



Europe A-CDM FIXM Extension v1.0

Logical Model - Reference Material

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2014

Version: 1.0

The Flight Information Exchange Model (FIXM) is an exchange model capturing Flight and Flow information that is globally standardised. It supports, like AIXM and WXXM, a “core + extension” mechanism: the core part contains the pieces of flight information that are globally recognised and which are endorsed by the FIXM CCB, while extensions supplement the core FIXM model in order to support additional requirements from particular communities of interest. *[adapted from the [FIXM Strategy v1.0](#)]*

This document describes the Logical Model of the **Europe A-CDM Extension v1.0**. It provides guidance material of the extension classes and properties. It also provides information related to the derivation classes from the FIXM core and other relationships between entities.

The **Europe A-CDM FIXM Extension v1.0** is still a **research extension** which **shall not be used for any operational purposes**. It is delivered officially to the FIXM CCB and made publicly available on www.FIXM.aero, so that its content can be considered for inclusion in future core FIXM versions, in accordance with the rules for governing the FIXM content described in the FIXM CCB Charter v1.0.

Please, remember this extension has been developed in research context and therefore is not meant to be used for operational purposes.

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Table of Contents

1	Acronyms and Terminology.....	7
1.1	Terminology.....	7
1.2	Acronyms.....	8
2	Overview.....	9
3	AcdmAerodrome package.....	11
3.1	AcdmAerodromeReference.....	12
4	AcdmAircraftDescription package.....	13
4.1	AcdmAircraftType.....	14
5	AcdmAlerts package.....	15
5.1	AcdmAlert.....	16
5.2	AcdmAlertCode package.....	17
5.3	AcdmAlertLevel package.....	17
5.4	AcdmAlertStatus package.....	18
6	AcdmATV package.....	19
6.1	AcdmAirportTransitView.....	20
6.2	AcdmAircraftFlightStatus.....	22
7	AcdmDeparture package.....	23
7.1	AcdmFlightDeparture.....	24
7.2	AcdmGate.....	26
7.3	AcdmRemoteDeicing.....	26
8	AcdmExtension package.....	27
8.1	AcdmExtension.....	28
9	AcdmFlight package.....	29
9.1	AcdmFlight.....	29
9.2	AcdmFlightID.....	31
9.3	AcdmGufi.....	32
9.4	AcdmlataFlightID.....	33
9.5	AcdmlcaoFlightID.....	34
9.6	AcdmlfplID.....	35
10	AcdmTypes package.....	36
10.1	AcdmAerodromelataCode.....	36
10.2	AcdmCarrierIdentifier.....	36
10.3	AcdmDate.....	37
10.4	AcdmGateName.....	37
10.5	AcdmlataAircraftIdentifier.....	37

10.6	AcdmIataCarrierIdentifier	38
10.7	AcdmIataFlightNumber	38
10.8	AcdmIataSuffix.....	38
10.9	AcdmIfplIdentifier.....	39
11	References.....	40

List of tables

Table 1	AcdmAerodromeReference Attributes.....	12
Table 3	AcdmAircraftType Attributes.....	14
Table 4	AcdmAircraftType Relationships	14
Table 3	AcdmAlert Attributes.....	16
Table 4	AcdmAlert Relationships.....	16
Table 5	AcdmAlertLevel Attributes	17
Table 6	AcdmAlertStatus Attributes.....	18
Table 7	AcdmAirportTransitView Attributes	20
Table 8	AcdmAirportTransitView Relationships.....	21
Table 9	AcdmAircraftFlightStatus Attributes.....	22
Table 10	AcdmFlightDeparture Attributes	25
Table 11	AcdmFlightDeparture Relationships.....	25
Table 12	AcdmGate Attributes	26
Table 13	AcdmRemoteDeicing Attributes	26
Table 14	AcdmExtension Relationships.....	28
Table 15	AcdmFlight Relationships	30
Table 16	AcdmFlightID Attributes	31
Table 17	AcdmFlightID Relationships	31
Table 18	AcdmGufi Attributes	32
Table 19	AcdmIataFlightID Attributes	33
Table 20	AcdmIcaoFlightID Attributes.....	34
Table 21	AcdmIfpliID Attributes	35

List of figures

Figure 1 Terminology.....	7
Figure 2 Acronyms.....	8
Figure 3 AcdmOverview UML view	9
Figure 4 AcdmAerodrome package UML view	11
Figure 5 AcdmAerodromeReference UML view.....	12
Figure 6 AcdmAerodromeReference Relationships	12
Figure 7 AcdmAircraftDescription package UML view	13
Figure 8 AcdmAircraftType UML view.....	14
Figure 9 AcdmAlert package UML view.....	15
Figure 10 AcdmAlert UML view.....	16
Figure 11 AcdmAlertCode UML view	17
Figure 12 AcdmAlertLevel UML view	17
Figure 13 AcdmAlertStatus UML view.....	18
Figure 14 AcdmATV package UML view	19
Figure 15 AcdmAirportTransitView UML view	20
Figure 16 AcdmAircraftFlightStatus UML view.....	22
Figure 17 AcdmDeparture package UML view	23
Figure 18 AcdmFlightDeparture UML view	24
Figure 19 AcdmGate UML view	26
Figure 20 AcdmRemoteDeicing UMLview	26
Figure 21 AcdmExtension package UML view.....	27
Figure 22 AcdmExtension UML view	28
Figure 23 AcdmFlight package UML view.....	29
Figure 24 AcdmFlight UML view.....	29
Figure 25 AcdmFlightID UML view	31
Figure 26 AcdmGufi UML view	32
Figure 27 AcdmIataFlightID UML view	33
Figure 28 AcdmIcaoFlightID.....	34
Figure 29 AcdmIplID UML view	35
Figure 30 AcdmIataCarrierIdentifier UML view.....	36
Figure 31 AcdmCarrierIdentifier UML view.....	36

Figure 32 AcdmDate UML view	37
Figure 33 AcdmGateName UML view	37
Figure 34 AcdmIataAircraftIdentifier	37
Figure 35 AcdmIataCarrierIdentifier UML view.....	38
Figure 36 AcdmIataAircraftIdentifier UML view	38
Figure 37 AcdmIataSuffix UML view.....	38
Figure 38 AcdmIplIdentifier UML view.....	39

Document History

Version	Version Type	Author	Description of Changes
1.0	Final	Carlos Fornas, EUROCONTROL	First version of the document

