



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

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

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FOREWORD

1. This document, prepared by EUROCAE Working Group 69, was accepted by the Council of EUROCAE on 6 October 2008.
2. EUROCAE is an international non-profit making organisation. Membership is open to European manufacturers of equipment for aeronautics, trade associations, national civil aviation administrations, users, and non-European organisations. Its work programme is principally directed to the preparation of performance specifications and guidance documents for civil aviation equipment, for adoption and use at European and worldwide levels.
3. The findings of EUROCAE are resolved after discussion among its members and in cooperation with RTCA Inc., Washington DC, USA and/or the Society of Automotive Engineers (SAE), Warrendale PA, USA through their appropriate committees.
4. During the preparation of this document, coordination took place with the EUROCONTROL Airport CDM Task Force. Further revision of the document may be appropriate when definitive documents or manuals on Airport CDM are published by EUROCONTROL.
5. EUROCAE performance specifications are recommendations only. EUROCAE is not an official body of the European Governments; its recommendations are valid as statements of official policy only when adopted by a particular government or conference of governments. The inclusion of references to standards published by other standardisation bodies, or extracts from those standards, does not imply any safety or regulatory liability.
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CHAPTER 1

GENERAL

1.1 INTRODUCTION

Airport Collaborative Decision Making (CDM) is an important enabler of Air Traffic Management (ATM) capacity and efficiency. The concept of Airport CDM does not imply any particular system or architecture. Rather, it is 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. Airport CDM also addresses the need for operational decisions to be made collaboratively thus providing a substantial contribution to maximising capacity and efficiency.

Although Airport CDM is applicable to all phases of flight, the Airport CDM concept has seen its first prototypes and trials at airports and this document is therefore dedicated to Airport CDM. An Airport CDM Task Force was created under the EATM Airport Throughput Business Division (APT) of EUROCONTROL, and documents created by this Task Force have contributed significantly to the development of this document.

Airport Collaborative Decision Making is about improving the way operational Partners at airports and the European ATM network work together at an operational level.

Airport CDM allows an Airport CDM Partner to make the right decisions in collaboration with other Airport CDM Partners, knowing their preferences and constraints and the actual and predicted situation. The decision making by the Airport CDM Partners is totally dependent upon the sharing of accurate and timely information and upon adapted Airport CDM procedures, mechanisms and tools.

While the implementation of the Airport CDM concept requires first and foremost a change in culture regarding the way that data is used and decisions are made, it nevertheless requires that the Airport CDM Partners¹ possess certain capabilities or systems that enable them to share data and make and implement decisions collaboratively.

The EUROCONTROL: Airport CDM Implementation Manual [doc ref. 3] 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 AIRPORT CDM DOCUMENTS

Much of the key development work in the Airport CDM field has been conducted by EUROCONTROL and in particular the EUROCONTROL Airport CDM Task Force. This document therefore builds upon the key outputs of the Task Force, namely the EUROCONTROL: Airport CDM Operational Concept Document [doc ref. 1], the EUROCONTROL: Airport CDM Functional Requirements Document [doc ref. 2] and the EUROCONTROL: Airport CDM Implementation Manual [doc ref. 3], to derive this set of EUROCAE standards (comprising this document, ED-145 and ED-146).

The principle input to this work is the EUROCONTROL: Airport CDM Functional Requirements Document [doc ref. 2], which has continued to develop in parallel with this document, the former identifying functionalities and the latter identifying technical means of achieving these functionalities.

