REPUBLIQUE DU CAMEROUN

Paix - Travail - Patrie

AUTORITE AERONAUTIQUE

Le Directeur Général

REPUBLIC OF CAMEROON

Peace – Work – Fatherland

CAMEROON CIVIL AVIATION AUTHORITY

The Director General

CIRCULAR N° 000023 /C/CCAA/DG of 25 NOV 2020

Laying down specifications for the Aeronautical Information Exchange Model (AIXM 5.1).

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1. INTRODUCTION

The purpose of this Circular is to provide acceptable means of compliance (AMC), among others, to establish compliance with the regulations and guidance material (GM) to support the interpretation of the regulations.

This Circular, by itself, does not establish, change or modify regulatory requirements or permit any violation, nor does it establish minimum standards.

1.1. Subject

(1) The purpose of this circular is to specify how the Aeronautical Information eXchange Model (AIXM) should be used by AISPs in Cameroon to provide aeronautical information in a digital format in the scope of Aeronautical Information Service.

(2) AIXM shall support the transition from AIS to AIM by enabling the collection, verification, dissemination and transformation of digital aeronautical data throughout the data chain, in particular in the segment that connects AIS with the next intended user.

1.2. Applicability

(1) This circular applies to air navigation service providers in general and aeronautical information service providers in particular.

1.3. Description of changes

Not applicable.

2. REQUIREMENTS AND REFERENCES

2.1. Requirements

(a) Arrête N° 001303/MINT du 29 septembre 2006 portant Règlementation de la fourniture du service d'information aéronautique dans l'espace aérien et sur le territoire Camerounais.

(b) Arrête N° 00711/MINT du 8 juin 2006 portant organisation des services de la circulation aérien au Cameroun.

(c) L'instruction 1298/MINT du 29 septembre 2006 portant organisation de la fourniture des services d'information aéronautique et des cartes aéronautiques dans l'espace aérien et sur le territoire camerounais.

(d) ICAO Convention on International Civil Aviation, Annex 15 - Aeronautical Information Services, Sixtenth Edition- July 2018.

2.2. Reference documents

(a) Eurocontrol AIXM confluence :

www.ext.eurocontrol.int/aixm_confluence ;

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(b) ICAO doc 8126 - Aeronautical Information Services Manual, Sixth Edition, 2003;

(c) ICAO doc 10066 – Procedures for Air Navigation Services - Aeronautical Information Management (PANS-AIM), First Edition, 2018;

(d) Plan national de transition du service d'information aéronautique (AIS) à la gestion de l'information aéronautique (AIM) au Cameroun du 09 novembre 2018, Edition 1.0.

3. DEFINITIONS AND ABBREVIATIONS

(1) The following definitions are used in this circular:

(a) **Aeronautical Data:** a representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing.

(b) **Aeronautical Feature:** the abstract representation (in a model) of a real-world phenomenon which falls within the scope of the aeronautical information domain.

(c) **Aeronautical information:** means information resulting from the assembly, analysis and formatting of aeronautical data.

(d) **Aeronautical Information Management (AIM):** The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

(e) **Aeronautical Information Publication (AIP):** A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation

(f) **Aeronautical Information service (AIS):** A service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

(g) **Aeronautical information service provider (AISP):** the organization responsible for the provision of an aeronautical information service.

(h) **Data product:** Data set or data set series that conforms to a data product specification (ISO 19131).

(i) **Data set:** Identifiable collection of data (ISO 19101).

(j) **Feature:** Abstraction of real-world phenomena (ISO 19101)

(k) **Feature attribute:** Characteristic of a feature (ISO 19101).

(l) **Feature operation:** Operation that every instance of a feature type

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may perform (ISO 19110).

(m) **Feature relationship:** Relationship that links instances of one feature type with instances of the same or a different feature type (ISO 19101).

(n) **Feature type:** Class of real-world phenomena with common properties (ISO 19110).

(o) **Heliport:** An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

(p) **Metadata:** data about data (ISO 19115).

(q) **NOTAM:** A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to the personnel concerned with flight operations.

(r) **Position (geographical):** Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

(s) **Requirement**: Need or expectation that is stated, generally implied or obligatory (ISO 9000).

(t) **Validation:** Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000).

(u) **Verification:** Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000).

(2) The following abbreviations are used in this circular:

(a) **AICM:** Aeronautical Information Conceptual Model

(b) **AIM**: Aeronautical Information Management

(c) **AIP:** Aeronautical Information Publication

(d) **AIS:** Aeronautical Information Services

(e) **AIXM:** Aeronautical Information eXchange Model

(f) **AMC:** Acceptable Means of Compliance

(g) **CCAA**: Cameroon Civil Aviation Authority

(h) **EAD:** European AIS Database

(i) **eAIP:** electronic Aeronautical Information Publication

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(j) **ICAO:** International Civil Aviation Organization

(k) **LCN :** Load Classification Number

(l) **MoC :** Means of Compliance

(m) **PCN :** Pavement Classification Number

(n) **uom :** unit of measurement

4. CONTEXT

(1) AIXM plays an important role in the national plan for the transition from AIS to AIM conceived and adopted by the CCAA. This specification represents the first project (P06-1) of step 06 (P06) in phase 2 - going digital.

(2) AIXM is an implementation of the Aeronautical Information Conceptual Model (AICM) which describes the features and properties of aeronautical objects. AICM is used as the logical basis for AIXM.

(3) This specification is designed to enable the harmonised conception and implementation of the aeronautical information database, provided by Aeronautical Information Service Providers (AISP) in accordance with the ICAO Convention on International Civil Aviation.

(4) The visualization of information on the paper and electronic aeronautical information publication (eAIP) is beyond the scope of this circular.

5. SCOPE

(1) This circular provides common coding rules and guidelines for the provision of the AIP Data Set in AIXM 5.1 version, with the aim to ensure that this data set can be effectively used by the downstream AIS data chain actors, particularly by the Data Provider organizations and flight planning service providers.

(2) The AIXM specifications covers data on the following subjects and corresponding properties in brackets that must be included AIP data set as a minimum:

(a) ATS airspace (type, name, lateral limits, vertical limits, class of airspace);

(b) Special activity airspace (type, name, lateral limits, vertical limits, restriction, activation);

(c) Route (designator, flight rules);

(d) Route segment (navigation specification from point to point, track, length, upper limit, lower limit, minimum en-route altitude (MEA), minimum obstacle clearance altitude (MOCA), direction of cruising level, required navigation performance);

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(e) Waypoint - en-route (identification, location, formation);

(f) Aerodrome/Heliport (ICAO location indicator, name, designator IATA, served city, certified ICAO, certification date, certification expiration date, control type, field elevation, reference temperature, magnetic variation, reference point);

(g) Runway (designator, nominal length, nominal width, surface type, strength);

(h) Runway Direction (designator, true bearing, threshold, take off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA));

(i) Final Approach and Take-Off area - FATO (designation, length, width, threshold point);

(j) Touch-down and lift-off area - TLOF (designator, centre point, length, width, surface type);

(k) Radio navigation aid (type, identification, name, aerodrome/heliport served, hours of operation, magnetic variation, frequency/channel, position, elevation, magnetic bearing, true bearing, zero bearing direction).

(3) In addition to the subjects cited in 5 (3) above, this circular also provides specifications on the following subjects needed for the AIP data set:

(a) Aerodrome Ground Light;

(b) En-route Holding Pattern;

(c) Service

(d) Radio communication channel

6. MEANS OF COMPLIANCE

(1) The requirements for the possible MoC specified in this CCAA Specification for AIXM are included in Appendix 2 to this circular. They comprise mandatory requirements as well as optional elements.

(2) To achieve compliance with the MoC detailed in the CCAA AIXM specification, the mandatory requirements must be implemented and conformance against these tested.

7. CONTACT

(1) For more information, please contact:

contact@ccaa.aero

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(2) Any suggestion to modify this circular will be highly appreciated and can be submitted via the above-mentioned email address.

Paule ASSOUMOU KOKI

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1. APPENDIX 1: CONVENTIONS USED IN THE CCAA AIXM SPECIFICATIONS

(1) In Appendix 2, the requirements are classified into three:

- Mandatory for "shall" items;
- Optional for "should" or "may" items;

(2) Every requirement and recommendation in this specification is denoted by an identifier structured in a specific manner. This identifier is used to reference the requirement/recommendation uniquely. These identifiers have the form:

[FXN]-[nnn]

where:

- [FXN]: is a sequence of characters to identify the functional area to which the requirement applies. e.g. "ASE" for requirements related to the airspace aspects of AIXM.
- [nnn]: is a numeric identifier for a sequence of requirements within the same functional area.

(3) The functional areas referred to in this circular are:

- ASE: Airspace;
- RTE: Route;
- DNP: Designated Point;
- AHP: Airport and Heliport;
- RWY: Runway;
- TLA: Touch Down and Lift off;
- NAV: Navigation Aids;
- VOR: VHF Omnirange;
- TCN: Tactical Air Navigation System- TACAN;
- MKR: Marker Beacon;
- ILZ: Instrument Landing System;
- MLS: Microwave Landing System;
- AGL: Aeronautical Ground Light;
- HPT: Holding Pattern;
- SER: Service;
- UNI: Unit;
- RCC: Radio Communication Channel.

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2. APPENDIX 2: AIXM CONCEPTION REQUIREMENTS

(1) Introduction

(a) The CCAA specification for AIXM 5.1 requirements for the exchange of aeronautical information adhere to the ICAO requirements for the provision of the AIP data set.

(b) For each functionality, AIXM requirements have been divided into:

- Coding Guidelines;
- AIXM Coding Checklist; and
- Coding Rules.

2.1.1.b.1. Coding guidelines give a general conceptual model of the concept expressed through the relationship between AIXM classes and relevant list of values for some properties.

2.1.1.b.2. AIXM Coding Checklist gives details on the properties of each feature of the dataset.

2.1.1.b.3. AIXM Coding Rules provides detail requirements for AIXM implementation including the level of enforcement and the justification for each rule.

(2) Airport/heliport (AHP) data

(a) Coding guidelines

2.1.2.a.1. Main classes for the airport/heliport concept

The figure below shows the main AIXM 5 classes used for the airport/heliport concept.

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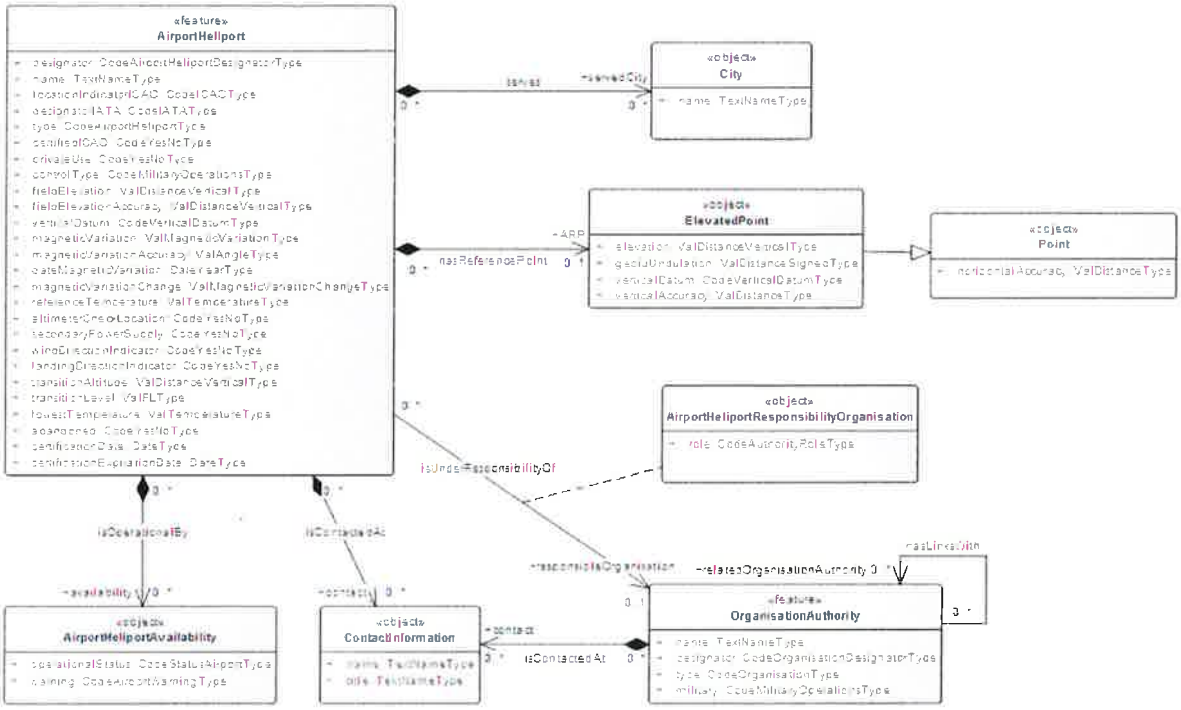

2.1.2.a.2. Basic data for Airport/heliport

For Airport/Heliport, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are ICAO location indicator, name, designator IATA, served city, certified ICAO, certification date, certification expiration date, control type, field elevation, reference temperature, magnetic variation, reference point.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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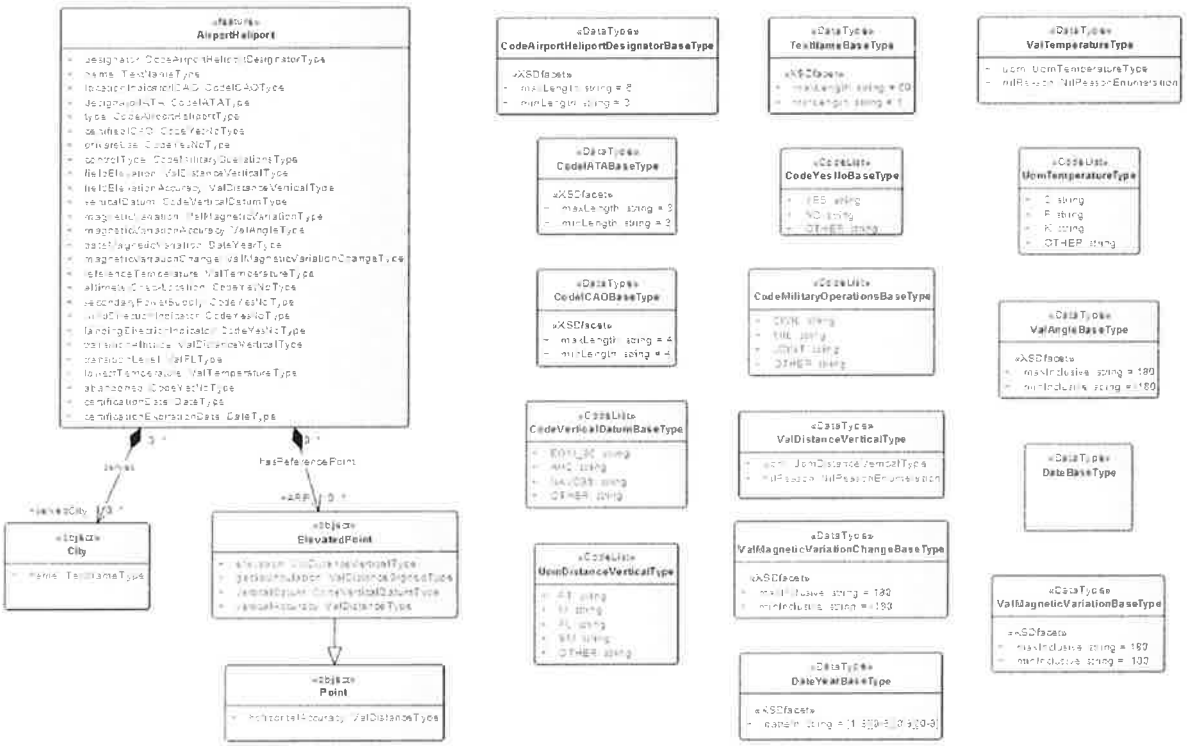

2.1.2.a.3. Designation of an airport/heliport

In AIXM 5, three attributes may be used to define the designator of an AirportHeliport:

- designator,
- locationIndicatorICAO,
- designatorIATA.