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1 Acronyms and Terminology

1.1 Terminology

Term	Definition
Airport Collaborative Decision Making (A-CDM)	<p>Airport Collaborative Decision Making is the concept which aims at improving Air Traffic Flow and Capacity Management (ATFCM) at airport by reducing delays, improving predictability of events and optimising the utilisation of resources.</p> <p>Implementation of Airport CDM allows each Airport CDM Partner to optimise their decisions in collaboration with other Airport CDM Partners, knowing their preferences and constraints and the actual and predicted situation.</p> <p>The decision making by the Airport CDM Partners is facilitated by the sharing of accurate and timely information and by adapted procedures, mechanisms and tools [1].</p>
Flight Information Exchange Model (FIXM)	<p>The Flight Information Exchange Model (FIXM) is a data interchange format for sharing information about flights throughout their lifecycle. FIXM increases interoperability among all air traffic stakeholders by mediating interactions between Air Traffic Management systems, airspace users, transportation authorities, security and defence authorities, logistics and transportation providers, and many more.</p> <p>FIXM provides common situational awareness, facilitates incident management, and enables the use of transportation and security data in new ways previously unavailable. FIXM simplifies the global exchange of data by providing a framework developed on international standards.</p> <p>FIXM has a strong harmonization role. It provides a standardized way of communicating transportation and security data. It incorporates semantic context for the flight data it expresses, which makes it flexible: new data elements can be added to FIXM, and existing data elements can be discovered. FIXM is also modular, allowing a wide variety of system interactions while maintaining efficiency [3].</p>

Figure 1 Terminology

1.2 Acronyms

Term	Definition
A-CDM	Airport Collaborative Decision Making
ATV	Airport Transit View
FIXM	Flight Information Exchange Model
GUFID	Globally Unique Flight Identifier
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IFPLID	IFPS Identifier
IFPS	Integrated Initial Flight Planning System
TOBT	Target Off-Block Time
UFI	Unique Flight Identifier (IATA)
UML	Unified Modelling Language

Figure 2 Acronyms

2 Overview

This document describes the Logical Model of the A-CDM FIXM v2.0 Extension. Its purpose is to provide guidance material of the extension classes and properties, eg. definitions. It also provides information related to the derived classes from the FIXM core and other relationships between entities.

This model was developed according to the “FIXM Modelling Best Practices” [2] with special focus on extension development section.

The document is organised in sections covering the packages of the logical model in UML also provided in www.fixm.aero [3]. The package description sections are alphabetically ordered. With the exception of the “AcdmAlerts” and “AcdmATV” packages, the extension packages are named according to the FIXM Core Logical Model packages. Each of those packages contains specialised classes that add new properties in order to cover A-CDM. These packages can also contain codelists (enumerations in the XSDs).

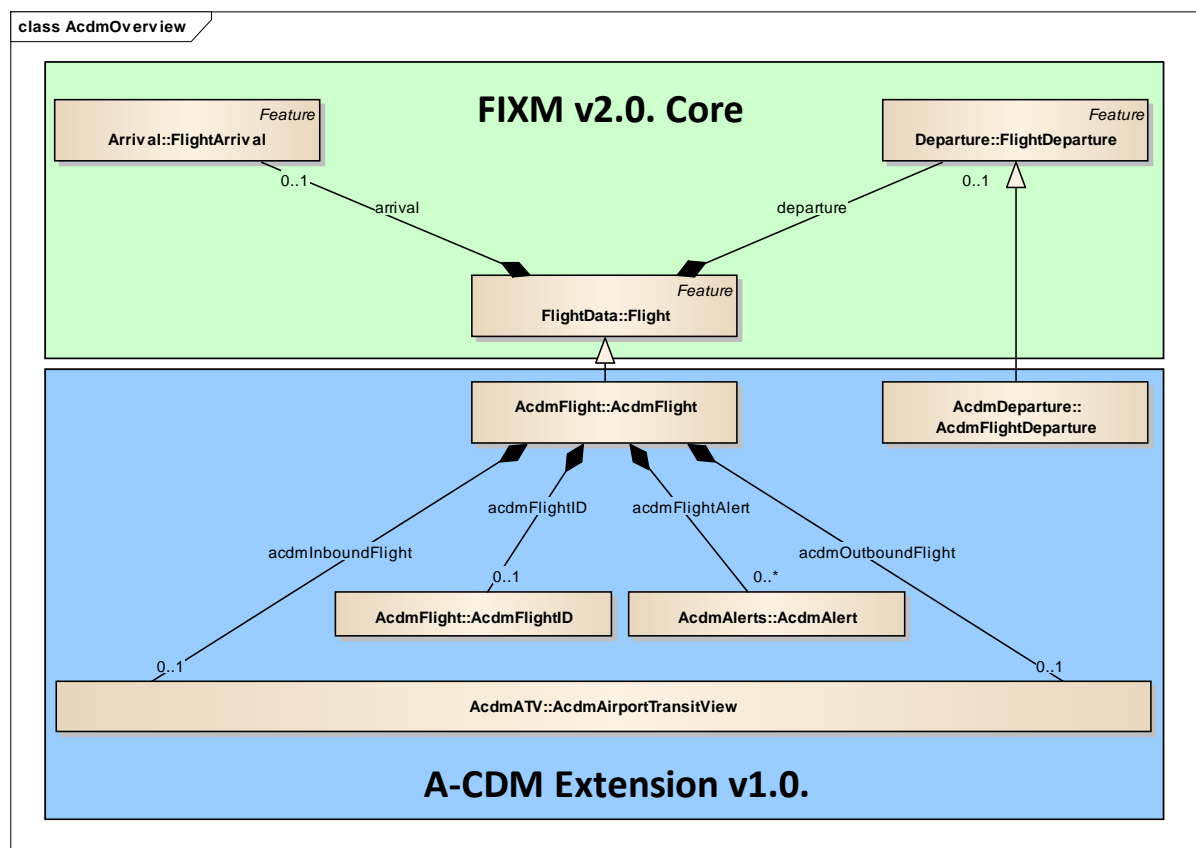


Figure 3 AcdmOverview UML view

This figure shows a summary of the content this extension in relation to the content of the FIXM Core v2.0. The main properties added in this extension are:

- Additional data elements for Flight Departure.
- A-CDM Alerts, as defined in the A-CDM Implementation Manual [1].
- A dedicated container for specifying the Flight Identifier. This is required as the GUF is not available in Europe yet.

The Airport Transit View (ATV) concept which provides structure to link consecutive flight legs operated by an aircraft from the perspective of an airport. Linking together the inbound flight arriving at the airport, the turnaround at the airport, and the outbound flight departing from the airport.

3 AcdmAerodrome package

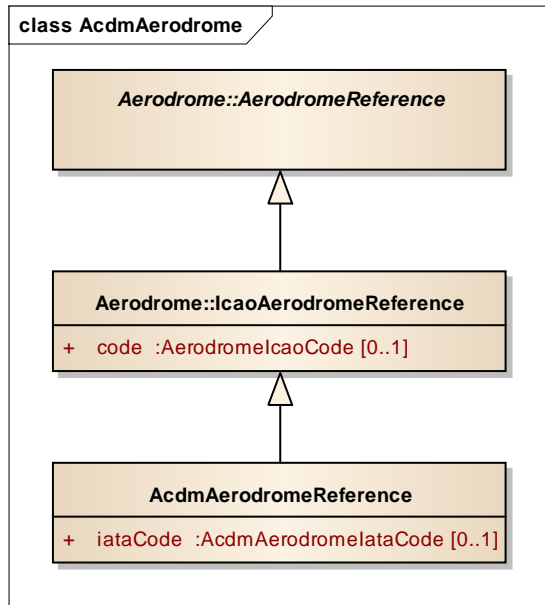


Figure 4 AcdmAerodrome package UML view

This package is an extension of the "Aerodrome" package of the FIXM core, enriching it with more properties to cover the extension scope.