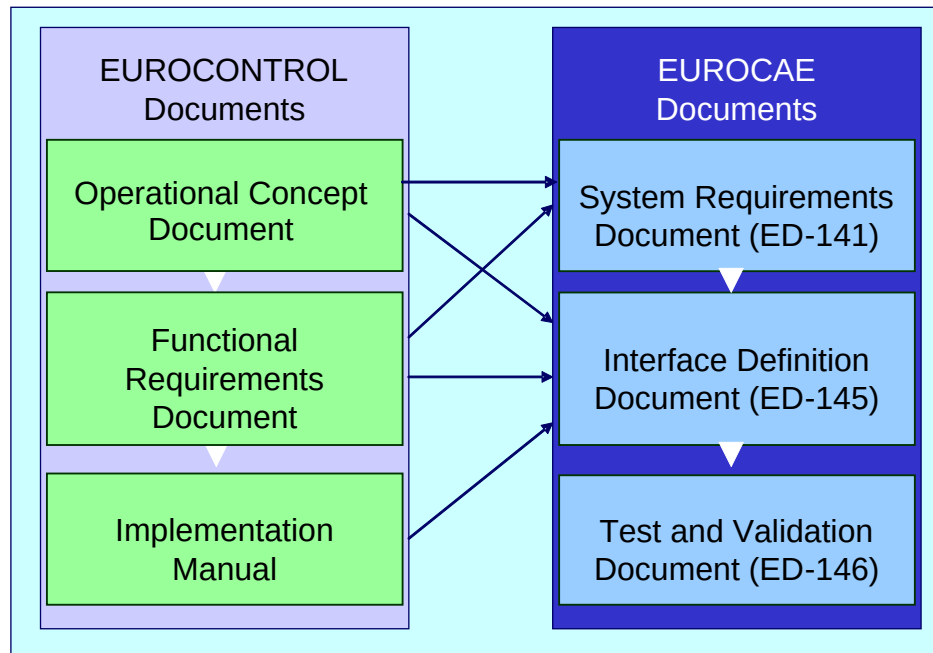
The first document of the EUROCAE Airport CDM set is the Minimum Specifications for Airport CDM systems (ED-141).

¹ For terms definition please refer to section 1.5 Glossary of Defined Terms. Airport CDM Partner is defined in Appendix A.

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

The final document of the EUROCAE Airport CDM set is the Test and Validation Document (ED-146) that provides a basis from which an Airport CDM implementer can develop testing specifications to ensure his/her installation is compliant with ED-141 and ED-145.

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



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 Airport CDM to ensure interoperability. The intention of this document is to provide such guidance for an Airport CDM system

This document contains the Minimum Technical Specifications for Airport 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 airports compliant with the Airport CDM concept.

These specifications were based on existing and proposed products, methods and requirements that support the Airport CDM concept, and builds upon the work carried out by the EUROCONTROL Airport CDM and OATA Projects. Adherence to these specifications is intended to enable the implementation of a system at an airport in accordance with the Airport CDM local operational requirements.

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

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

Chapter 2 presents the Airport CDM system, proposes a high level system description, introduces the logical view and the data flows and presents the functional elements.

Chapter 3 presents the system functional requirements.

Chapter 4 presents the system technical requirements.

Appendix A provides a list of Airport CDM definitions

Appendix B provides a list of acronyms

Appendix C provides a list of contributors

The requirements identified in this document are referenced by a number prefixed by the document ID (e.g. [ED141-0080] refer to the requirement number 80).

It is to be noted that only the mandatory requirements (i.e. containing a “**shall**”) are addressed by ED146 (Test and Validation 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.

Should – means that this requirement constitutes good practice and is therefore recommended but is not necessary for compliance with this standard.

Note – Denotes explanatory text that supports the requirement to which it belongs but is not part of the requirement.

Abbreviations – Abbreviations and acronyms used in this document have the meaning specified in the glossary of defined terms in section 1.5 Glossary of Defined Terms.

Annex – Annexes contain text supporting this document but are not considered to be part of the requirements necessary to claim compliance with it.

Figures and Diagrams – Figures and diagrams in this document are used to illustrate a concept and/or relationships and data flows. In NO case do they imply a particular architecture or implementation solution.

1.5 GLOSSARY OF DEFINED TERMS

1.5.1 Airport CDM Definitions

Please refer to EUROCONTROL: Airport CDM Functional Requirements Document definitions

[doc ref. 2]. See Appendix A.