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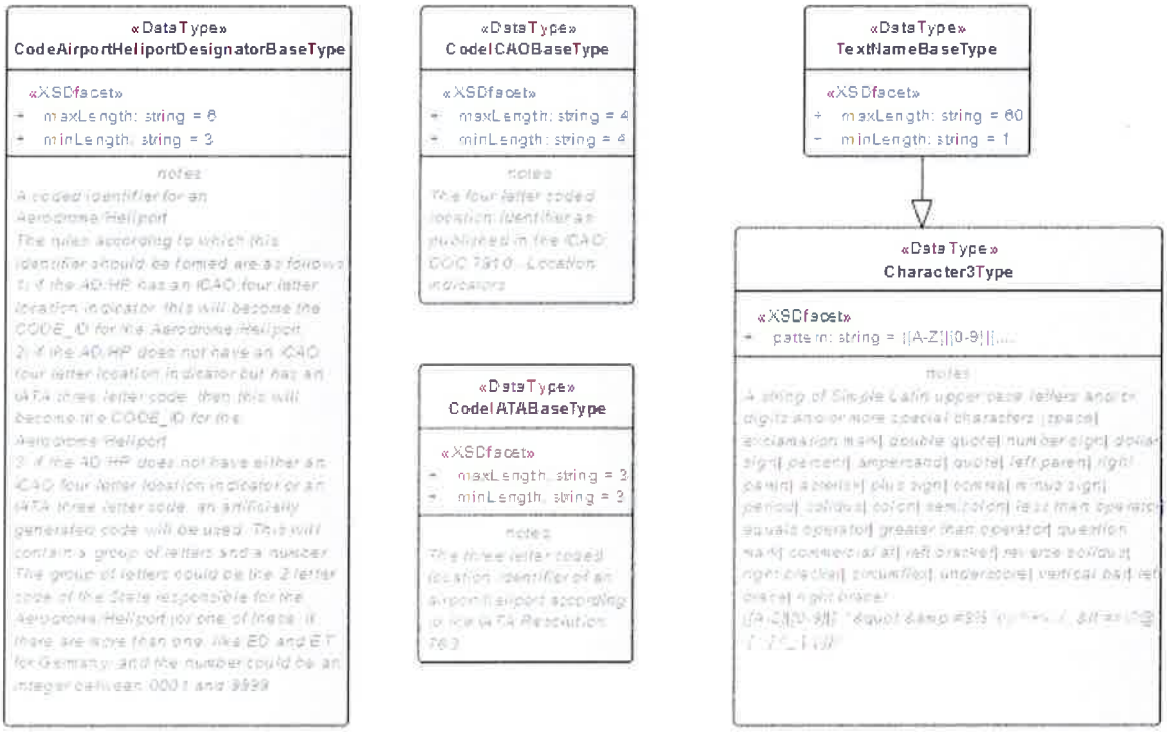
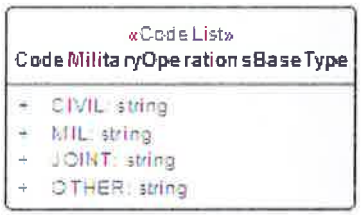


2.1.2.a.4. Class for Control type

The primary organisation type in terms of civil or military, which controls the airport/heliport is encoded by the controlType attribute.



2.1.2.a.5. Class for Field Elevation

The fieldElevation attribute is used to code the vertical distance above Mean Sea Level (MSL) of the highest point of the landing area. The corresponding accuracy value is given by fieldElevationAccuracy attribute

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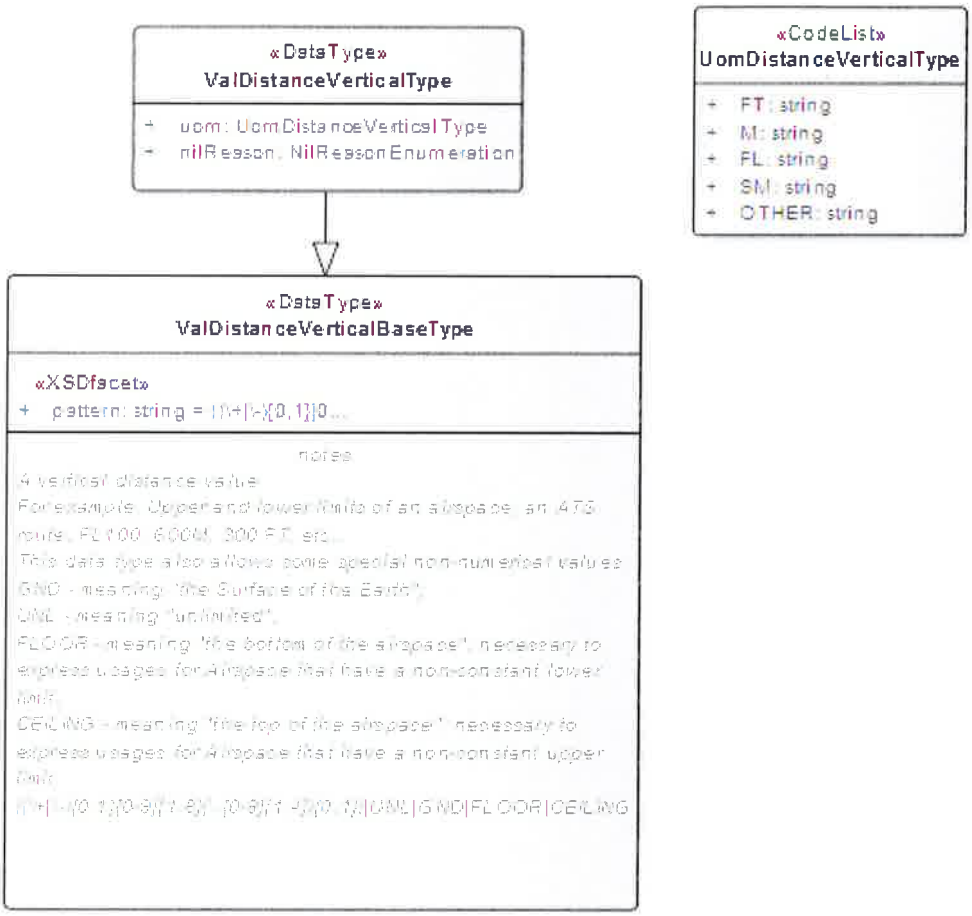
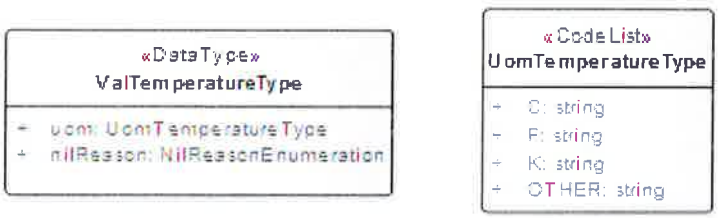


2.1.2.a.6. Class for Reference Temperature

The referenceTemperature attribute is used to code the monthly mean of the daily maximum temperatures for the hottest month of the year at an airport/heliport.



2.1.2.a.7. Class for Magnetic variation

The magnetic variation is the angular difference between Magnetic North and Geographical North (True north) measured at a given position and date.

The magneticVariation attribute is used to provide the angular value of the magnetic variation. The value range allowed by AIXM is between -180 and 180 degrees.

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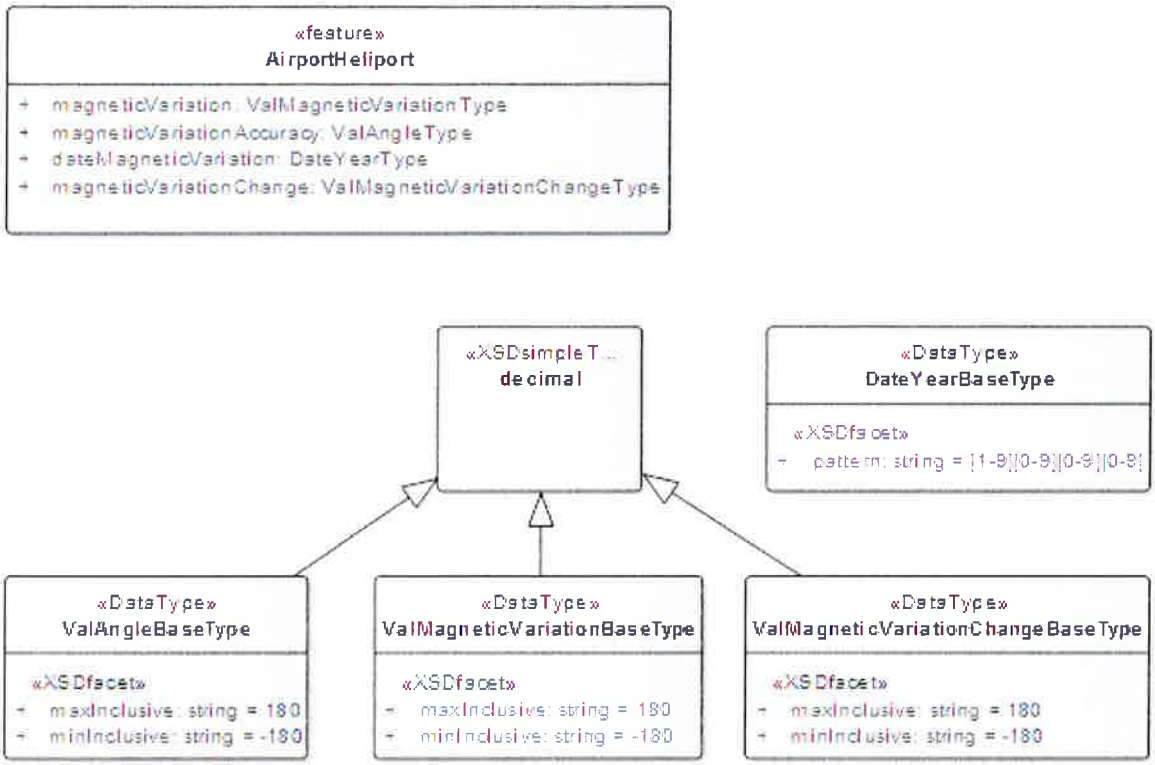

2.1.2.a.8. Class for Airport reference point

The ARP property identifies the Airport Reference Point. It is encoded by using the Point class. The elevation for an ARP is not required. For details about the encoding of Points see the topic Geometry.

In addition, PANS-AIM requires the accuracy to be provided. In AIXM the AirportHeliport.ARP.ElevatedPoint.horizonalAccuracy attribute is used for that purpose.

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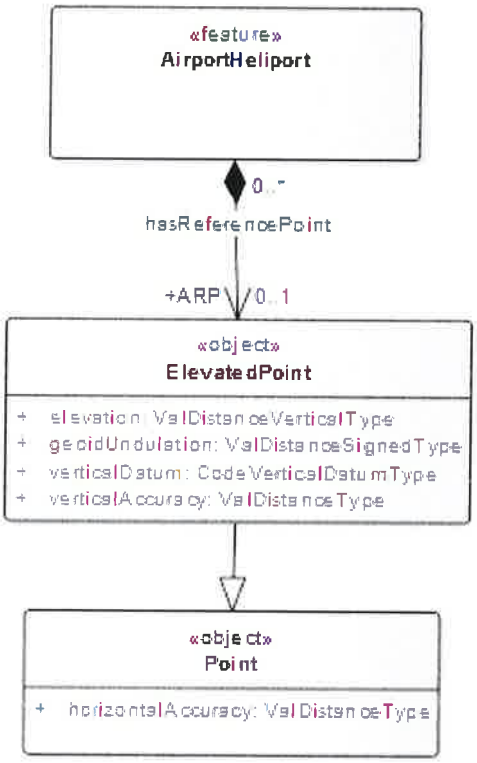

2.1.2.a.9. Class for Airport/Heliport Availability

The diagram below shows the AIXM classes, including the relevant data types and code lists, needed to encode that information.

The AirportHeliportAvailability class is used to define the operational status of the airport/heliport and any reason for caution when operating at the airport/heliport.

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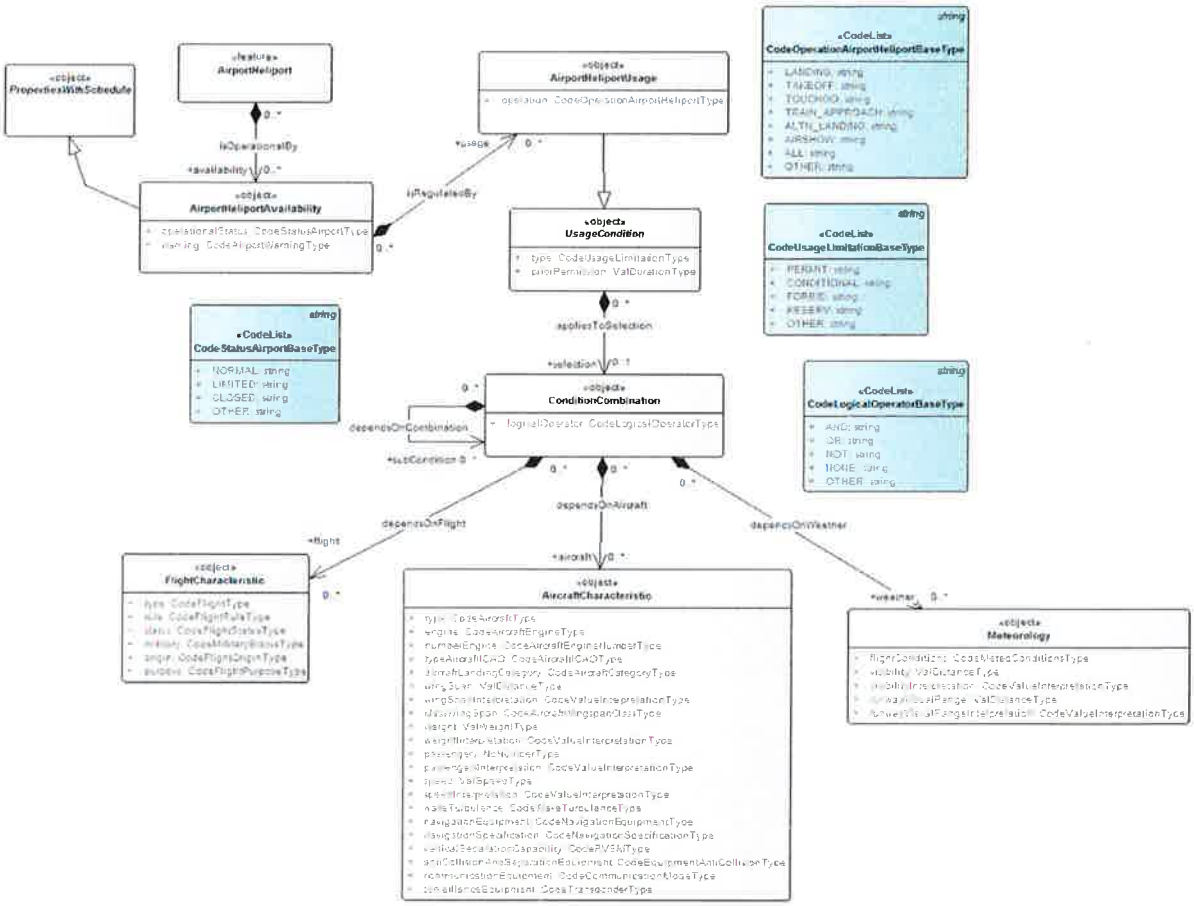

(b) AIXM coding checklist

The following table provided a complete overview of the AIXM 5 features/objects and properties relevant for the coding of airports/heliports. The table also gives an indication if the property is mandatory for an AIP data set and under which conditions.