3.1 AcdmAerodromeReference

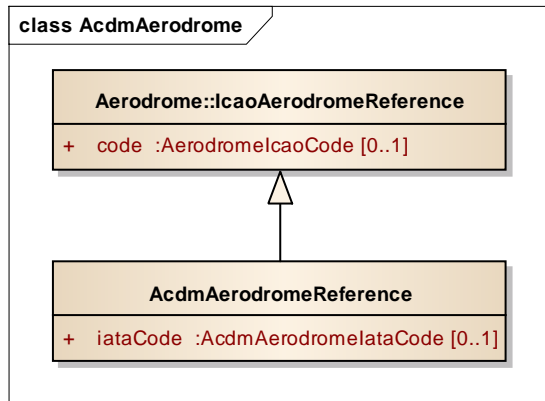


Figure 5 AcdmAerodromeReference UML view

Definition: Aerodrome reference extension which allows identifying an aerodrome by the standard IATA airport code and the standard ICAO aerodrome code.

Attributes

Name	Type	Multiplicity	Definition
iataCode	AcdmAerodromeIataCode	[0..1]	Aerodrome's IATA code, e.g. "BCN".

Table 1 AcdmAerodromeReference Attributes

Relationships

Relationship type	Connectors
Generalization	From AcdmAerodromeReference To IcaoAerodromeReference

Figure 6 AcdmAerodromeReference Relationships

4 AcdmAircraftDescription package

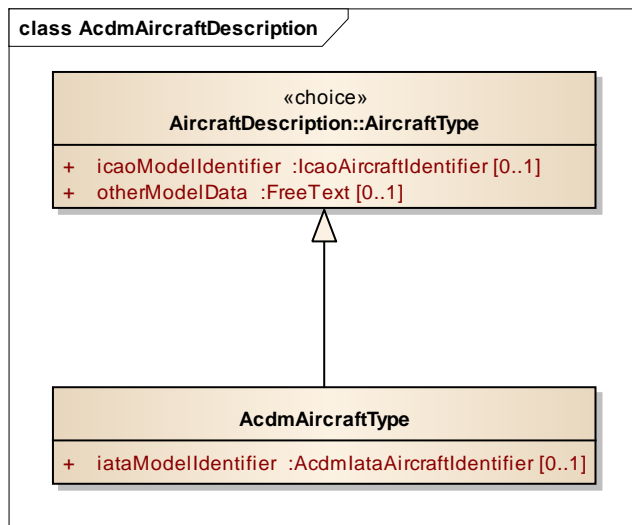


Figure 7 AcdmAircraftDescription package UML view

This package is an extension of the "AircraftDescription" package of the FIXM core, enriching it with more properties to cover the extension scope.

4.1 AcdmAircraftType

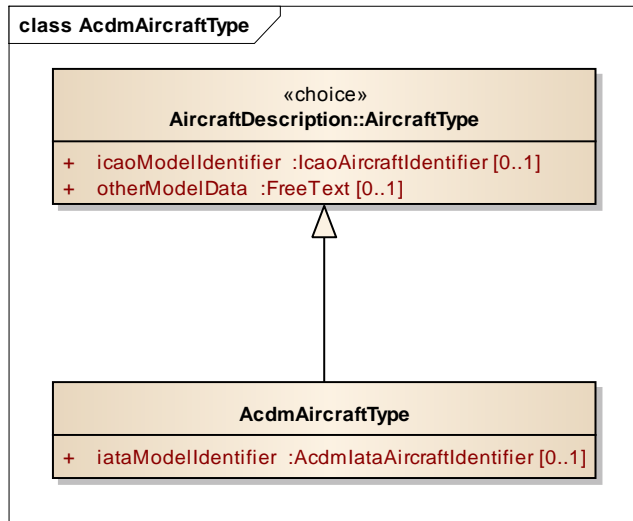


Figure 8 AcdmAircraftType UML view

Definition: Aircraft Type extension which allows using the manufacturer and model of the airframe expressed either as an ICAO-approved designator, a text descriptor, or IATA-approved designator.

Attributes

Name	Type	Multiplicity	Definition
iataModelIdentifier	AcdmIataAircraftIdentifier	[0..1]	The IATA code of the aircraft type.

Table 2 AcdmAircraftType Attributes

Relationships

Relationship type	Connectors
Generalization	From AcdmAircraftType To AircraftType

Table 3 AcdmAircraftType Relationships

5 AcdmAlerts package

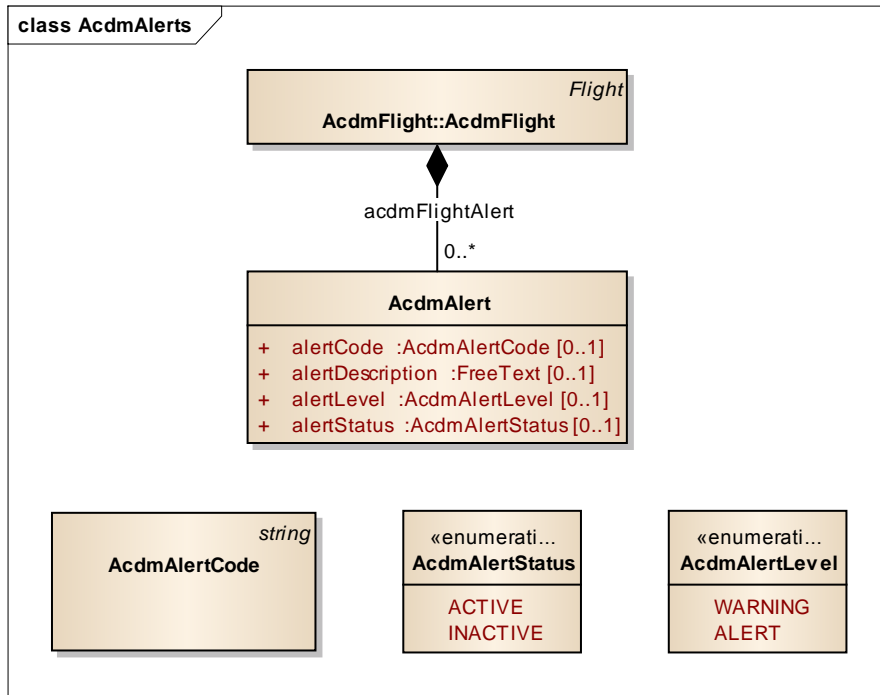


Figure 9 AcdmAlert package UML view

This package contains stand-alone extension classes that provide structure for the "A-CDM Alert" concept in FIXM.