1.5.2 General Definitions

For general definitions, please refer to the EATM glossary of terms [doc ref. 9]

1.6 ABBREVIATIONS

1.6.1 Airport CDM Abbreviations

Please refer to EUROCONTROL: Airport CDM Functional Requirements Document definitions

[doc ref. 2]. See Appendix B. List of acronyms

1.6.2 General Abbreviations

For general abbreviations, please refer to the EATM glossary of terms [doc ref. 9]

1.7 APPLICABLE DOCUMENTS

1. EUROCONTROL: Airport CDM Operational Concept Document, Final Edition, October 2005.
2. EUROCONTROL: Airport CDM Functional Requirements Document, Final Edition, October 2005 – *Note: A new version will be available by the time this document is released.*

1.8 REFERENCE DOCUMENTS

3. EUROCONTROL: Airport CDM Implementation Manual.— *Note: A new version will be available by the time this document is released.*
4. EUROCONTROL: CFMU Flight Progress Messages V1.5, 31 Jan 2008, Hans Koolen, Ref.: URB/USD/MSG_INTF.
5. DPI summary document, V1.1, CFMU, June 2006.
6. Safety Assessment of Airport Collaborative Decision Making (A-CDM), V1.2, December 2006.
7. Airport CDM Interface Specification document (EUROCAE ED-145).
8. EEC Note 03/06 "Airport CDM Munich".
9. EATM glossary of terms.

CHAPTER 2

SYSTEM DESCRIPTION

2.1 THE AIRPORT CDM SYSTEM

In its basic form Airport CDM can be enabled through simple technology such as a maintained spreadsheet commonly available to all Partners, through to the federation of advanced applications such as Arrival Manager (AMAN), Departure Manager (DMAN), Surface Manager (SMAN) etc. Airport 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 needs specific to an individual airport.

2.1.1 Operational Context

The Air Transport Network is the result of the combination of flight segments, where CFMU performs the flow and capacity management functions, ATC performs the tactical control functions while ground segments are managed by airport Partners.

The efficiency of the Air Transport System is highly dependent on traffic predictability and the ability to take tactical decisions based on a common understanding of Partner's needs. There must be an effective flow of information between the different Airport CDM Partners if the delays and alterations occurring during one phase of flight are to be successfully managed during subsequent phases. Today, the knock-on effect that deviations from the plan produce on the ATN (Air Transport Network) are not anticipated downstream. This results in missed ATFCM slots or non-compliance with the slot allocation requirements and as such in inefficient use of the available en route and airport network capacity.

Airport CDM ensures the sharing of consistent data and collaborative decisions among Airport CDM Partners (airport operator, aircraft operators, ATC, ground handlers, de-icing companies and CFMU), greatly enhancing traffic predictability and overall efficiency.

2.1.2 Airport CDM System Goals

The goals of the Airport CDM system are to support Airport CDM Partners executing their tasks and supporting their decision making as defined in the EUROCONTROL: Airport CDM Operational Concept Document [doc ref.1] to:

- Improve predictability,
- Improve performance,
- Reduce costs,
- Optimise/enhance use of airport resources,
- Reduce wastage of ATFCM slots,
- Reduce airport congestion.
- Reduce pollution

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.

2.1.3 Airport CDM Data Base

The Airport CDM system links users together via some form of shared database. It can be implemented as either a centralized or distributed capability dependent upon the needs of Airport CDM users and the pre-existing information systems found at any particular airport.

Information sharing is the prime focus of Airport CDM. The aim is to deliver information to the Airport CDM system for each phase of aircraft operation such that other users can access the shared information and plan appropriately. Delivering information to the Airport CDM system on each inbound and outbound flight is an ongoing process throughout the day.

2.2 AIRPORT CDM: THE LOGICAL VIEW

In order to provide an overview of the Airport CDM context, the notion of Logical Elements has been created.

The “External” Logical Elements depict a possible distribution of responsibilities amongst Airport CDM Partners.

The “Internal” Logical Elements depict a possible division of Airport CDM System core capabilities.

2.2.1 External Logical Elements

As shown in figure 1 below, the following External Elements are defined according to the responsibilities of each Airport CDM Partner:

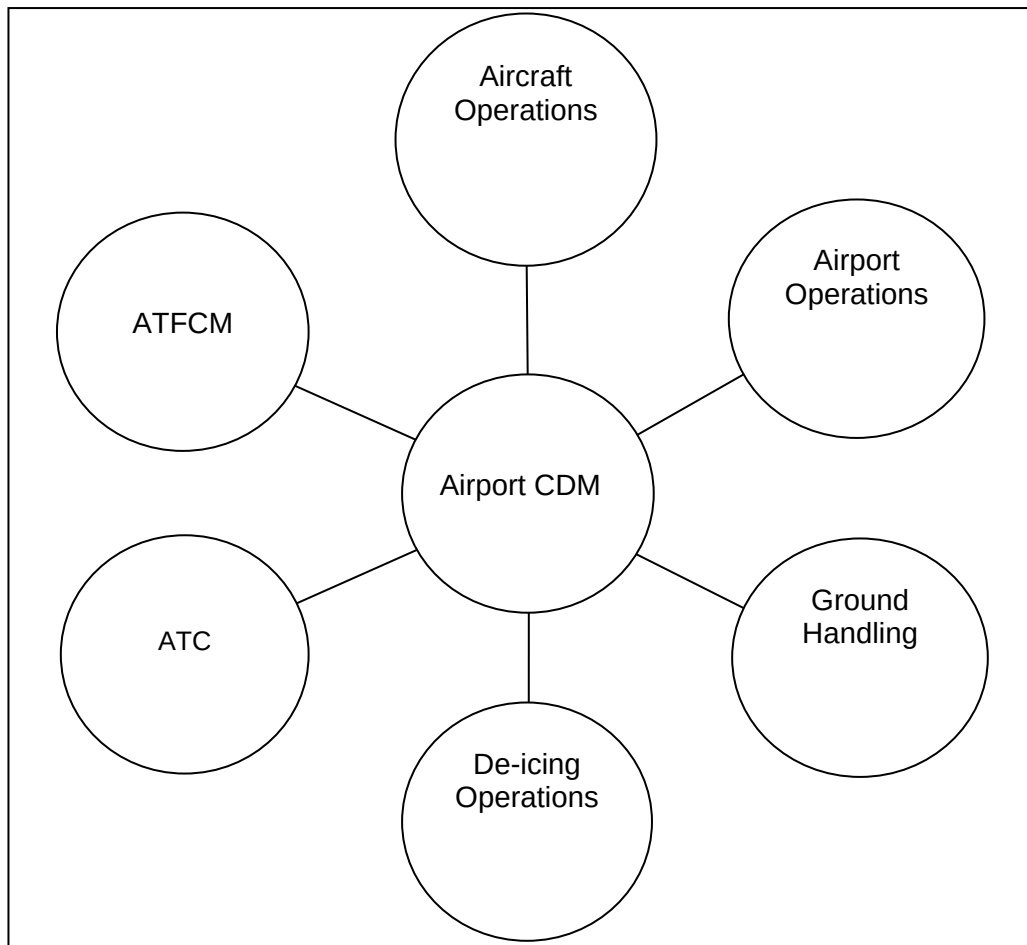
- Aircraft Operations (responsibility of Aircraft Operators)
- Airport Operations (responsibility of Airport Operator)
- Ground Handling (responsibility of Ground Handlers)
- De-icing Operations (responsibility of De-icing Companies)
- Air Traffic control -ATC-, (responsibility of ATC)
- Air Traffic Flow and Capacity Management -ATFCM- (responsibility of CFMU)

The Airport CDM system generates a coherent situational picture, plans through e.g. Milestones², monitors the Milestones, and generates alerts. It for example provides taxi-times and departure planning information and triggers the distribution of this information.

The exact aim of these External Logical Elements is dependent on local issues; a particular process may not be managed by the same External Logical Element in all airports, or may be shared between more than one External Logical Element. The description below is a generic example.

Local implementation must take the local sharing of responsibilities into consideration.

² For the definition of Milestones, please refer to section 3.2.2.2.



2.2.2

Logical Data Flows

In order to understand the requirements of an Airport CDM system and provide a modular concept, it is necessary to consider the data flows exchanged with each External Logical Element.

For a description of information exchange, see Airport CDM Interface Specification document (EUROCAE ED-145). [doc ref. 7].

The sub-sections below present the main data flows exchanged by each external logical element. Some data can be provided by more than one logical element, but for simplicity only one has been retained in this description. The priority over the most reliable data source (depending on the type of flight and status of flight) will be decided locally at an airport when implementing Airport CDM.

The information to and from external logical elements depends on the local distribution of responsibilities.

2.2.2.1

Aircraft Operations

Aircraft Operations need:

- Updated Airport CDM situational information such as planned, estimated and actual landing, in-blocks, TSAT and take-off times

Aircraft Operations provide:

- Flight Plan and other data related to the flight, planned, estimated and actual times related to progress of turn-around such as TOBT