AIXM Feature/Object	AIXM Feature/Object Property	Complex Type or xlink:href to other Feature	AIP data set
City	name		Mandatory
AirportHeliport	designator		Mandatory
	name		Mandatory
	locationIndicatorICAO		Mandatory, if applicable
	designatorIATA		Mandatory, if applicable
	type		Optional

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	certifiedICAO		Mandatory
	privateUse		Optional
	controlType		Mandatory
	fieldElevation		Mandatory
	fieldElevationAccuracy		Mandatory
	verticalDatum		Mandatory
	magneticVariation		Mandatory
	magneticVariationAccuracy		Mandatory
	dateMagneticVariation		Mandatory
	magneticVariationChange		Mandatory
	referenceTemperature		Mandatory
	altimeterCheckLocation		Optional
	secondaryPowerSupply		Optional
	windDirectionIndicator		Optional
	landingDirectionIndicator		Optional
	transitionAltitude		Mandatory
	transitionLevel		Optional
	lowestTemperature		Optional
	abandoned		Optional
	certificationDate		Mandatory
	certificationExpirationDate		Mandatory
	contaminant	AirportHeliportContamination	Optional
	servedCity	City	Mandatory
	responsibleOrganisation	AirportHeliportResponsibilityOrganisation	Optional
	ARP	ElevatedPoint	Mandatory
	aviationBoundary	ElevatedSurface	Optional

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	altimeterSource	xlink:href -> AltimeterSource	Optional
	contact	ContactInformation	Optional
	availability	AirportHeliportAvailability	Optional
	annotation	Note	Mandatory for information required by PANS-AIM for which there is no dedicated AIXM property, viz: -Geoid undulation for the Field elevation -Airport reference point - Site -Airport reference point - DirectionAirport reference point - Distance
	annotation	Note	Optional

(c) CODING RULES

2.1.2.c.1. Coding Rules for Airport & Heliport

Req. ID	Data Encoding Rule	Justification
AHP-101	The **AirportHeliport.designator** attribute is mandatory.	AIXM 4.5 / Minimal data rule

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AHP-102	The **locationIndicatorICAO** attribute is mandatory	Minimum data set AIP
AHP-103	The **designatorIATA** attribute is mandatory.	Minimum data set AIP
AHP-104	The **name** attribute is mandatory	Minimum data set AIP
AHP-105	The **servedCity** property is mandatory.	Minimum data set AIP
AHP-106	The **ARP.ElevatedPoint.pos** property is mandatory.	Minimum data set AIP
AHP-107	The **certifiedICAO** attribute is mandatory.	Minimum data set AIP
AHP-108	The **certificationDate** attribute is mandatory.	Minimum data set AIP
AHP-109	The **certificationExperationDate** attribute is mandatory.	Minimum data set AIP
AHP-110	The **controlType** attribute is mandatory.	Minimum data set AIP
AHP-111	The **fieldElevation** attribute is mandatory.	Minimum data set AIP
AHP-112	The **referenceTemperature** attribute is mandatory.	Minimum data set AIP
AHP-113	The **magneticVariation** attribute is mandatory.	Minimum data set AIP
AHP-114	The **dateMagneticVariation** attribute is mandatory.	Minimum data set AIP
AHP-115	The **magneticVariationChange** attribute is mandatory.	Minimum data set AIP
AHP-116	The **magneticVariationAccuracy** attribute is mandatory.	Minimum data set AIP

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AHP-117	The rules according to which the **AirportHeliport.designator** should be formed are as follows: 1) If the Airport/Heliport has an ICAO four letter location indicator, this will become the designator for the Aerodrome/Heliport; 2) If the Airport/Heliport does not have an ICAO four letter location indicator but has an IATA three letter code, then this will become the designator for the Aerodrome/Heliport; 3) If the Airport/Heliport does not have either an ICAO four letter location indicator or an IATA three letter code, an artificially generated code will be used. This will contain a group of letters and a number. The group of letters could be the 2 letter code of the State responsible for the Aerodrome/Heliport (or one of these, if there are more than one, like ED and ET for Germany) and the number could be an integer between 0001 and 9999.	EAD / Data Harmonisation
AHP-118	Only numerical values shall be used for coding the **AirportHeliport.fieldElevation**. 'GND', 'UNL', 'FLOOR' and 'CEILING' shall not be	PANS-AIM

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	used.	
AHP-119	The **uom** used for the vertical distance for **AirportHeliport.fieldElevation** shall be Feet ('F') or Meters ('M'). Flight level ('FL') or Standards meters ('SM') shall not be used.	PANS-AIM
AHP-202	For every **AirportHeliport** there should be at least one postal address and one telephone number defined.	EAD
AHP-210	The **type** attribute is mandatory.	AIXM 4.5, Minimal data rule
AHP-203	If **AirportHeliport.type** equal-to 'AH' or 'HP', there must be at least a related **TLOF** coded for the **Airport/Heliport.**	EAD
AHP-204	If **AirportHeliport.type** equal-to 'AD', there may not exist any related **TLOF** for the **Airport/Heliport.**	EAD
AHP-205	If **AirportHeliport.type** equal-to 'HP', there may not exist any **Runway** specified for the **Airport/Heliport.**	EAD
AHP-206	**AirportHeliport.locationIndicatorICAO** shall be unique.	EAD
AHP-207	If **AirportHeliport.magneticVariation** is specified, then **AirportHeliport.dateMagneticVariation** is mandatory.	EAD

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AHP-208	**AirportHeliport.magneticVariationChange** may be specified only if **AirportHeliport.magneticVariation** has been specified.	EAD
AHP-209	**AirportHeliport.filedElevationAccuracy** may be specified only if **AirportHeliport.filedElevation** has been specified.	EAD
AHP-120	If coded, the value of the **AirportHeliport.fieldElevationAccuracy** shall be 0.5m or less.	PANS-AIM
AHP-121	If coded, the value of the **AirportHeliport.ARP.ElevatedPoint.verticalAccuracy** shall be be 0.5m or less.	PANS-AIM
AHP-122	If coded, **AirportHeliport.fieldElevationAccuracy.uom**, **AirportHeliport.fieldElevation.uom**, **ARP.ElevatedPoint.elevation.uom**, **ARP.ElevatedPoint.verticalAccuracy.uom**, **ARP.ElevatedPoint.geoidUndulation.uom** shall have the same value.	Data consistency rule
AHP-123	Coordinates of **AirportHeliport.ARP** shall be published with at least 4 decimals resolution.	PANS-AIM
AHP-124	The value 'OTHER' shall not be used	AIXM 4.5 /

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	for **AirportHeliport.fieldElevationAccuracy.uom** or **AirportHeliport.fieldElevation.uom.**	Standard
AHP-125	If coded, the value of the **AirportHeliport.ARP.ElevatedPoint.horizontalAccuracy** shall be 30 M or less.	PANS-AIM
AHP-126	If coded, the value of the **AirportHeliport.ARP.ElevatedPoint.geoidUndulation** shall be published with at least 1m or 1ft resolution.	PANS-AIM
AHP-127	If coded, the value of the **AirportHeliport.fieldElevation** shall be published with at least 1m or 1ft resolution.	PANS-AIM
AHP-128	If coded, the value of the **AirportHeliport.magneticVariationAccuracy** shall be 1 degree or less.	PANS-AIM
AHP-129	If coded, the value of the **AirportHeliport.magneticVariation** shall be published with at least 1 degree resolution.	PANS-AIM

(3) RUNWAY

(a) CODING GUIDELINES

2.1.3.a.1. RUNWAY CLASS

The figure below shows the main AIXM 5 classes used for the runway and runway direction concept.

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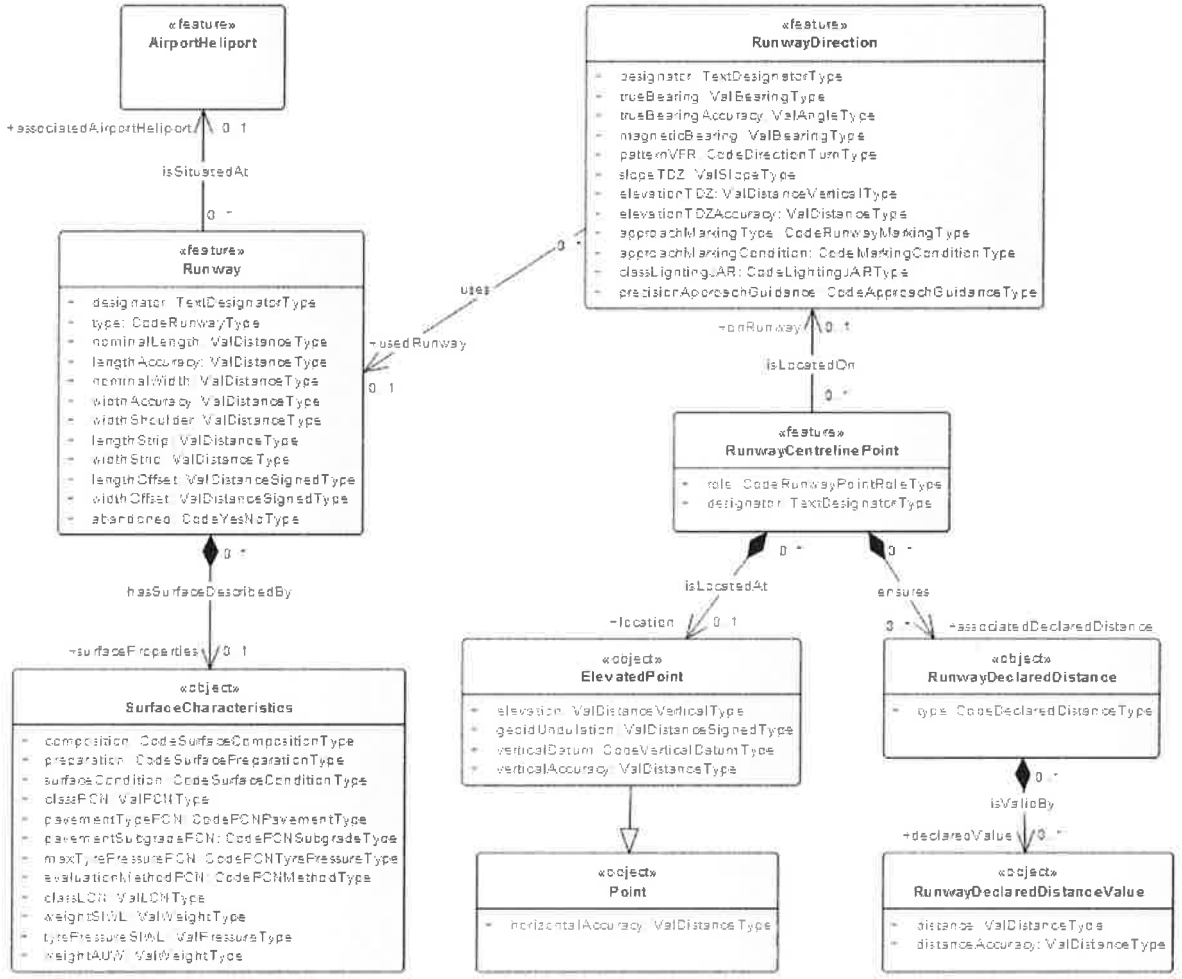

2.1.3.a.2. Basic data for runway

For Runway, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are designator, nominal length, nominal width, surface type, strength.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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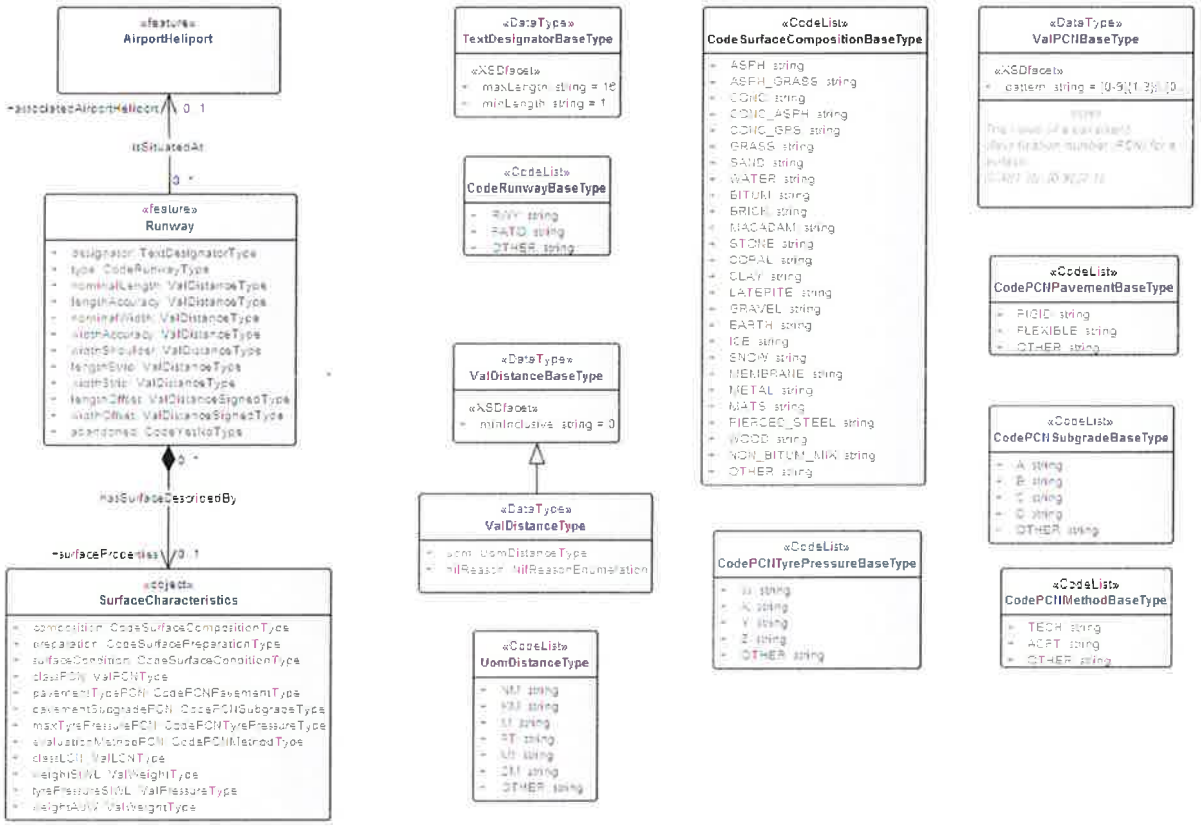

2.1.3.a.3. RUNWAY DIRECTION CLASS

For Runway Direction, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are designator, true bearing, threshold, ...

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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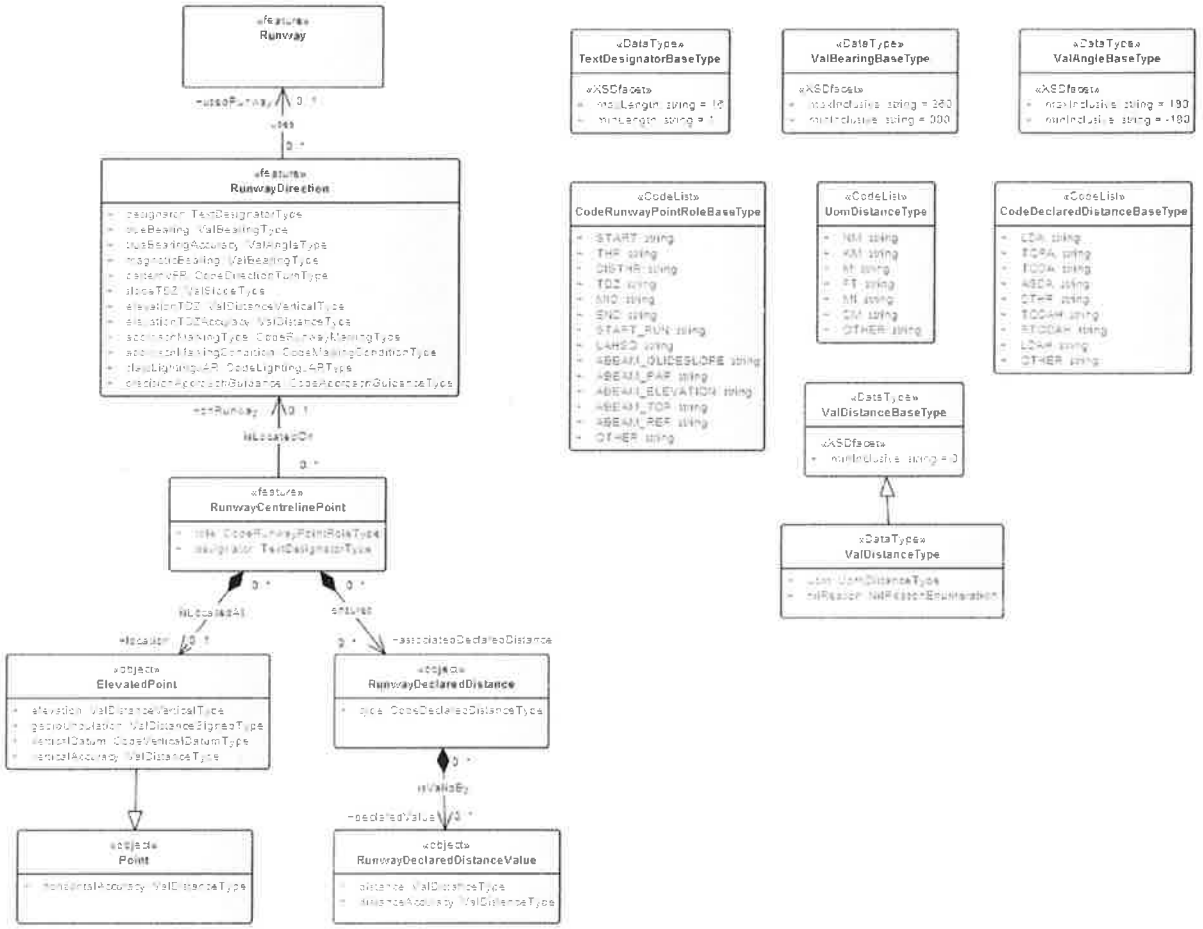

2.1.3.a.4. DECLARED DISTANCE CLASS

For Runway Direction, PANS-AIM requires declared distances information as part of the minimum AIP data set. These are: take off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA).