5.1 AcdmAlert

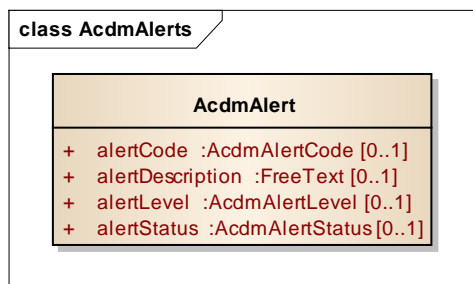


Figure 10 AcdmAlert UML view

Definition: A system generated message which alerts the Airport CDM Partners of an irregularity and which normally requires one or more partners to make a manual intervention to resolve the irregularity [A-CDM Implementation Manual].

Attributes

Name	Type	Multiplicity	Definition
alertCode	AcdmAlertCode	[0..1]	Code of the A-CDM alert as defined in the A-CDM Implementation Manual.
alertDescription	FreeText	[0..1]	Short textual description of the A-CDM alert as defined in the A-CDM Implementation Manual.
alertLevel	AcdmAlertLevel	[0..1]	Describes the kind of the A-CDM alert, such as WARNING or ALERT.
alertStatus	AcdmAlertStatus	[0..1]	Specifies whether the alert stills applicable or not.

Table 4 AcdmAlert Attributes

Relationships

Relationship type	Connectors	Definition
Aggregation	acdmFlightAlert From AcdmAlert [0..*] To AcdmFlight	A-CDM Alert concerning to the flight, as defined in A-CDM Implementation Manual.

Table 5 AcdmAlert Relationships

5.2 AcdmAlertCode package

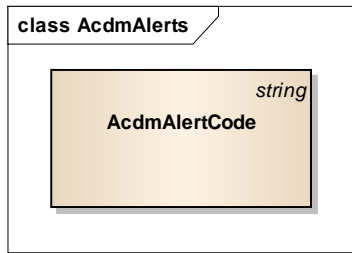


Figure 11 AcdmAlertCode UML view

Definition: String that indicates the A-CDM Alert designator, e.g. "CDM12".

5.3 AcdmAlertLevel package

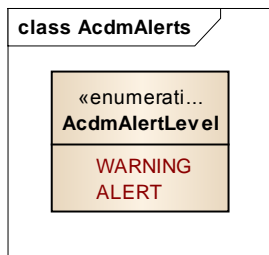


Figure 12 AcdmAlertLevel UML view

Definition: Enumeration which indicates the A-CDM alert category kind.

Attributes

Name
WARNING
ALERT

Table 6 AcdmAlertLevel Attributes

5.4 AcdmAlertStatus package

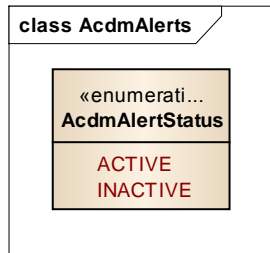


Figure 13 AcdmAlertStatus UML view

Definition: Enumeration which indicates if an A-CDM alert stills applicable.

Attributes

Name
ACTIVE
INACTIVE

Table 7 AcdmAlertStatus Attributes

6 AcdmATV package

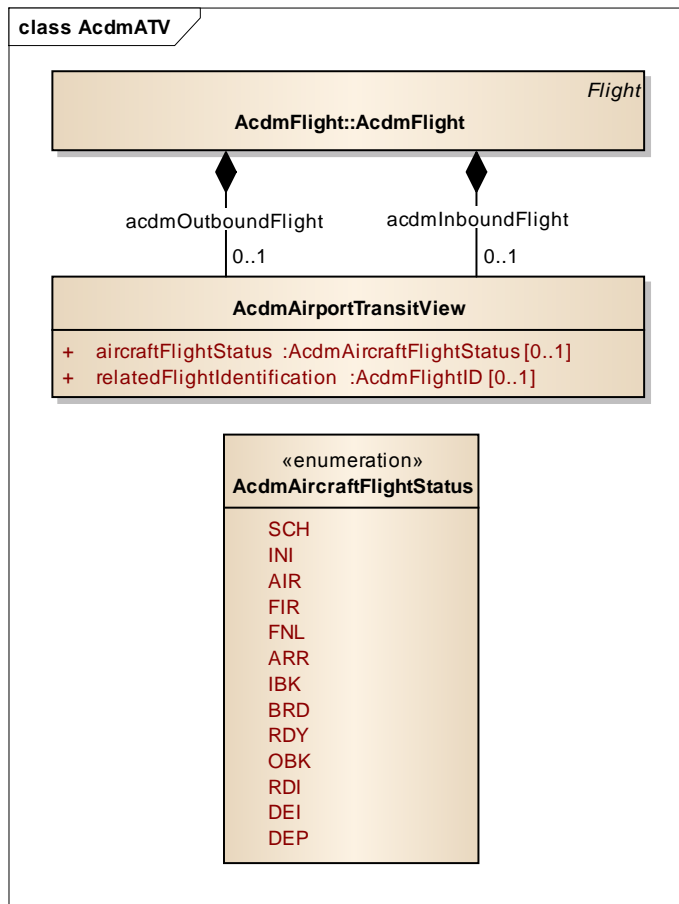


Figure 14 AcdmATV package UML view

This package contains stand-alone extension classes that provide structure for the "Airport Transit View" concept in FIXM.

6.1 AcdmAirportTransitView

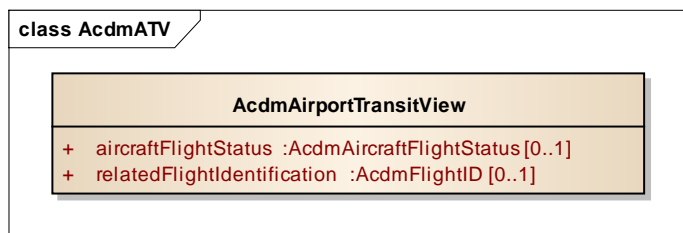


Figure 15 AcdmAirportTransitView UML view

Definition: The path and operations linked to an aircraft during its "visit" to the airport. It starts at the Initial approach fix (STAR) and includes the taxi-in segment, the turn round processes from the airspace user, the taxi-out segment and ends with the handover to the TMA departure controller at the SID [SESAR OFA 05.01.01].

Attributes

Name	Type	Multiplicity	Definition
aircraftFlightStatus	AcdmAircraftFlightStatus	[0..1]	Status of an aircraft at an aerodrome combining information about the outbound flight, the inbound flight and the turnaround process, as defined in the A-CDM Implementation Manual.
relatedFlightIdentification	AcdmFlightID	[0..1]	<p>Flight Identification of the preceding/following flight leg that is operated by the aircraft during the "visit" to the airport.</p> <p>For inbound flights, this corresponds to the identification of the following flight leg, , i.e. the identification of the acdmOutboundFlight</p> <ul style="list-style-type: none"> For outbound flights, this corresponds to the identification of the preceding flight leg, i.e. the identification of the acdmInboundFlight.

