towards real-time information.

3.2 ACCOUNT MANAGEMENT

The character of A-CDM, being that of sharing information in a distributed environment, requires a secure connection and access management between all A-CDM stakeholders and system connections. It is important to control system access and limiting it to authorized persons, interfaces or connected partner systems.

System access and security is based on a tiered approach that authenticates a specific user/user role, a specific technical access point, and the specific data accessible by any particular user/user role.