The diagram below shows the AIXM classes, including the relevant data types (in green colour) needed to encode that information:

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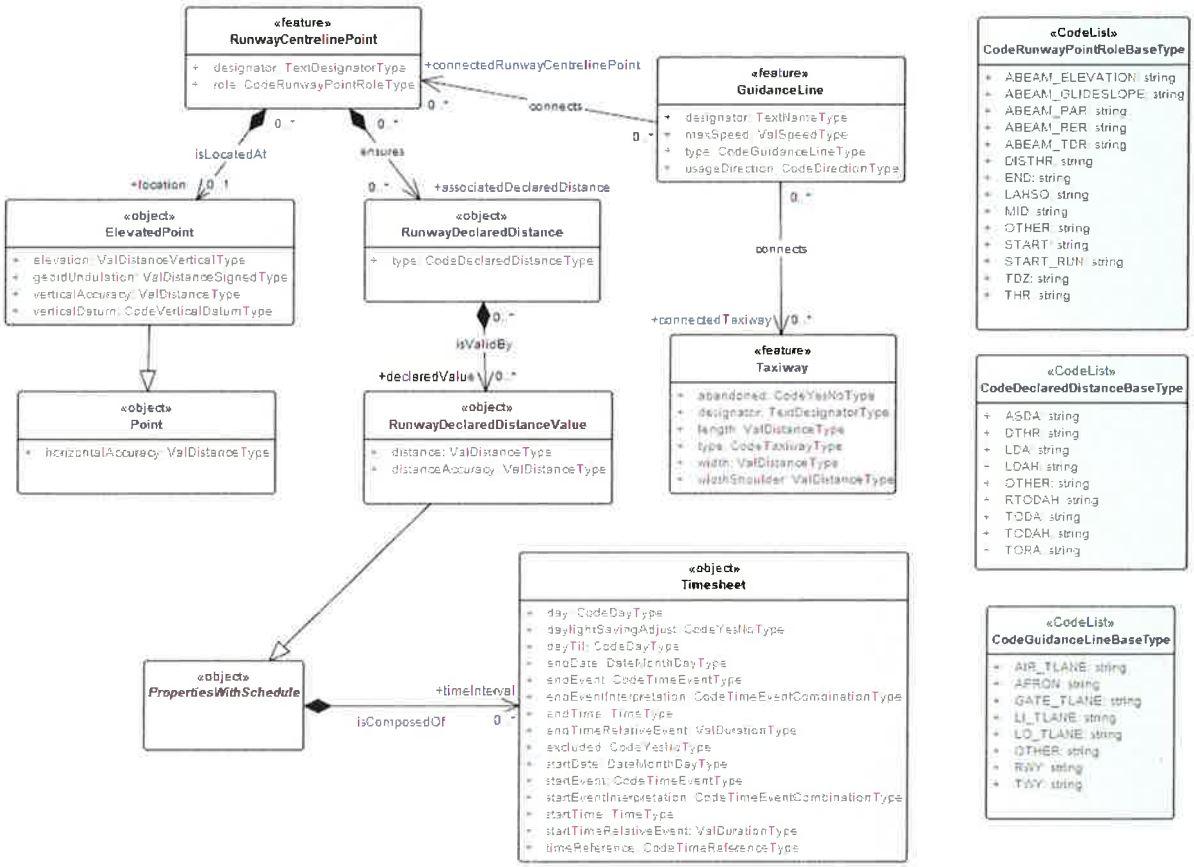

(b) AIXM CODING CHECKLIST

The following table provides a complete overview of the AIXM 5 features/objects and properties relevant for the coding of runways and FATOs which will be published as part of an PANS-AIM defined AIP data set.

The table also gives an indication if the property is mandatory for an AIP data set and under which conditions.

AIXM Feature/Object	AIXM Feature/Object Property	Complex Type or xlink:href to other feature	AIP Data Set
Runway	designator		Mandatory
	type		Mandatory (AIXM constraint to distinguish between Runway and FATO)
	nominalLength		Mandatory
	lengthAccuracy		Mandatory

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	nominalWidth		Mandatory
	widthAccuracy		Mandatory
	widthShoulder		Optional
	lengthStrip		Optional
	widthStrip		Optional
	lengthOffset		Optional
	widthOffset		Optional
	abandoned		Optional
	surfaceProperties	SurfaceCharacteristics	Mandatory
	associatedAirportHeliport	xlink:href -> AirportHeliport	Mandatory
	overallContaminant	RunwayContamination	Optional
	annotation	Note	Optional
	areaContaminant	RunwaySectionContamination	Optional
RunwayDirection	designator		Mandatory
	trueBearing		Mandatory
	trueBearingAccuracy		Mandatory
	magneticBearing		Optional
	patternVFR		Optional
	slopeTDZ		Optional
	elevationTDZ		Optional
	elevationTDZAccuracy		Optional

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	approachMarkingType		Optional
	approachMarkingCondition		Optional
	classLightingJAR		Optional
	precisionApproachGuidance		Optional
	usedRunway	xlink:href -> Runway	Mandatory
	startingElement	xlink:href -> RunwayElement	Optional
	annotation	Note	Optional
	availability	ManoeuvringAreaAvailability	Optional
RunwayCentrelinePoint	role		Optional
	designator		Optional
	location	ElevatedPoint	Mandatory
	onRunway	xlink:href -> RunwayDirection	Mandatory
	associatedDeclaredDistance	RunwayDeclaredDistance	Mandatory
	navaidEquipment	NavaidEquipmentDistance	Optional
	annotation	Note	Optional
SurfaceCharacteristics	composition		Mandatory
	preparation		Optional
	surfaceCondition		Optional

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	classPCN		Mandatory or LCN or SIWL or weightAUW
	pavementTypePCN		Mandatory or LCN or SIWL or weightAUW
	pavementSubgradePCN		Mandatory or LCN or SIWL or weightAUW
	maxTyrePressurePCN		Mandatory or LCN or SIWL or weightAUW
	evaluationMethodPCN		Mandatory or LCN or SIWL or weightAUW
	classLCN		Mandatory or PCN or SIWL or weightAUW
	weightSIWL		Mandatory or LCN or PCN or weightAUW
	tyrePressureSIWL		Mandatory or LCN or PCN or weightAUW
	weightAUW		Mandatory or LCN or SIWL or PCN
	annotation	Note	Optional
RunwayDeclaredDistance	type		Mandatory
	declaredValue	RunwayDeclaredDistanceValue	Mandatory (for TORA, TODA, ASDA, LDA, rejected TODA)

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	annotation	Note	Optional
RunwayDeclaredDistanceValue	timeInterval	Timesheet	Optional
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	distance		Mandatory
	distanceAccuracy		Mandatory

(c) CODING RULES

2.1.3.c.1. Coding Rules for Runway basic data

Req. ID	Data Encoding Rule	Justification
RWY-101	The **Runway.type** attribute is mandatory.	Data consistency
RWY-102	The **Runway.designator** attribute is mandatory.	Minimum AIP data set
RWY-103	The **Runway.nominalLength** attribute is mandatory.	Minimum AIP data set
RWY-104	The **Runway.nominalWidth** attribute is mandatory.	Minimum AIP data set
RWY-105	The **Runway.lengthAccuracy** attribute is mandatory.	Minimum AIP data set
RWY-106	The **Runway.widthAccuracy** attribute is mandatory.	Minimum AIP data set
RWY-108	For Runway, the **SurfaceCharacteristics.composition** attribute is mandatory.	Minimum AIP data set
RWY-109	For Runway, the **SurfaceCharacteristics.**	Minimum AIP

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	classPCN attribute is mandatory.	data set
RWY-110	For Runway, the **SurfaceCharacteristics. pavementTypePCN** attribute is mandatory.	Minimum AIP data set
RWY-111	For Runway, the **SurfaceCharacteristics. pavementSubgradePCN** attribute is mandatory.	Minimum AIP data set
RWY-112	For Runway, the **SurfaceCharacteristics. maxTyrePressurePCN** attribute is mandatory.	Minimum AIP data set
RWY-113	For Runway, the **SurfaceCharacteristics. evaluationMethodPCN** attribute is mandatory.	Minimum AIP data set
RWY-114	The distance between the first and the last **RunwayCentrelinePoint** associated to the same **Runway** cannot exceed 10 KM.	EAD
RWY-115	A **Runway** of type 'RWY' cannot be associated with an **AirportHeliport** with type "HP".	AIXM 4.5 Business Rules / Data consistency rule
RWY-116	Each **Runway** shall have assigned **associatedAirport Heliport** value.	AIXM 4.5 / Minimal data rule
RWY-117	If coded, the value of the **Runway.lengthAccuracy** shall be 1 M or less.	PANS-AIM
RWY-118	If coded, the value of the **Runway.widthAccurac**	PANS-AIM

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	y shall be 1 M or less.	
RWY-119	If coded, the value of the **Runway.nominalLength** shall be published with at least 1m or 1ft resolution.	PANS-AIM
RWY-120	If coded, the value of the **Runway.nominalWidth** shall be published with at least 1m or 1ft resolution.	PANS-AIM

2.1.3.c.2. Coding Rules for Runway Direction basic data

Req.ID	Data Encoding Rule	Justification
RDN-101	The **RunwayDirection.designator** attribute is mandatory.	Minimum AIP data set
RDN-102	The **RunwayDirection.trueBearing** attribute is mandatory.	Minimum AIP data set
RDN-103	The **RunwayDirection.trueBearingAccuracy** attribute is mandatory.	Minimum AIP data set
RDN-104	Each **RunwayDirection** shall have a related **RunwayCentreLinePoint** with **type** equal-to 'THR' or equal-to 'DISTHR'.	Minimum AIP data set
RDN-105	The **RunwayCentreLinePoint.location** attribute is mandatory.	Minimum AIP data set
RDN-106	Each **RunwayCentreLinePoint** with **type** equal-to 'THR' or 'DISTHR' shall have an **ElevatedPoint.elevatio**	PANS-AIM

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	n.	
RDN-107	Each **RunwayCentreLinePoint** with **type** equal-to 'THR' or 'DISTHR' shall have an **ElevatedPoint.verticalAccuracy**.	PANS-AIM
RDN-116	**RunwayDirection.designator** must have between 2 and 3 characters, of which the first 2 may be only digits, which indicate an integer value between 01 and 36, inclusive. Examples: 09, 09L, 09R, 09C, 09T, etc.	EAD, Data harmonisation
RDN-117	The **RunwayDirection.trueBearing** must match (or differ exactly by 180°) with the value calculated using the geographical coordinates of the associated **RunwayCentrelinePoint** (through the associated **Runway**).	EAD
RDN-118	The difference between **trueBearing** and **magneticBearing** has to be consistent with the value **magneticVariation** of the related **AirportHeliport**, taking in consideration the current date and the annual rate of change (**magneticVariationChange** in the referred **AirportHeliport**).	EAD
RDN-119	The **RunwayCentrelinePoi**	EAD

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	nt.location must be plausibly close (less than 20 KM) to that of the location of the **ARP** of the related **AirportHeliport**.	
RDN-120	The points on the centre line of one runway must define a straight line (with a tolerance of 50 M).	EAD
RDN-121	**ElevatedPoint.geoidUndulation** may be specified only if **ElevatedPoint.elevation** has been specified.	EAD
RDN-130	If **Runway.type** equal-to 'FATO' the **RunwayCentrelinePoint.location** must be plausibly close (less than 10 KM) to that of the related **TLOF**.	EAD, Data consistency
RDN-132	The **RunwayCentreLinePoint.horizontalAccuracy** attribute is mandatory.	PANS-AIM
RDN-132	Each **RunwayDirection** shall have assigned **usedRunway** value.	Data consistency
RDN-133	The **RunwayCentreLinePoint.geoidUndulation** shall be provided where appropriate.	PANS-AIM
RDN-133	If coded, the value of the **RunwayDirection.trueBearing** shall be be published with at least 2 decimals resolution.	PANS-AIM

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RDN-134	The **RunwayCentreLinePoint.onRunway** property is mandatory.	Data consistency
RDN-134	If coded, the value of the **RunwayDirection.trueBearingAccuracy** shall be 0.01 degree or less.	PANS-AIM
RDN-135	If **RunwayCentrelinePoint.role** equal-to 'THR' or' DISTHR' or 'END', the coordinates of the **RunwayCentrelinePoint.location** shall be published with at least 6 decimals resolution.	PANS-AIM
RDN-136	If coded, the value of the **RunwayCentrelinePoint.location.ElevatedPoint.horizontalAccuracy** shall be 1 M or less.	PANS-AIM
RDN-137	If coded for a precision approach runway and **RunwayCentrelinePoint.role** equal-to 'THR' or' DISTHR', the value of the **RunwayCentrelinePoint.location.ElevatedPoint.elevation** shall be published with at least 1 decimals of a meter or of a feet resolution.	PANS-AIM
RDN-138	If coded for a non-precision approach runway and **RunwayCentrelinePoint.role** equal-to 'THR' or' DISTHR', the value of the **RunwayCentrelinePoint.location.ElevatedPoint.**	PANS-AIM

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	elevation shall be published with at least 1m or 1ft resolution.	
RDN-139	If coded for a precision approach runway and **RunwayCentrelinePoint.role** equal-to 'THR' or' DISTHR', the value of the **RunwayCentrelinePoint.location.ElevatedPoint.geoidUndulation** shall be published with at least 1 decimals of a meter or of a feet resolution.	PANS-AIM
RDN-140	If coded for a non-precision approach runway and **RunwayCentrelinePoint.role** equal-to 'THR' or' DISTHR', the value of the **RunwayCentrelinePoint.location.ElevatedPoint.geoidUndulation** shall be published with at least 1m or 1ft resolution.	PANS-AIM
RDN-141	If coded for precision approach runways, the value of the **RunwayCentrelinePoint.location.verticalAccuracy** shall be 0.25 m or less.	PANS-AIM
RDN-144	The coordinates of the **RunwayCentrelinePoint.location** if used as **TerminalSegmentPoint** s hall be published with at least 5 decimals resolution.	PANS-AIM
RDN-145	If coded for non-precision approach runways, the	PANS-AIM

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	value of the **RunwayCentrelinePoint.location.verticalAccuracy** shall be 0.5 m or less.	