Table 8 AcdmAirportTransitView Attributes

Relationships

Relationship type	Connectors	Definition
Aggregation	acdmInboundFlight From AcdmAirportTransitView [0..1] To AcdmFlight	Airport Transit View of the preceding operations linked to the aircraft in the scope of the previous flight leg which the aircraft has operated.
Aggregation	acdmOutboundFlight From AcdmAirportTransitView [0..1] To AcdmFlight	Airport Transit View of the following operations linked to the aircraft in the scope of the next flight leg which the aircraft will operate.

Table 9 AcdmAirportTransitView Relationships

6.2 AcdmAircraftFlightStatus

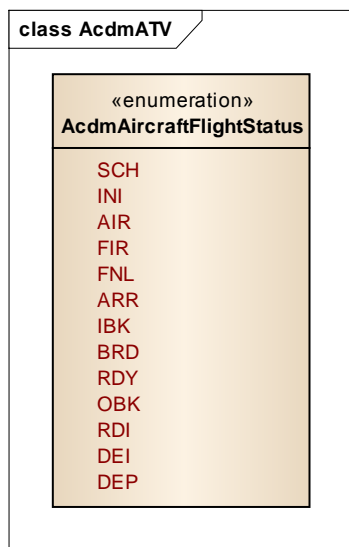


Figure 16 AcdmAircraftFlightStatus UML view

Definition: Indicates the Aircraft Flight Status of the aircraft according to A-CDM Implementation Manual.

Attributes

Name	Definition
SCH	Scheduled
INI	Initiated
AIR	Airborne
FIR	Flight entered local FIR (Flight Information Region)
FNL	Final
ARR	Landed
IBK	In-Block
BRD	Boarding
RDY	Ready
OBK	Off-Block
RDI	Ready for de-icing
DEI	De-icing in progress
DEP	Departed

Table 10 AcdmAircraftFlightStatus Attributes

7 AcdmDeparture package

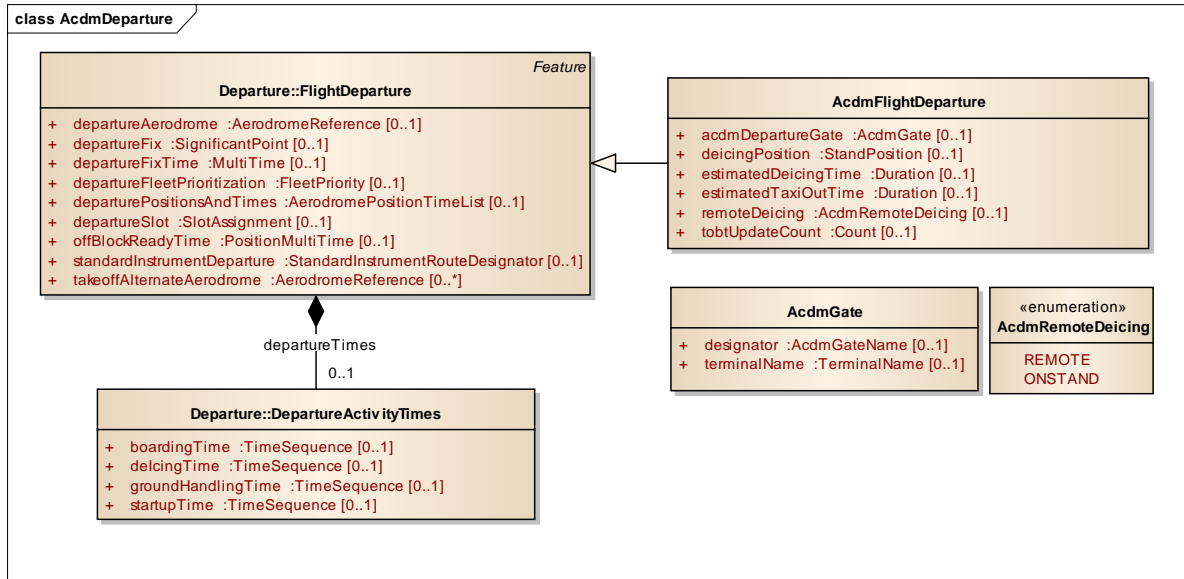


Figure 17 AcdmDeparture package UML view

This package is an extension of the "Departure" package of the FIXM core, enriching it with more properties to cover the extension scope.

7.1 AcdmFlightDeparture

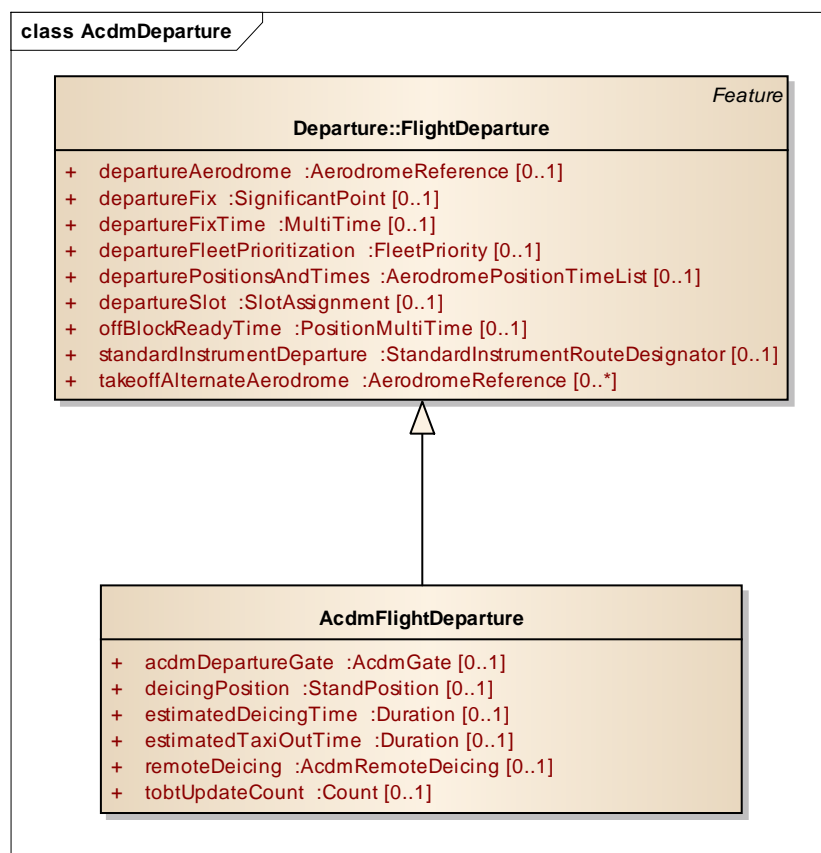


Figure 18 AcdmFlightDeparture UML view

Definition: FlightDeparture extension which allows to use dedicated properties in the scope of Airport CDM.