2.1.3.c.3. Coding Rules for Runway Declared Distances

Req. ID	Data Encoding Rule	Justification
RDN-108	If **Runway.type** equal-to 'RWY' for each related **RunwayDirection** a **RunwayDeclaredDistance.type** equal-to 'TODA' shall be provided.	Minimum AIP data set
RDN-110	If **Runway.type** equal-to 'RWY' for each related **RunwayDirection** a **RunwayDeclaredDistance.type** equal-to 'TORA' shall be provided.	Minimum AIP data set
RDN-111	If **Runway.type** equal-to 'RWY' for each related **RunwayDirection** a **RunwayDeclaredDistance.type** equal-to 'ASDA' shall be provided.	Minimum AIP data set
RDN-201	If **RunwayDeclaredDistance.type** is equal-to 'TORA', 'TODA', or 'ASDA' the related **RunwayCentrelinePoint.role** should be equal-to 'START_RUN' or 'START' or 'THR'	Data Consistency
RDN-112	If **Runway.type** equal-to 'RWY' for each related **RunwayDirection** a **RunwayDeclaredDistance.type** equal-to 'LDA' shall	Minimum AIP data set

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	be provided.	
RDN-201	If **RunwayDeclaredDistance.type** is equal-to 'LDA' the related **RunwayCentrelinePoint.role should be** equal-to 'THR' or 'DISTHR' or 'START'	Data Consistency
RDN-127	If **Runway.type** equal-to 'FATO' for the related **RunwayDirection** the **RunwayDeclaredDistance.type** shall not have assigned value other than ('TODAH', 'RTODAH', 'LDAH').	Data consistency
RDN-113	If **Runway.type** equal-to 'FATO' for each related **RunwayDirection** a **RunwayDeclaredDistance.type** equal-to 'RTODAH' shall be provided.	Minimum AIP data set
RDN-129	If **Runway.type** equal-to 'RWY' for the related **RunwayDirection** the **RunwayDeclaredDistance.type** shall not have assigned value other than ('TODA', 'TORA', 'ASDA', 'LDA', 'DTHR').	Data consistency
RDN-115	For each **RunwayDeclaredDistance** a **RunwayDeclaredDistance.declaredValue** shall be provided.	PANS-AIM
RDN-151	For each **RunwayDeclaredDistanceValue.distance** a **RunwayDeclaredDistanceValue.distanceAccuracy** shall	PANS-AIM

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	be provided.	
RDN-152	Each **RunwayDeclaredDistanceValue.distance.uom** shall not have assigned value other than ('M', 'FT').	PANS-AIM
RDN-153	Each **RunwayDeclaredDistanceValue.distanceAccuracy.uom** shall not have assigned value other than ('M', 'FT').	PANS-AIM
RDN-122	For the same **RunwayCentrelinePoint** the **RunwayDeclaredDistanceValue.distance** (considering the **uom** information) of the 'TODA' must be equal with or greater than that of the 'TORA'.	EAD, Data consistency
RDN-123	For the same **RunwayCentrelinePoint** the **RunwayDeclaredDistanceValue.distance** (considering the **uom** information) of the 'ASDA' should be equal with or greater than that of the 'TORA'.	EAD, Data consistency
RDN-124	If **RunwayDeclaredDistance.type** is equal-to 'LDA', 'LDAH', 'TORA' or 'DTHR', the **RunwayDeclaredDistanceValue.distance** (considering the **uom** information) must be smaller than or equal to **nominalLength** of the related **Runway.**	EAD, Data consistency
RDN-131	For the same **RunwayCentrelinePo**	EAD,

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	int the **RunwayDeclaredDistanceValue.distance** (considering the **uom** information) of the 'RTODAH' must be equal with or greater than that of the 'TODAH'.	Data consistency
RDN-142	If coded, the value of the **RunwayDeclaredDistanceValue.distance** shall published with at least 1m or 1ft resolution.	PANS-AIM
RDN-143	If coded, the value of the **RunwayDeclaredDistanceValue.distanceAccuracy** shall be 1 m or less.	PANS-AIM
RDN-144	It is not possible to have a **RunwayCentrelinePoint** with **role** equal-to 'THR' and a **RunwayCentrelinePoint** with **role** equal-to' DISTHR' and both associated with the same **RunwayDirection**	ICAO Annex 14

(4) TLOF

(a) coding guidelines

2.1.4.a.1. Basic Data for TLOF

For TLOF, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are designator, centre point, length, width, surface type.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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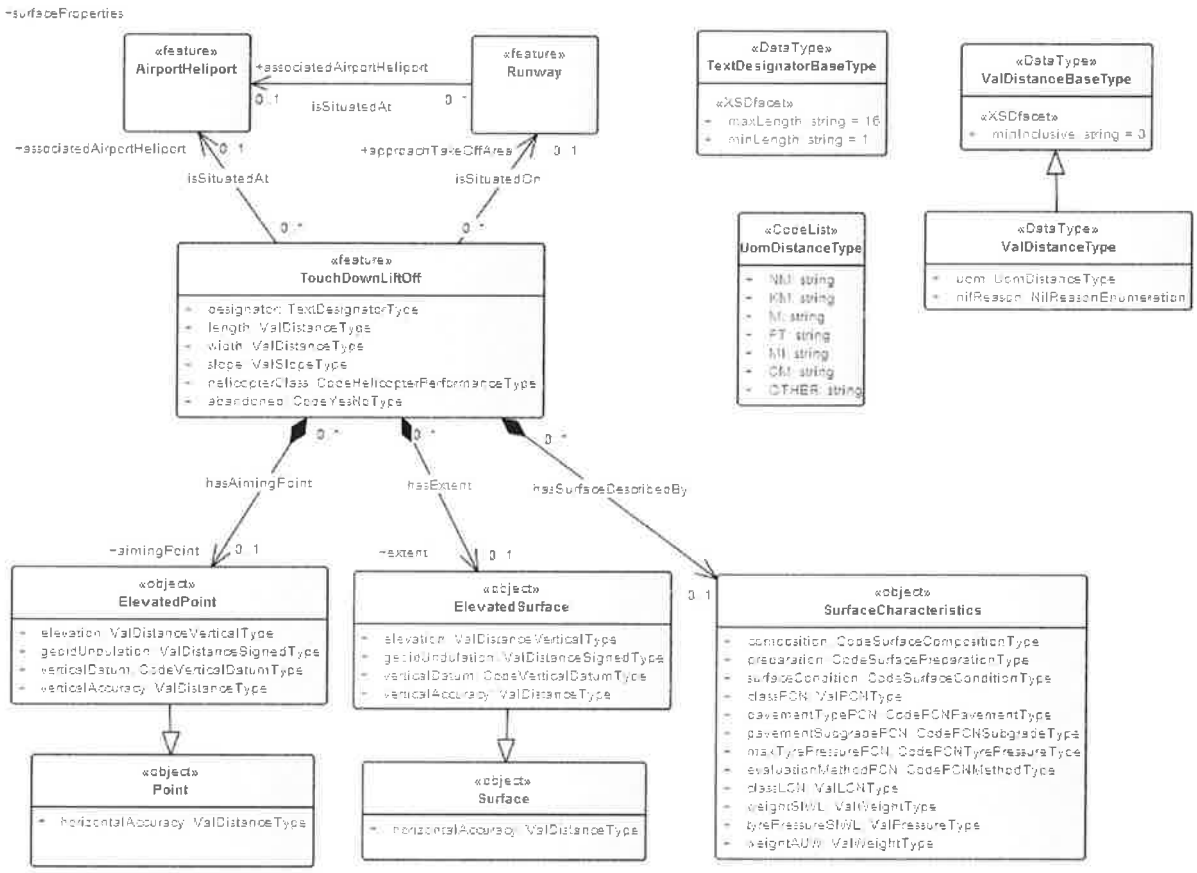

(b) TLOF AIXM checklist

AIXM Feature/Object	AIXM Feature/Object Property	Complex Type or xlink:href to other feature	AIP data set
TouchDownLiftOff	designator		Mandatory
	length		Mandatory
	width		Mandatory
	slope		Optional
	helicopterClass		Optional
	abandoned		Optional
	aimingPoint	ElevatedPoint	Mandatory (used to code

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			a centrepoint, in case both exists the centre point or aiming point has to be coded as annotation)
	extent	ElevatedSurface	Optional
	surfaceProperties	SurfaceCharacteristics	Mandatory
	associatedAirportHeliport	xlink:href -> AirportHeliport	Mandatory
	approachTakeOffArea	xlink:href -> Runway	Optional
	contaminant	TouchDownLiftOffContamination	Optional
	annotation	Note	Mandatory for information required by PANS-AIM for which there is no dedicated AIXM property, viz:

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			Accuracy for length Accuracy for width
	availability	ManoeuvringAreaAvailability	Optional
SurfaceCharacteristics	composition		Mandatory
	preparation		Optional
	surfaceCondition		Optional
	classPCN		Optional
	pavementTypePCN		Optional
	pavementSubgradePCN		Optional
	maxTyrePressurePCN		Optional
	evaluationMethodPCN		Optional
	classLCN		Optional
	weightSIWL		Optional
	tyrePressureSIWL		Optional
	weightAUW		Optional
	annotation	Note	Optional

(c) Coding Rules for Basic Data for TLOF

Req.ID	Data Encoding Rule	Justification
TLA-101	The **TouchDownLiftOff.designator** attribute is	Minimum AIP data

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	mandatory.	set
TLA-102	The **TouchDownLiftOff.aimingPoint** property is mandatory.	Minimum AIP data set
TLA-103	The **TouchDownLiftOff.length** attribute is mandatory unless an **extend** is coded.	Minimum AIP data set
TLA-104	The **TouchDownLiftOff.width** attribute is mandatory unless an **extend** is coded.	Minimum AIP data set
TLA-105	If a value for the **TouchDownLiftOff.length** attribute is provided a **Note** for the **TouchDownLiftOff** with **propertyName** equal-to 'length' should be coded to provide the corresponding accuracy.	Minimum AIP data set
TLA-106	If a value for the **TouchDownLiftOff.width** attribute is provided a **Note** for the **TouchDownLiftOff** with **propertyName** equal-to 'width' should be coded to provide the corresponding accuracy.	Minimum AIP data set
TLA-107	For **TouchDownLiftOff** the **SurfaceCharacteristic.composition** attribute is mandatory.	Minimum AIP data set
TLA-108	The position given by **ElevatedPoint** must be plausibly close (less than 20 KM) to that of the **ARP** of the related **AirportHeliport**.	EAD

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TLA-109	**ElevatedPoint.geoidUndulation** may be specified only if **ElevatedPoint.elevation** has been specified.	EAD
TLA-110	The related **Runway** should be related to the same **AirportHeliport** as the **TouchDownLiftOff**.	EAD
TLA-111	If both a **width** and **length** and also an **extend** is coded the data have to be consistent (i.e. the positions defined by the **ElevatedSurface** have to match with the values of the length and width).	Data consistency
TLA-112	The **TouchDownLiftOff.ElevatedPoint.elevation** attribute is mandatory	Minimum AIP data set
TLA-113	The **TouchDownLiftOff.ElevatedPoint.horizonalAccuracy** should be provided.	PANS-AIM
TLA-114	The **TouchDownLiftOff.ElevatedPoint.verticalAccuracy** should be provided.	PANS-AIM
TLA-115	The **TouchDownLiftOff.ElevatedPoint.geoidUndulation** should be provided where appropriate.	PANS-AIM
TLA-116	The **TouchDownLiftOff.associatedAirportHeliport** property is mandatory.	AIXM 4.5 / Minimal data rule
TLA-117	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.vertical Accuracy** shall be 0.5m	PANS-AIM

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	or less for heliports with or without a PinS approach.	
TLA-118	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.vertical.Accuracy** shall be 0.25m or less for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2.	PANS-AIM
TLA-119	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.elevation** shall be published with at least 1m or 1ft resolution for heliports with or without a PinS approach or for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2 (non-precision).	PANS-AIM
TLA-120	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.elevation** shall be published with at least 0.1 m or 0.1 ft resolution for heliports with or without a PinS approach or for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2 (non-precision).	PANS-AIM
TLA-121	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.geoidUndulation** shall be published with at least 1m or 1ft resolution for heliports	PANS-AIM

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	with or without a PinS approach or for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2 (non-precision).	
TLA-122	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.geoidUndulation** shall be published with at least 0.1 m or 0.1 ft resolution for heliports with or without a PinS approach or for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2 (non-precision).	PANS-AIM
TLA-123	Coordinates of **TouchDownLiftOff.aimingPoint** shall be published with at least 6 decimals resolution.	PANS-AIM
TLA-124	If coded, the value of the **TouchDownLiftOff.aimingPoint.ElevatedPoint.horizontalAccuracy** shall be 1 M or less.	PANS-AIM

(5) Airspace (ASE) data

(a) AIRSPACE CODING GUIDELINES

2.1.5.a.1. AIRSPACE

In the PANS-AIM Aeronautical Data Catalogue, ATS airspace is defined as follows:

Airspaces of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules

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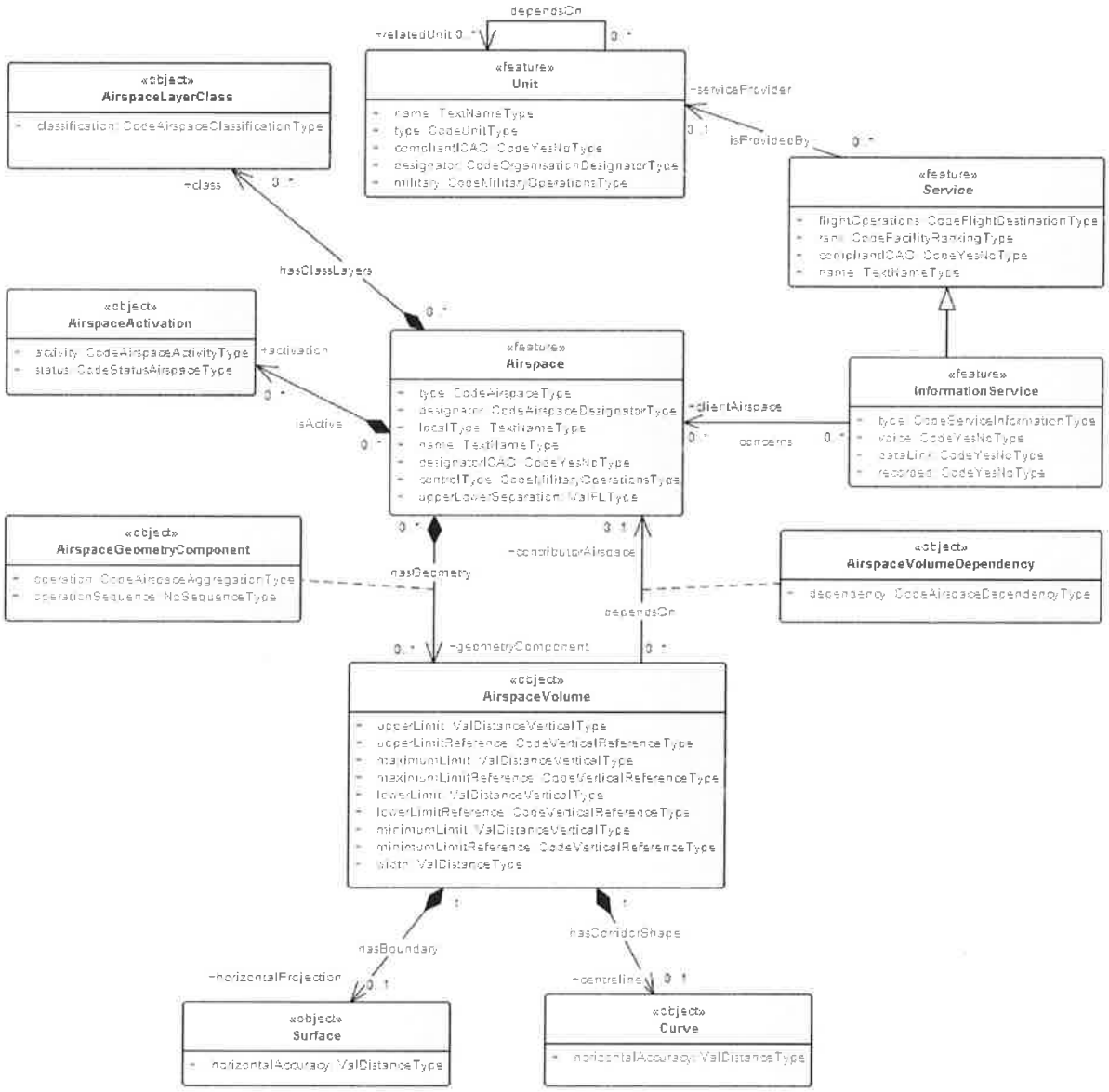
of operation are specified.

PANS-AIM lists the following types of ATS airspaces:

- FIR/UIR
- CTA
- TMA
- CTR

The figure below shows the main AIXM 5 classes used for the airspace concept.



2.1.5.a.2. BASIC DATA FOR AIRSPACE

For Airspace, PANS-AIM requires some basic properties as part of the minimum AIP data set.

In addition, PANS-AIM also defines in Appendix 2 'CONTENTS OF THE

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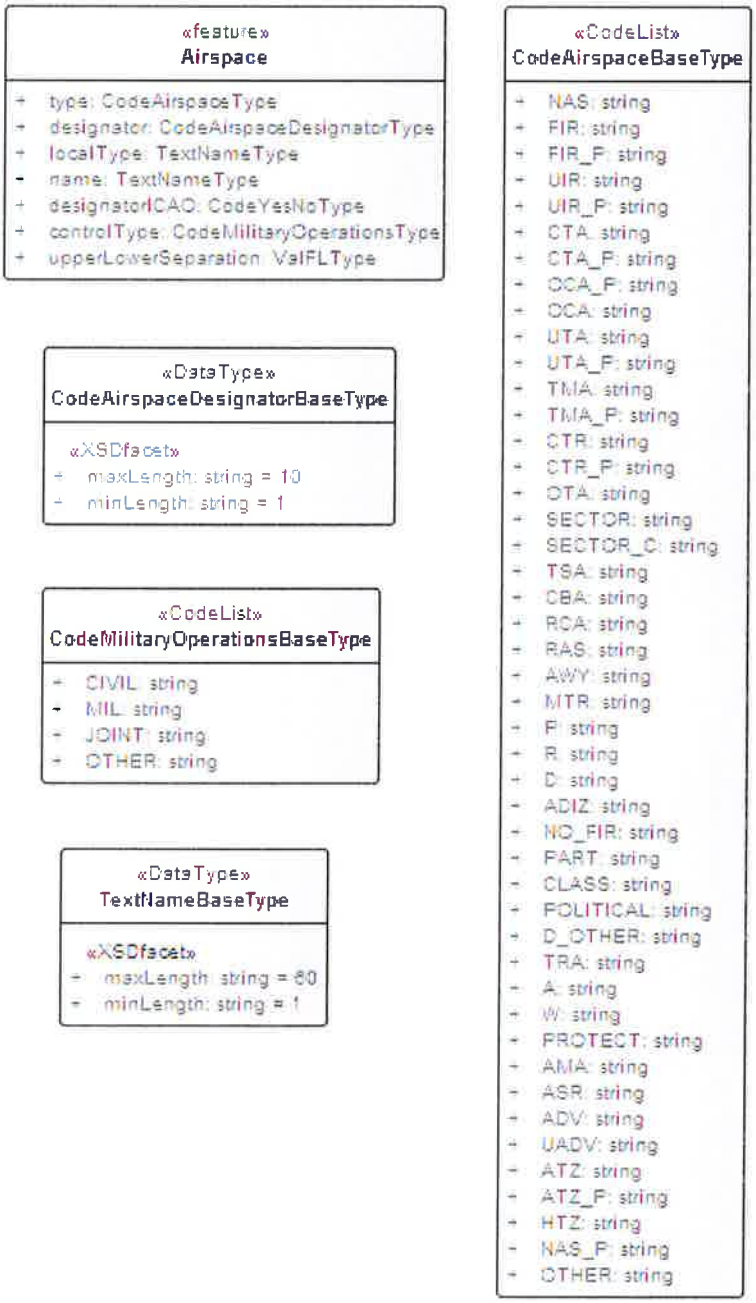
AERONAUTICAL INFORMATION PUBLICATION (AIP)' requirements for the publication of the airspace type, name and designation.

The diagram below shows the AIXM classes, including the relevant data types and code lists, needed to encode that information:



2.1.5.a.3. VERTICAL LIMITS OF AIRSPACE

For ATS and special activity airspaces, PANS-AIM requires its vertical limits to be provided as part of the minimum AIP data set.

In AIXM 5 for the encoding of the vertical limits of an airspace, the AirspaceVolume class is used.

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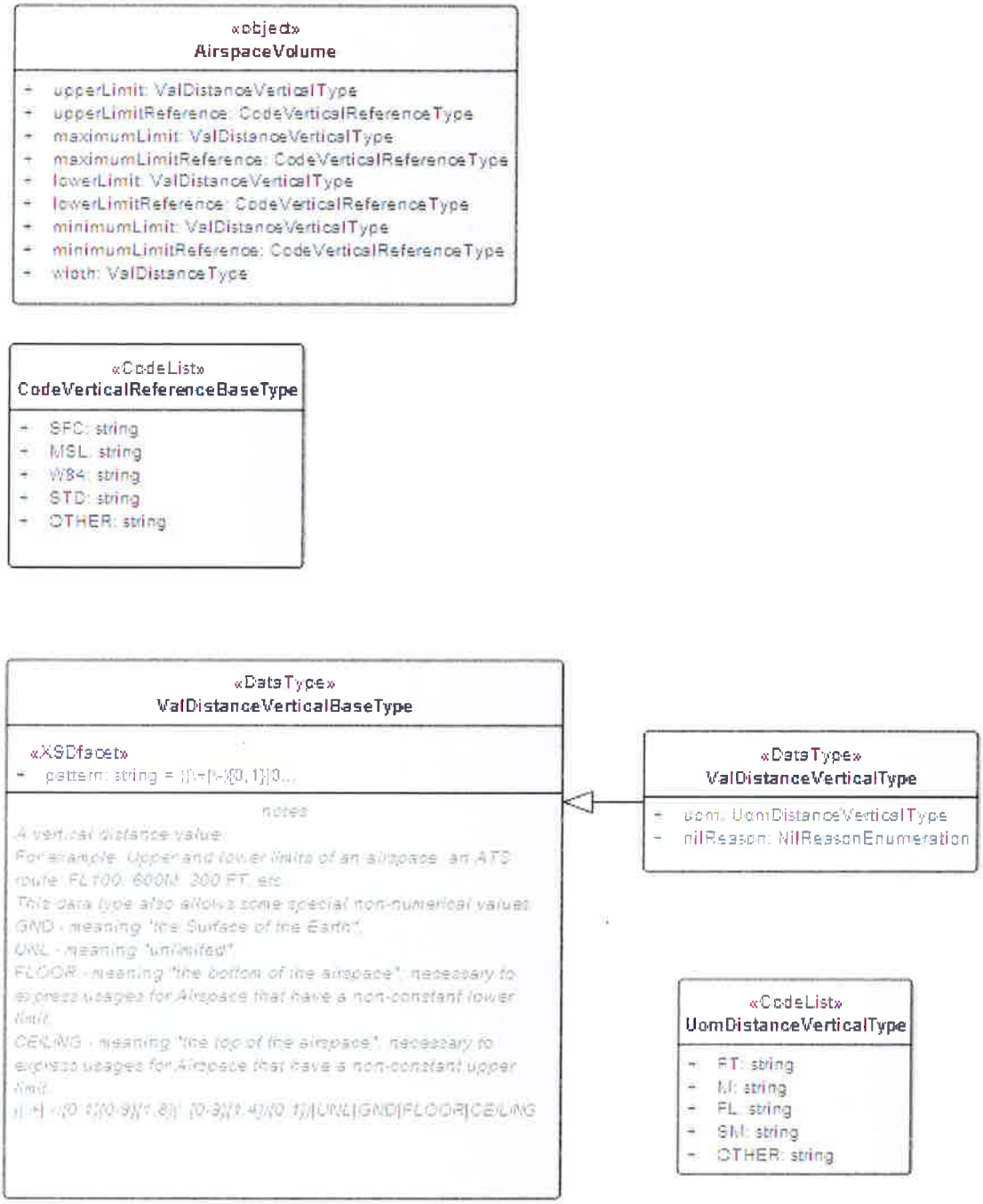

2.1.5.a.4. GEOMETRY OF AIRSPACE

For ATS and special activity airspaces, PANS-AIM requires its lateral limits to be provided as part of the minimum AIP data set.

The diagram below shows the AIXM classes that may be used to encode that information:

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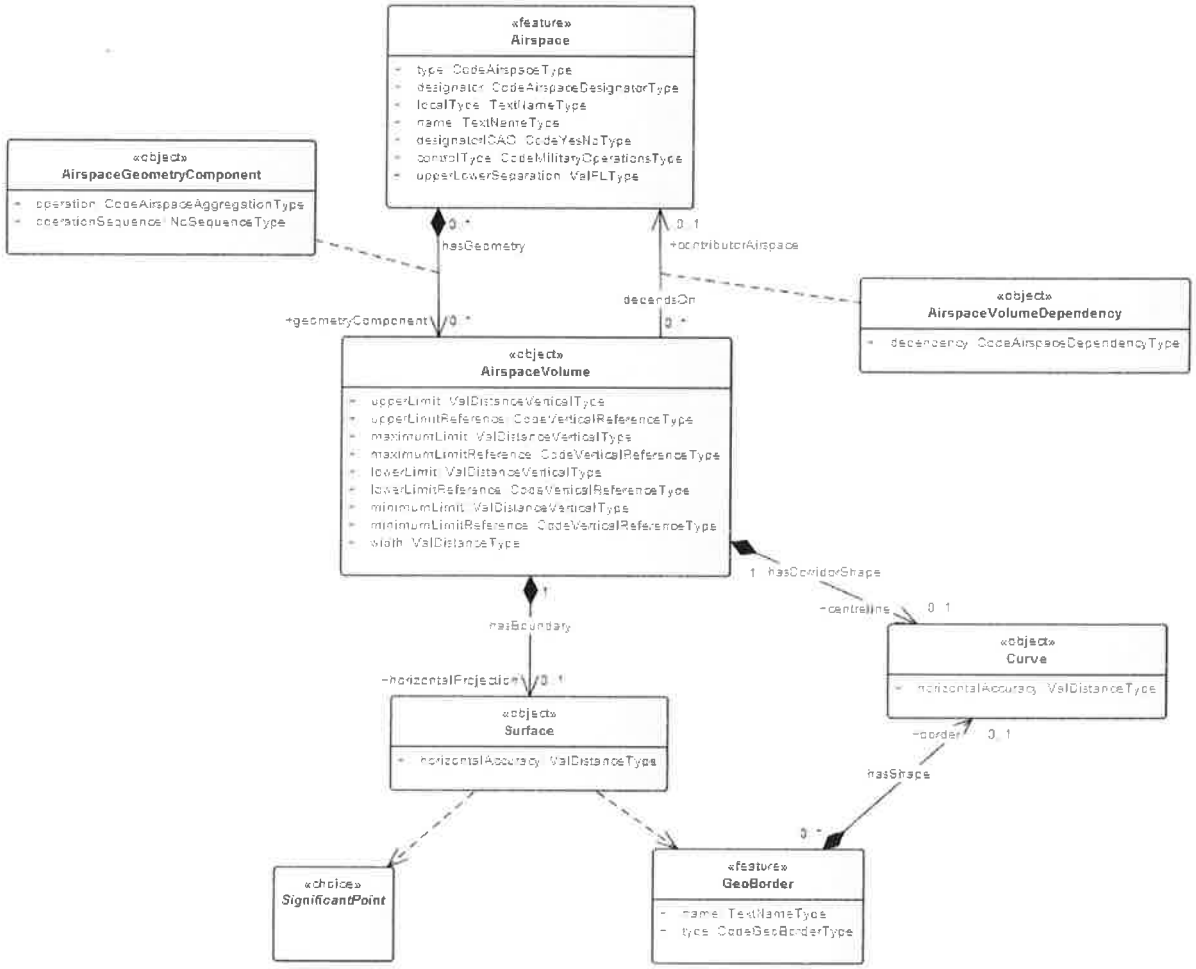
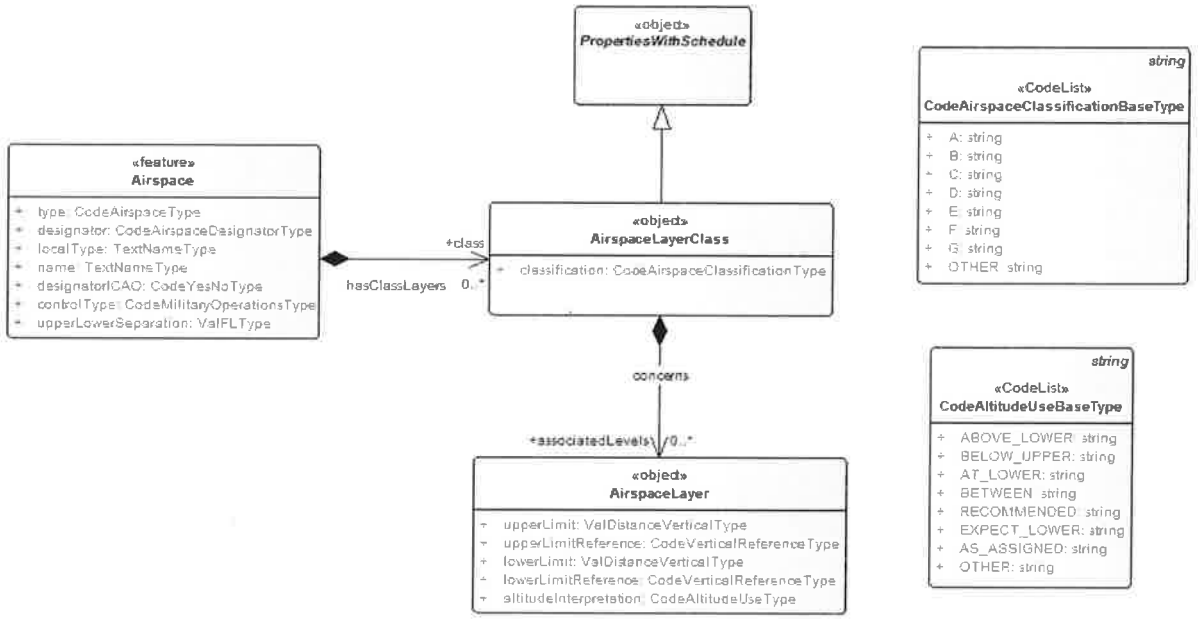


2.1.5.a.5. CLASS OF AIRSPACE

For ATS airspace, PANS-AIM requires the class of airspace as part of the minimum AIP data set.

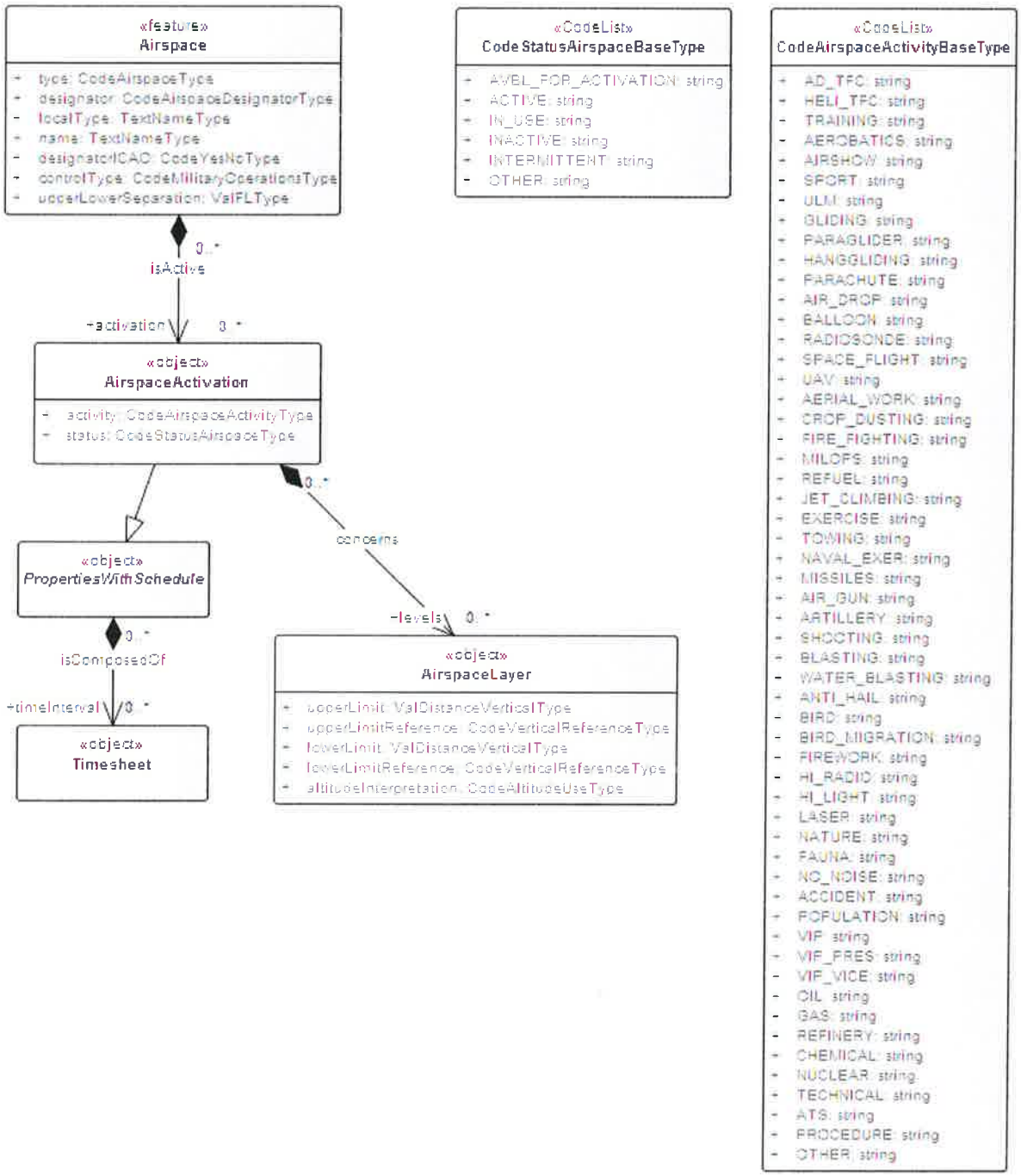


2.1.5.a.6. RESTRICTION AND ACTIVATION

For special activity airspace, PANS-AIM requires as part of the minimum AIP data set to provide information about the type of restriction or nature of hazard. In case of an ADIZ (Air Defense Information Zone), the risk of interception in the event of penetration shall be indicated.