Attributes

Name	Type	Multiplicity	Definition
acdmDepartureGate	AcdmGate	[0..1]	Gate at which the passengers access for boarding.
deicingPosition	StandPosition	[0..1]	Aircraft stand position at which the de-icing procedure takes place.
estimatedDeicingTime	Duration	[0..1]	Forecast duration of the de-icing procedure.
estimatedTaxiOutTime	Duration	[0..1]	The estimated taxi time between off-block and take off. This estimate includes any delay buffer time at the holding point or

			remote deicing prior to take off. [A-CDM Implementation Manual].
remoteDeicing	RemoteDeicing	[0..1]	Indicates whether the deicing procedure is executed in remote position or on departure stand.
tobtUpdateCount	Count	[0..1]	The number of updates to Target Off Block Time after Target Start Up Approval Time has been issued. (e.g. max 3 updates after Target Start Up Approval Time issue).

Table 11 AcdmFlightDeparture Attributes

Relationships

Relationship type	Connectors
Generalization	From AcdmFlightDeparture To FlightDeparture

Table 12 AcdmFlightDeparture Relationships

7.2 AcdmGate

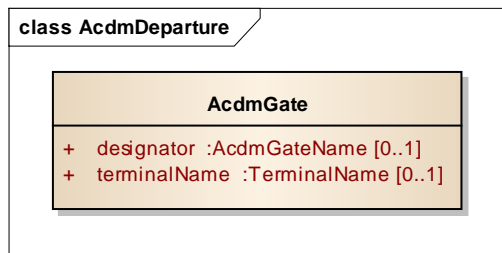


Figure 19 AcdmGate UML view

Definition: A specified location for boarding and leaving an aircraft in an airport.

Attributes

Name	Type	Multiplicity	Definition
designator	AcdmGateName	[0..1]	Common gate name.
terminalName	TerminalName	[0..1]	Terminal name where the gate is located.

Table 13 AcdmGate Attributes

7.3 AcdmRemoteDeicing

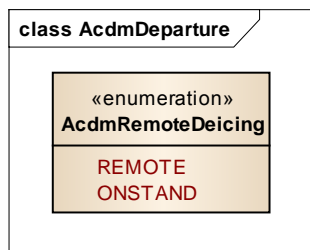


Figure 20 AcdmRemoteDeicing UMLview

Definition: Indicates whether the de-icing procedure is executed in remote position or on departure stand.

Attributes

Name
REMOTE
ONSTAND

Table 14 AcdmRemoteDeicing Attributes

8 AcdmExtension package

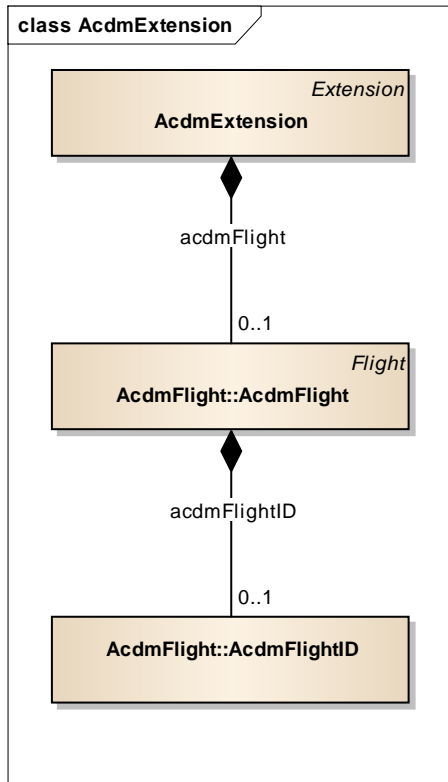


Figure 21 AcdmExtension package UML view

This package is an extension of the "Extension" package of the FIXM core, enriching it with more properties to cover the extension scope.

8.1 AcdmExtension

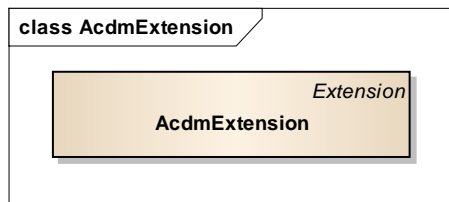


Figure 22 AcdmExtension UML view

Definition: Extension specific to Airport Collaborative Decision Making. It contains all the A-CDM specific elements, to segregate them from the core elements and from other extensions.

Relationships

Relationship type	Connectors
Generalization	From AcdmExtension To Extension
Aggregation	From AcdmFlight To AcdmExtension

Table 15 AcdmExtension Relationships

9 AcdmFlight package

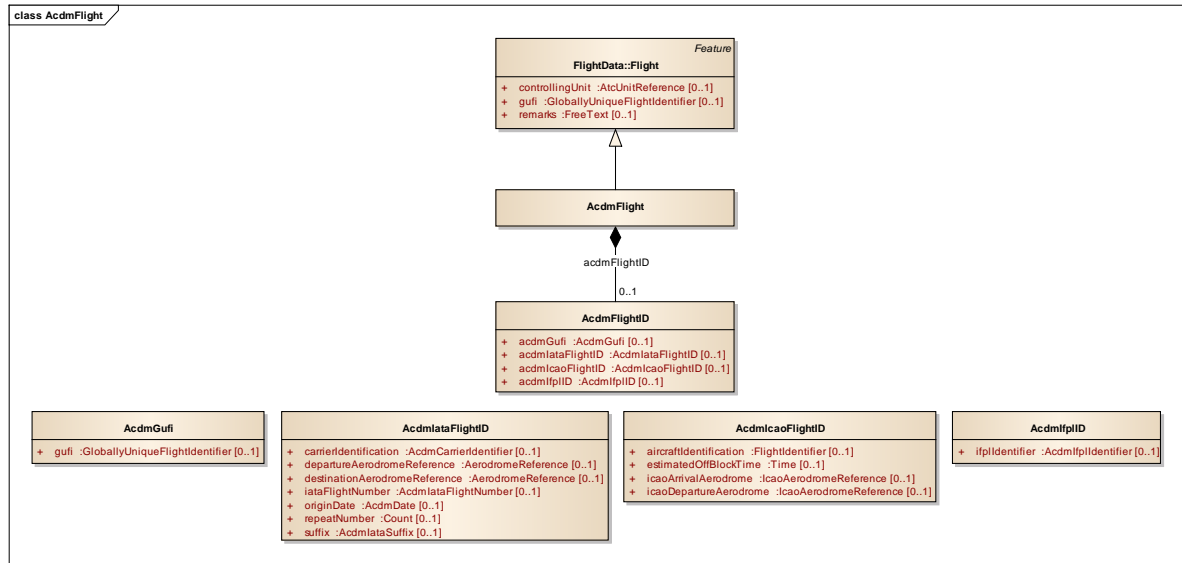


Figure 23 AcdmFlight package UML view

This package is an extension of the "FlightData" package of the FIXM core, enriching it with more properties to cover the extension scope.