In addition, information on system and means of activation announcements, together with information pertinent to civil flights and applicable ADIZ procedures shall be provided.

The figure below shows the main AIXM 5 classes used for the airspace activation concept, including relevant list of values for some properties.



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2.1.5.a.7. ATS UNIT PROVIDING SERVICE

The ATS unit providing service for an airspace is not part of the minimum AIP data set but required in ENR 2.1 FIR, UIR, TMA AND CTA:

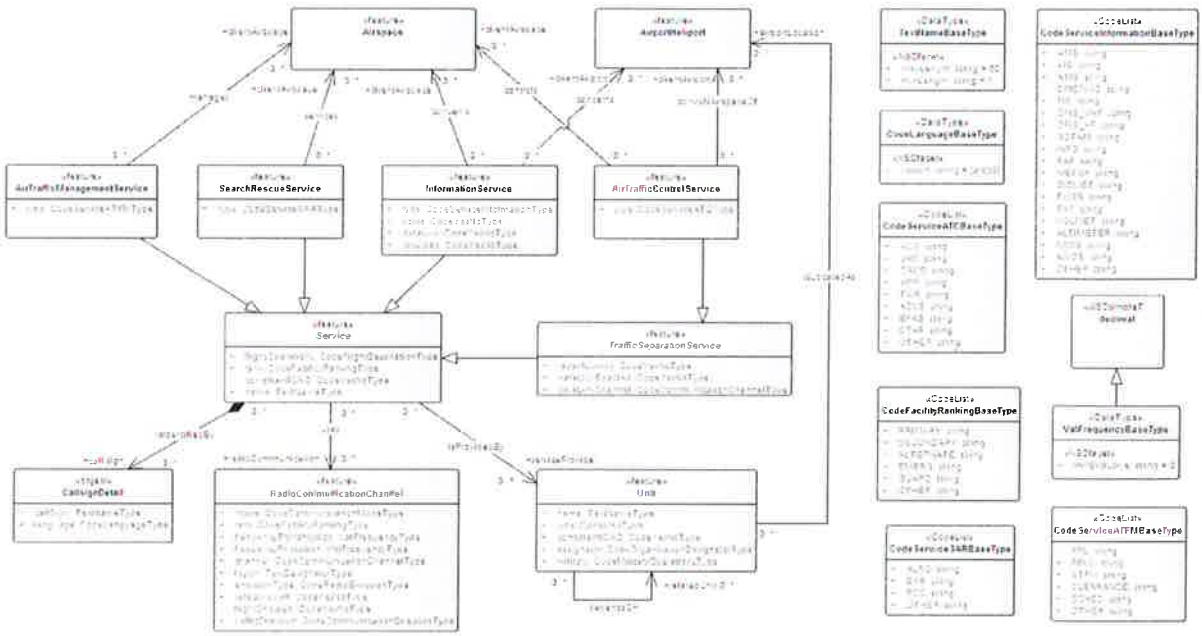
- identification of unit providing the service;
- call sign of aeronautical station serving the unit and language(s) used, specifying the area and conditions, when and where to be used, if applicable;
- frequencies, and if applicable SATVOICE number, supplemented by indications for specific purposes.

and AD 2.17 / AD 3.16 Air traffic services airspace

- call sign and language(s) of the ATS unit providing service;

Hence, it is considered conditional data.

The figure below shows the main AIXM 5 classes used for encoding ATS unit providing service, including relevant list of values for some properties.



(b) AIXM CODING CHECKLIST

AIXM Feature/Object	AIXM Feature/Object Property	Complex Type or xlink : href to other Feature	AIP data set

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Airspace	type		Mandatory
	designator		Conditional for some types of airspaces it is required, ENR 5.1 Prohibited, restricted and danger areas ENR 5.5 Aerial sporting and recreational activities AD 2.17/AD 3.16 Air traffic services airspace
	localType		Optional
	name		Mandatory
	designatorICAO		Optional but should be used for FIR/UIR and other airspaces that have an ICAO location indicator (DOC 7910)
	controlType		Optional
	upperLowerSeparation		Optional
	class	AirspaceLayerClass	Mandatory For ATS Airspaces
	protectedRoute	xlink:href -> Route	Optional
	geometryComponent	AirspaceGeometryComponent	Mandatory

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	activation	AirspaceActivation	Mandatory For Special Activity Airspaces
	annotation	Note	Optional
AirspaceLayerClass	timeInterval	Timesheet	Optional
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	classification		Mandatory For ATS Airspaces
	associatedLevels	AirspaceLayer	Optional
AirspaceLayer	upperLimit		Optional
	upperLimitReference		Optional
	lowerLimit		Optional
	lowerLimitReference		Optional
	altitudeInterpretation		Optional
	discreteLevelSeries	xlink:href -> StandardLevelColumn	Optional
	annotation	Note	Optional
AirspaceGeometryComponent	operation		Mandatory For Airspace Aggregation (i.e. more than one AirspaceVolum

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			e)
	operationSequence		Mandatory For Airspace Aggregation (i.e. more than one AirspaceVolume)
	annotation	Note	Optional
	theAirspaceVolume	AirspaceVolume	Mandatory
AirspaceVolume	upperLimit		Mandatory For airspaces with one Airspace Volume and Airspace Aggregation by copying the geometry
	upperLimitReference		Mandatory if upperLimit is specified (except for UNL)
	maximumLimit		Optional
	maximumLimitReference		Optional
	lowerLimit		Mandatory For airspaces with one Airspace Volume and Airspace Aggregation by copying the geometry
	lowerLimitReference		Mandatory if lowerLimit is

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			specified (except for GND)
	minimumLimit		Optional
	minimumLimitReference		Optional
	width		Mandatory For Airspace corridor
	horizontalProjection	Surface	Mandatory For airspaces with one Airspace Volume and Airspace Aggregation by copying the geometry
	centreline	Curve	Mandatory for Airspace corridor
	contributorAirspace	AirspaceVolumeDependency	Mandatory for Airspace Aggregation by referencing
	annotation	Note	Optional
AirspaceVolumeDependency	dependency		Mandatory for Airspace Aggregation by referencing
	annotation	Note	Optional
	theAirspace	xlink:href -> Airspace	Mandatory for Airspace Aggregation by referencing
Surface	horizontalAccu		Mandatory for

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	racy		airspaces with one Airspace Volume and Airspace Aggregation by copying the geometry
	annotation	Note	Optional
	including all GM_Surface properties	see gml:Surface	Mandatory for airspaces with one Airspace Volume and Airspace Aggregation by copying the geometry
Curve	horizontalAccuracy		Mandatory for Airspace corridor
	annotation	Note	Optional
	including all GM_Curve properties	see gml:Curve	Mandatory for Airspace corridor
AirspaceActivation	timeInterval	Timesheet	Conditional for Special Activity Airspaces
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	activity		Mandatory for Special Activity Airspaces
	status		Mandatory for Special Activity

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			Airspaces
	levels	AirspaceLayer	Optional
	user	xlink:href -> OrganisationAuthority	Conditional for Aerial Sporting Activities airspaces
	aircraft	AircraftCharacteristic	Optional
AirTrafficControlService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	call-sign	CallsignDetail	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces) In some cases rather the

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			availability of the RadioCommunicationChannel may be coded, instead.
	annotation	Note	Optional
	radarAssisted		Optional
	dataLinkEnabled		Optional
	dataLinkChannel		Optional
	type		Optional
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientAirspace	xlink:href -> Airspace	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	clientRoute	RoutePortion	N/A
	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	N/A
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A
	aircraftLocator	xlink:href -> DirectionFinder	N/A
InformationService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional

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	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	call-sign	CallsignDetail	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3) In some cases rather the availability of the RadioCommunicationChannel may be coded, instead.

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	annotation	Note	Optional
	type		Optional
	voice		Optional
	dataLink		Optional
	recorded		Optional
	navaidBroadcast	xlink:href -> VOR	Optional
	clientAirspace	xlink:href -> Airspace	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientRoute	RoutePortion	N/A
	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	N/A
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A
SearchRescueService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional (for ENR 2.1 and AD 2.17/AD 3.16

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			airspaces)
	call-sign	CallsignDetail	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces), In some cases rather the availability of the RadioCommunicationChannel may be coded, instead.
	annotation	Note	Optional
	type		Optional
	clientAirspace	xlink:href -> Airspace	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	clientRoute	RoutePortion	N/A
CallsignDetail	callSign		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)

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	language		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	annotation	Note	Optional
Unit	name		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces)
	type		Optional
	compliantICAO		Optional
	designator		Optional
	military		Optional
	position	ElevatedPoint	Optional
	airportLocation	xlink:href -> AirportHeliport	Optional
	ownerOrganisation	xlink:href -> OrganisationAuthority	Optional
	contact	ContactInformation	Optional
	relatedUnit	UnitDependency	Optional
	availability	UnitAvailability	Optional
	annotation	Note	Optional
ServiceOperationalStatus	timeInterval	Timesheet	Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces), In some cases rather the

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			availability of the RadioCommunicationChannel may be coded, instead.
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	operationalStatus		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces), In some cases rather the availability of the RadioCommunicationChannel may be coded, instead.
RadioCommunicationChannel	mode		Optional
	rank		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	frequencyTransmission		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)

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	frequencyReception		Conditional (for ENR 2.1 and AD 2.17/AD 3.16 airspaces and other airspaces where required, e.g. ENR 5.3)
	channel		Optional
	logon		Optional
	emissionType		Optional
	selectiveCall		Optional
	flightChecked		Optional
	trafficDirection		Optional
	location	ElevatedPoint	Optional
	availability	RadioCommunicationOperationalStatus	Optional
	annotation	Note	Optional
OrganisationAuthority	name		Conditional for Aerial Sporting Activities airspaces (and other airspaces where applicable, e.g. ENR 5.3)
	designator		Optional
	type		Optional
	military		Optional
	contact	ContactInformation	Conditional for Aerial Sporting Activities airspaces (and

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			other airspaces where applicable, e.g. ENR 5.3)
	relatedOrganisationAuthority	OrganisationAuthorityAssociation	Optional
	annotation	Note	Optional
ContactInformation	name		Optional
	title		Optional
	address	PostalAddress	Optional
	networkNode	OnlineContact	Optional
	phoneFax	TelephoneContact	Conditional for Aerial Sporting Activities airspaces
	annotation	Note	Optional
TelephoneContact	timeInterval	Timesheet	Optional
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	voice		Conditional for Aerial Sporting Activities airspaces
	facsimile		Optional

(c) AIXM CODING RULES

2.1.5.c.1. Basic Data of Airspace

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Req. ID	Data encoding rule	Justification
ASE-101	The **Airspace.type** attribute is mandatory.	Minimum AIP data set
ASE-102	The **Airspace.name** attribute is mandatory.	Minimum AIP data set
ASE-103	The **Airspace.designator** attribute is mandatory for airspaces with **Airspace.type** equal-to 'FIR', 'UIR', 'P', 'R', 'D'.	Minimum AIP data set
ASE-104	If **Airspace.type** equal-to 'FIR' or 'UIR', then **Airspace.designatorICAO** is mandatory.	Data consistency
ASE-105	If the Airspace **Airspace.designatorICAO** equal-to 'YES', then the **Airspace.designator** must be composed of exactly 4 letters	ICAO Annex 11
ASE-106	Airspaces published in ENR 5.2 (Military exercise and training areas) should be encoded with **controlType** = 'MIL'	PANS-AIM, AIP content
ASE-107	The **upperLowerSeperation** attribute may be specified only for **Airspace.type** equal-to 'FIR'.	ICAO Annex 11

2.1.5.c.2. Vertical Limits of Airspace

Req. ID	Data encoding rule	Justification
ASE-300	An **Airspace** shall have defined vertical limits.	Minimum AIP data set
ASE-301	If **AirspaceVolume.lowerLimit** is specified, then **AirspaceVolume.lowerLimitReference** is mandatory, except **AirspaceVolume.lowerLimit** is equal-to 'GND'.	AIXM Model / Minimal data rule
ASE-302	If **AirspaceVolume.upperLimit** is specified, then **AirspaceVolume.upperLimitReference** is mandatory, except **AirspaceVolume.upperLimi**	AIXM Model / Minimal data rule

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	t is equal-to 'UNL'.	
ASE-303	If the **lowerLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceVolume.lowerLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency
ASE-304	If the **upperLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceVolume.upperLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency
ASE-305	If **AirspaceVolume.maximumLimit** is specified, then **AirspaceVolume.maximumLimitReference** is mandatory, except **AirspaceVolume.upperLimit** is equal-to 'UNL'.	AIXM Model / Minimal data rule
ASE-306	If **AirspaceVolume.minimumLimit** is specified, then **AirspaceVolume.minimumLimitReference** is mandatory, except **AirspaceVolume.minimumLimit** is equal-to 'GND'.	AIXM Model / Minimal data rule
ASE-307	**AirspaceVolume.maximumLimitReference** should have the value 'SFC' [The distance measured from the surface].	AIXM 4.5 Business Rules / Data consistency
ASE-308	**AirspaceVolume.minimumLimitReference** should have the value 'SFC' [The distance measured from the surface].	AIXM 4.5 Business Rules / Data consistency
ASE-309	When expressed using the same **uom** and the same vertical reference (***LimitReference**), the value of **AirspaceVolume.upperLimit** (or **AirspaceVolume.maximumLimit)**	AIXM 4.5 Business Rules / Data consistency rule

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	must be higher than **AirspaceVolume.lowerLimit** a nd **AirspaceVolume.minimumLimit** .	
ASE-310	**AirspaceVolume.lowerLimit** shall not be equal-to 'FLOOR' or 'CELLING' or 'UNL'.	EAD / Data consistency
ASE-311	**AirspaceVolume.upperLimit** shall not be equal-to 'FLOOR' or 'CELLING' or 'GND'.	EAD / Data consistency
ASE-312	**AirspaceVolume.minimumLimit** sh all not be equal-to 'FLOOR' or 'CELLING' or 'UNL'.	EAD / Data consistency
ASE-313	**AirspaceVolume.maximumLimit** sh all not be equal-to 'FLOOR' or 'CELLING' or 'GND'.	EAD / Data consistency
ASE-315	The value 'OTHER' shall not be used for **AirspaceVolume.minimumLimit.**	AIXM 4.5/ Data consistency rule
ASE-316	The value 'OTHER' shall not be used for **AirspaceVolume.maxiumumLi mit.**	AIXM 4.5/ Data consistency rule
ASE-317	The value 'OTHER' shall not be used for **AirspaceVolume.upperLimit.uo m.**	AIXM 4.5/ Data consistency rule
ASE-318	The value 'OTHER' shall not be used for **AirspaceVolume.lowerLimit.uo m.**	AIXM 4.5/ Data consistency rule
ASE-319	**Airspace.type** equal-to 'CTA', 'CTA-P', 'UTA', 'UTA-P', 'OCA" or "OCA-P" should not have **AirspaceVolume.lowerLimit** l ower than 200 m (or 700 ft) or equal-to 'GND'.	ICAO Annex 11, Item 2.9.3.2

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2.1.5.c.3. Coding Rules for Geometry of Airspace