9.1 AcdmFlight

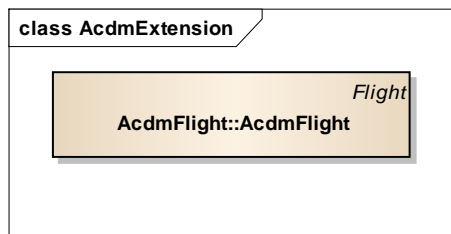


Figure 24 AcdmFlight UML view

Definition: Flight extension which allows to use dedicated properties in the scope of Airport Collaborative Decision Making.

Relationships

Relationship type	Connectors	Definition
Generalization	From AcdmFlight To	

Relationship type	Connectors	Definition
	Flight	
Aggregation	acdmFlight From AcdmFlight [0..1] To AcdmExtension	
Aggregation	acdmFlightAlert From AcdmAlert [0..*] To AcdmFlight	A-CDM Alert concerning to the flight, as defined in A-CDM Implementation Manual.
Aggregation	acdmFlightID From AcdmFlightID [0..1] To AcdmFlight	
Aggregation	acdmInboundFlight From AcdmAirportTransitView [0..1] To AcdmFlight	Airport Transit View of the preceding operations linked to the aircraft in the scope of the previous flight leg which the aircraft has operated.
Aggregation	acdmOutboundFlight From AcdmAirportTransitView [0..1] To AcdmFlight	Airport Transit View of the following operations linked to the aircraft in the scope of the next flight leg which the aircraft will operate.

Table 16 AcdmFlight Relationships

9.2 AcdmFlightID

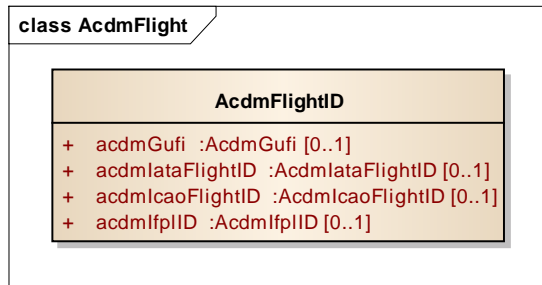


Figure 25 AcdmFlightID UML view

Definition: General structure to allow different flight identifiers for systems not supporting GUF. Many identifiers can coexist.

Attributes

Name	Type	Multiplicity	Definition
acdmGufi	AcdmGufi	[0..1]	Globally Unique Flight Identifier.
acdmIataFlightID	AcdmIataFlightID	[0..1]	IATA Unique Flight Leg Identifier as defined in the Schedule [AIDX, UFI].
acdmIcaoFlightID	AcdmIcaoFlightID	[0..1]	Flight identification based on ICAO fields present in the Flight Plan.
acdmIfplID	AcdmIfplID	[0..1]	Unique identifier assigned to a Flight by IFPS (Integrated Initial Flight Plan Processing System) [EUROCONTROL].

Table 17 AcdmFlightID Attributes

Relationships

Relationship type	Connectors
Aggregation	acdmFlightID From AcdmFlightID [0..1] To AcdmFlight

Table 18 AcdmFlightID Relationships

9.3 AcdmGufi

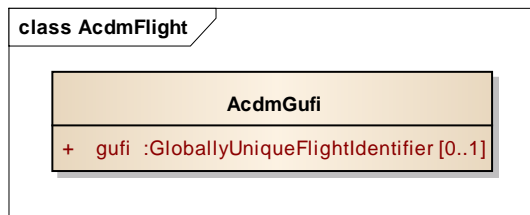


Figure 26 AcdmGufi UML view

Definition: Globally Unique Flight Identifier.

Attributes

Name	Type	Multiplicity	Definition
gufi	GloballyUniqueFlightIdentifier	[0..1]	A reference that uniquely identifies a specific flight and that is independent of any particular system.

Table 19 AcdmGufi Attributes

9.4 AcdmIataFlightID

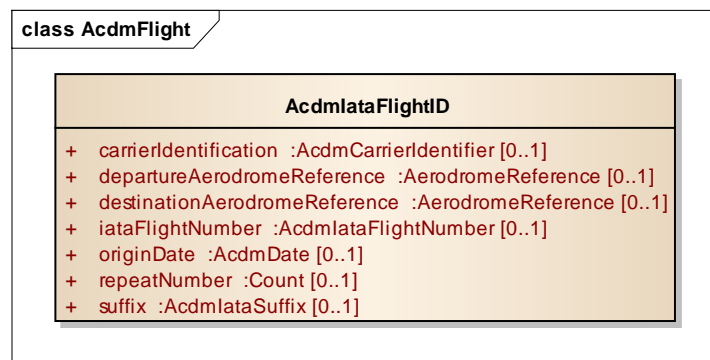


Figure 27 AcdmIataFlightID UML view

Definition: Flight identification structure as defined by IATA, also known as UFI (Unique Flight Identifier).

Attributes

Name	Type	Multiplicity	Definition
carrierIdentification	AcdmCarrierIdentifier	[0..1]	Code of the Aircraft Operator of the identified flight, usually IATA but can be ICAO, as defined in the Schedule [AIDX, UFI].
departureAerodromeReference	AerodromeReference	[0..1]	Code of scheduled departure airport usually IATA but can be ICAO or other as defined in the Schedule [AIDX, UFI].
destinationAerodromeReference	AerodromeReference	[0..1]	Code of scheduled arrival airport usually IATA but can be ICAO or other as defined in the Schedule [AIDX, UFI].
iataFlightNumber	AcdmIataFlightNumber	[0..1]	IATA flight number of the identified flight as defined in the Schedule [AIDX, UFI].
originDate	AcdmDate	[0..1]	Scheduled flight origin date based on the flight as defined in the Schedule [AIDX, UFI].
repeatNumber	Count	[0..1]	Repeat or departure attempt.
suffix	AcdmIataSuffix	[0..1]	suffix of the IATA flight number as defined in the Schedule [AIDX, UFI].

Table 20 AcdmIataFlightID Attributes

9.5 AcdmIcaoFlightID

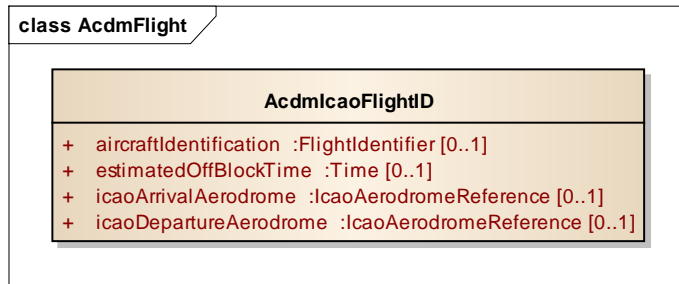


Figure 28 AcdmIcaoFlightID

Definition: Flight identification structure based on usual ICAO fields present in the Flight Plan.

Attributes

Name	Type	Multiplicity	Definition
aircraftIdentification	FlightIdentifier	[0..1]	Name used by ATS units to identify and communicate with an aircraft.
estimatedOffBlockTime	Time	[0..1]	Date and time at which the aircraft will off block according to ICAO flight plan filed.
icaoArrivalAerodrome	IcaoAerodromeReference	[0..1]	ICAO code of scheduled destination airport.
icaoDepartureAerodrome	IcaoAerodromeReference	[0..1]	ICAO code of scheduled departure airport.

Table 21 AcdmIcaoFlightID Attributes

9.6 AcdmIfplID

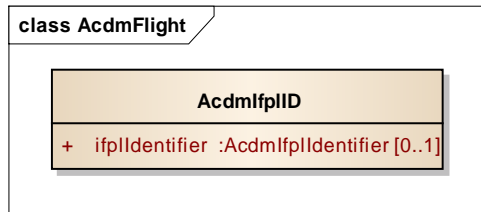


Figure 29 AcdmIfplID UML view

Definition: Unique identifier of a flight plan submitted to IFPS (Integrated initial Flight Plan Processing System). The identifier is assigned by IFPS.

Attributes

Name	Type	Multiplicity	Definition
ifplIdentifier	AcdmIfplIdentifier	[0..1]	Unique identifier of a flight when the flight plan is submitted to IFPS (Integrated initial Flight Plan Processing System). The identifier is assigned by IFPS.

Table 22 AcdmIfplID Attributes

10 AcdmTypes package

This package is an extension of the "Types" package of the FIXM core, enriching it with more properties to cover the extension scope.

10.1 AcdmAerodromelataCode

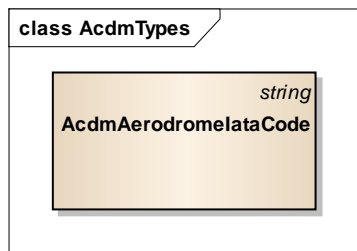


Figure 30 AcdmIataCarrierIdentifier UML view

Definition: IATA Airport Code. It is composed of three letters (e.g. "BCN").

Pattern: [A-Z]{3}.

10.2 AcdmCarrierIdentifier

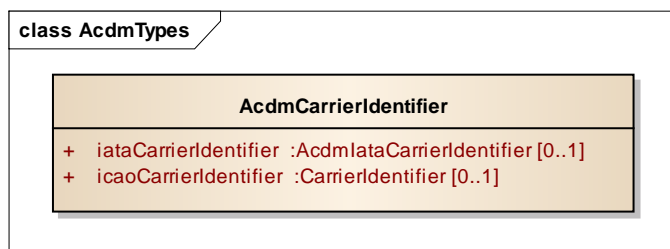


Figure 31 AcdmCarrierIdentifier UML view

Definition: Structure which allows identifying an Aircraft Operator using either ICAO or IATA designator.

10.3 AcdmDate

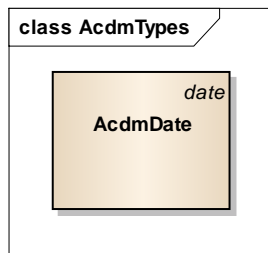


Figure 32 AcdmDate UML view

Definition: String which contains a date, eg. "2014-04-11".

10.4 AcdmGateName

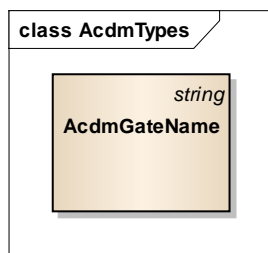


Figure 33 AcdmGateName UML view

Definition: String containing the name of the gate.

10.5 AcdmlataAircraftIdentifier

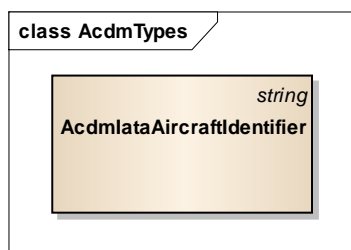


Figure 34 AcdmlataAircraftIdentifier

Definition: IATA standard nomenclature of aircraft manufacturer and type. It is composed of three digits/letters.

Pattern: [A-Z0-9]{3}.

10.6 AcdmIataCarrierIdentifier

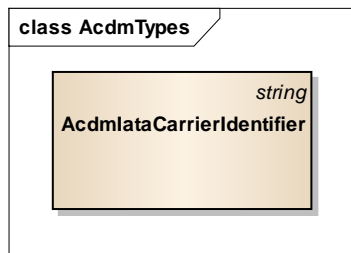


Figure 35 AcdmIataCarrierIdentifier UML view

Definition: IATA Aircraft Operator designator. It is composed of two digits/letters (e.g. "VY").

Pattern: [A-Z0-9]{2}.

10.7 AcdmIataFlightNumber

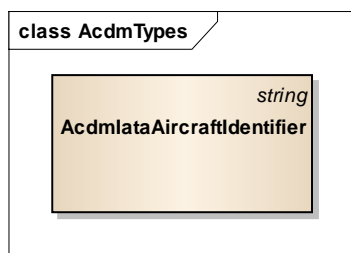


Figure 36 AcdmIataAircraftIdentifier UML view

Definition: IATA Flight Number. It is composed of three or four digits.

Pattern: [0-9]{3,4}.

10.8 AcdmIataSuffix

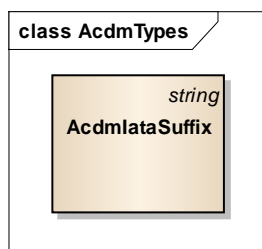


Figure 37 AcdmIataSuffix UML view

Definition: IATA Unique Flight Leg Identifier suffix. It is composed of one letter.

Pattern: [A-Z]{1}.

10.9 AcdmfplIdentifier

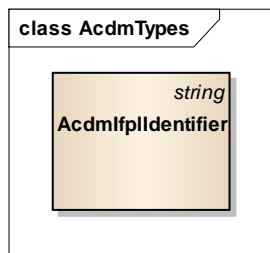


Figure 38 AcdmfplIdentifier UML view

Definition: Identifier created by IFPS (Integrated initial Flight Plan Processing System). It is composed of two letters followed by eight digits.

Pattern: [A-Z]{2}[0-9]{8}.

11 References

- [1] EUROCONTROL, ACI and IATA, *A-CDM Implementation Manual*, Edition 4, March 2012
- [2] FIXM CCB, *Flight Information Exchange Model Modelling Best Practices*, Edition 2, August 2013
- [3] [FIXM Strategy v1.0](#), FIXM Change Control Board.
- [4] www.fixm.aero