Req. ID	Data Encoding Rule	Justification
ASE-410	Airspace geometry may be defined either by providing a horizontal border and vertical limits (one airspace volume) or by an airspace aggregation (i.e. more than one airspace volume).	Data consistency
ASE-411	An **Airspace** instance shall have lateral & vertical limits (i.e. each **Airspace** shall have assigned **geometryComponent** and each **AirspaceGeometryComponent** shall have assigned **theAirspaceVolume** value).	Minimum AIP data set
ASE-412	**Airspace.type** equal-to 'PART', shall only be coded when it is used as parent within an airspace aggregation.	Data consistency
ASE-413	An **AirspaceVolume** that is not defined with a **contributorAirspace** must have either **horizontalProjection** or **centreline.**	EAD / Minimal data rule
ASE-414	An **Airspace** cannot be used twice for the definition (by aggregation) of the geometry of another **Airspace.**	EAD / Minimal data rule
ASE-415	If **Airspace** has more than one **geometryComponent,** then the **operationSequence** for each **AirspaceGeometryCompone**	AIXM Model / Data consisten

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	nt must be defined	cy rule
ASE-415	Each **AirspaceVolume** with assigned **centreline** value shall have assigned **width** value.	AIXM Model / Data consisten cy rule
ASE-416	Coordinates of ('FIR','FIR_P','UIR','UIR_P') boundary points shall be published with at least 2 decimals resolution.	PANS-AIM
ASE-417	Coordinates of boundary points of 'CTA','CTA_P','CTR','CTR_P','TMA',' TMA_P' shall be published with at least 4 decimals resolution.	PANS-AIM
ASE-418	Coordinates of ('P','R','D') boundary points shall be published with at least 2 decimals resolution if located outside CTA/CTR.	PANS-AIM
ASE-419	Coordinates of ('P','R','D') boundary points shall be published with at least 4 decimals resolution if located inside CTA/CTR.	PANS-AIM
ASE-420	If **AirspaceGeometryComponent.operation** is equal-to 'BASE', then **AirspaceGeometryComponent.operationSequence** must be 1 (first).	AIXM 4.5 Business Rules / Data consisten cy rule
ASE-421	If the **AirspaceVolume** does not have **centreline** (is not a corridor), then **width** shall not be specified	AIXM Model / Data consisten cy rule
ASE-422	For an **Airspace** defined as the aggregation of several **AirspaceGeometryComponent,** the result of the aggregation	EAD / Minimal data rule

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	shall not be an empty geometry	
ASE-423	The **horizontalAccuracy** of ('CTA','CTA_P','CTR','CTR_P','TMA','TMA_P') boundary points shall be equal-to or lower than '100' 'M' (or equal-to or lower than '300' 'FT)'.	PANS-AIM
ASE-424	The **horizontalAccuracy** of ('FIR','FIR_P','UIR','UIR_P') boundary points shall be equal-to or lower than '2' 'KM'.	PANS-AIM
ASE-425	The **horizontalAccuracy** of ('P','R','D') boundary points shall be equal-to or lower than '2' 'KM' if located outside CTA/CTR.	PANS-AIM
ASE-426	The **horizontalAccuracy** of ('P','R','D') boundary points shall be equal-to or lower than '100' 'M' if located inside CTA/CTR.	PANS-AIM
ASE-427	**An AirspaceVolume cannot have at the same time a horizontalProjection and a contributorAirspace.**	AIXM 4.5 Business Rules / Data consistency rule
ASE-428	An **AirspaceVolume** cannot have at the same time a **centreline** and a **contributorAirspace**.	AIXM 4.5 Business Rules / Data consistency rule
ASE-429	An **AirspaceVolume** cannot have at the same time a **horizontalProjection** and a **centreline.**	AIXM 4.5 Business Rules / Data consistency rule
ASE-431	An **AirspaceVolume** that has a	AIXM 4.5

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	geometry defined as a full copy of the geometry of another **Airspace** (**AirspaceVolumeDependency.dependency** value equal-to 'FULL_GEOMETRY'), shall not have vertical limits (because it re-uses the vertical limits of the **contributorAirspace).**	Business Rules / Data consistency rule
ASE-432	An **AirspaceVolume** for which the **lowerLimit** and **upperLimit** are not specified, must have the geometry defined as a full copy of the geometry of another **Airspace** (**AirspaceVolumeDependency.dependency** value equal-to 'FULL_GEOMETRY').	AIXM 4.5 Business Rules / Data consistency rule
ASE-433	The value 'OTHER' shall not be used for **AirspaceGeometryComponent.operation.**	AIXM 4.5 / Data consistency rule
ASE-434	The value 'OTHER' shall not be used for **AirspaceVolume.width.uom**	AIXM 4.5 / Data consistency rule
ASE-435	Coordinates of ("P','R','D") boundary points shall be aggregated with **Airspace** that have boundary points published with at least 2 decimals resolution, if outside CTA/CTR.	PANS-AIM
ASE-436	Coordinates of ("P','R','D") boundary points shall be aggregated with **Airspace** that have boundary points published with at least 4 decimals resolution, if inside CTA/CTR.	PANS-AIM
ASE-437	Coordinates of ("CTA','CTA-P','CTR','CTR-P', TMA, TMA-P') boundary points shall be	PANS-AIM

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	aggregated with Airspace that have boundary points published with at least 4 decimals resolution	
ASE-438	Coordinates of ("FIR','UIR','FIR-P','UIR-P") boundary points shall be aggregated with Airspace that have boundary points published with at least 2 decimals resolution	PANS-AIM
ASE-439	Each **AirspaceVolumeDependency** shall have assigned the **Airspace** value	AIXM4.5 / Minimal data rule
ASE-440	Each **AirspaceVolumeDependency** shall have assigned **dependency** value	AIXM4.5 / Minimal data rule
ASE-441	If **Airspace** has more than one **geometryComponent,** then the **operation** for each **AirspaceGeometryComponent** must be defined	AIXM Model / Data consistency
ASE-442	If **Airspace** has more than one **geometryComponent,** then there must exist exactly one with **operation** is equal-to 'BASE'.	AIXM 4.5 Business Rules / Data consistency rule
ASE-443	Child Airspace in airspace aggregation cannot have duplicate **AirspaceGeometryComponent.operationSequence**.	EAD Rule
ASE-444	If there is an **AirspaceVolumeDependency** coded for an **Airspace** the **Surface** and **Curve** shall not be encoded for that child airspace.	Data consistency

2.1.5.c.4. Coding Rules for Class of Airspace

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Req. ID	Data encoding rule	Justification
ASE-301	The **AirspaceLayerClass.classification** attribute is mandatory for ATS airspaces.	Minimum data
ASE-302	If **AirspaceLayerClass.upperLimit** is specified, then **AirspaceLayerClass.upperLimitReference** is mandatory, except **AirspaceLayerClass.upperLimit** is equal-to 'UNL' or 'CELLING'.	AIXM Model / Minimal data rule
ASE-303	If **AirspaceLayerClass.lowerLimit** is specified, then **AirspaceLayerClass.lowerLimitReference** is mandatory, except **AirspaceLayerClass.lowerLimit** is equal-to 'GND' or 'FLOOR'.	AIXM Model / Minimal data rule
ASE-304	If the **lowerLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceLayer.lowerLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency rule
ASE-305	If the **upperLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceLayer.upperLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency rule
ASE-306	If **Airspace.type** = 'CLASS', then **AirspaceLayerClass.classification** is mandatory.	Data consistency

2.1.5.c.5. Coding Rules for Airspace restriction and activation

Req. ID	Data encoding rule	Justification
ASE-501	The **AirspaceActivation.activity** attribute is mandatory for special activity airspaces and other regulated airspaces.	Minimum data

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ASE-310	If Hours of Applicability is encoded for an ATS airspace, the **AirspaceActivation.activity** shall be 'ATS'.	AIXM 5
ASE-311	If Hours of Applicability is encoded for an ATS airspace, **AirspaceActivation.status** shall be 'IN_USE'.	AIXM 5
ASE-361	If **Airspace.type** is 'FIR', 'UIR', then the corresponding timesheet shall be encoded with the meaning 'H24'.	EAD Rule
ASE-380	For special activity airspaces and other regulated airspaces the **AirspaceActivation.status** shall be encoded as 'AVBL_FOR_ACTIVATION' if the actual activation of the time of activity coded in the **Timesheet** is announced by NOTAM.	AIXM 5
ASE-381	For special activity airspaces and other regulated airspaces the **AirspaceActivation.status** shall be encoded as 'ACTIVE' if the actual activation of the time of activity coded in the **Timesheet** is not announced by NOTAM.	AIXM 5

2.1.5.c.6. Coding Rules for Class of Airspace

Req. ID	Data encoding rule	Justification
ASE-301	The **AirspaceLayerClass.classification** attribute is mandatory for ATS airspaces.	Minimum data
ASE-302	If **AirspaceLayerClass.upperLimit** is specified, then **AirspaceLayerClass.upperLimitReference** is mandatory, except **AirspaceLayerClass.upperLimit** is equal-to 'UNL' or 'CELLING'.	AIXM Model / Minimal data rule
ASE-303	If **AirspaceLayerClass.lowerLimit** is specified, then **AirspaceLayerClass.lowerLimitReference** is mandatory,	AIXM Model / Minimal

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	except **AirspaceLayerClass.lowerLimit** is equal-to 'GND' or 'FLOOR'.	data rule
ASE-304	If the **lowerLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceLayer.lowerLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency rule
ASE-305	If the **upperLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceLayer.upperLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency rule
ASE-306	If **Airspace.type** = 'CLASS', then **AirspaceLayerClass.classification** is mandatory.	Data consistency

2.1.5.c.7. Coding Rules for Airspace restriction and activation

Req. ID	Data encoding rule	Justification
ASE-501	The **AirspaceActivation.activity** attribute is mandatory for special activity airspaces and other regulated airspaces.	Minimum data
ASE-310	If Hours of Applicability is encoded for an ATS airspace, the **AirspaceActivation.activity** shall be 'ATS'.	AIXM 5
ASE-311	If Hours of Applicability is encoded for an ATS airspace, **AirspaceActivation.status** shall be 'IN_USE'.	AIXM 5
ASE-361	If **Airspace.type** is 'FIR', 'UIR', then the corresponding timesheet shall be encoded with the meaning 'H24'.	EAD Rule
ASE-380	For special activity airspaces and other regulated airspaces the **AirspaceActivation.status** shall be encoded as 'AVBL_FOR_ACTIVATION' if the actual	AIXM 5

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	activation of the time of activity coded in the **Timesheet** is announced by NOTAM.	
ASE-381	For special activity airspaces and other regulated airspaces the **AirspaceActivation.status** shall be encoded as 'ACTIVE' if the actual activation of the time of activity coded in the Timesheet is not announced by NOTAM.	AIXM 5

2.1.5.c.8. ATS Unit Providing Service

Req. ID	Data encoding rule	Justification
ASE-701	If a Service has a **clientAirspace** that is an ATS airspace or a special activity airspace the **Unit.name** related to the Service shall be provided.	PANS AIM
ASE-702	If a **Service** has a **clientAirspace** that is an ATS airspace or a special activity airspace the **Service.type** shall be provided.	Data consistency
ASE-703	If a **Service** has a **clientAirspace** that is an ATS airspace or a special activity airspace the **Service.call-sign** shall be provided.	Data consistency
ASE-704	If a **Service** has a **clientAirspace** that is an AD 2.17/AD 3.16 airspace the **Unit.airportLocation** of the unit providing the service should be provided.	Data consistency
ASE-705	If a **CallSignDetail.callSign** is provided, also a **CallSignDetail.language** shall be provided.	AIXM 4.5 / Minimal data rule
ASE-706	For the provision of the **CallSignDetail.language** Language codes - ISO 639-2 shall be used.	Data harmonisation
ASE-707	**AirTrafficManagementService** shall not be used as **Service** in case the **clientAirspace** is an ATS airspace or a special activity airspace.	Data harmonisation
ASE-708	Each **Service** related to an **Airspace** should have a **radioCommunication** with	Data harmonisati

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	coded **RadioCommunicationChannel.frequencyTransmission** and **RadioCommunicationChannel.frequencyReception** (if applicable).	on
ASE-360	If Hours of Service is encoded for an ATS airspace, **ServiceOperationalStatus.operationalStatus** shall be 'NORMAL'.	AIXM 5

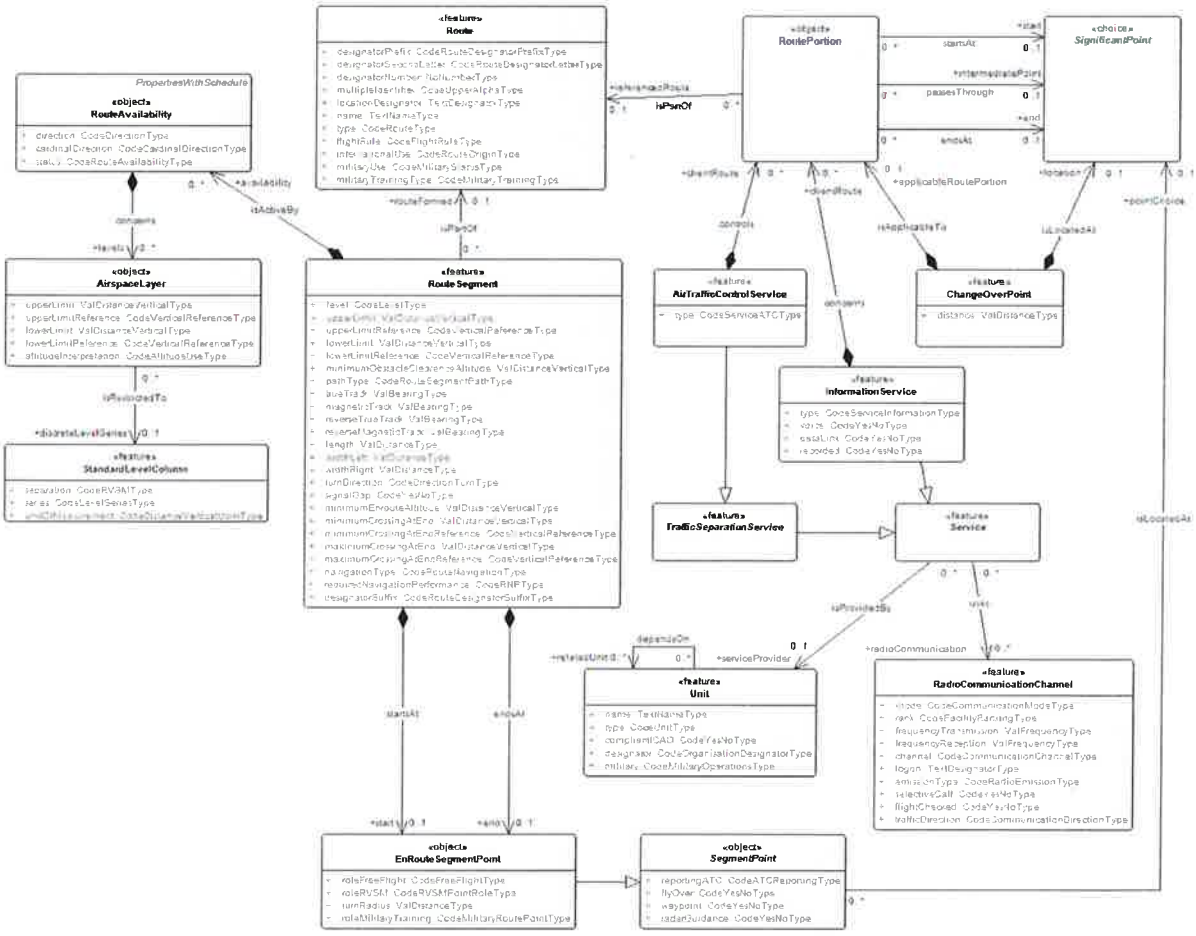
(6) ATS and other routes (RTE) data

(a) CODING GUIDELINES

2.1.6.a.1. Route

The term Route is used to mean variously, airway, advisory routes, controlled or uncontrolled routes, etc. excluding arrival and departure routes.

The figure below shows the main AIXM 5.1(.1) classes used for the route concept.



2.1.6.a.2. BASIC DATA FOR ROUTES

For Route, PANS-AIM requires some basic properties as part of the minimum AIP

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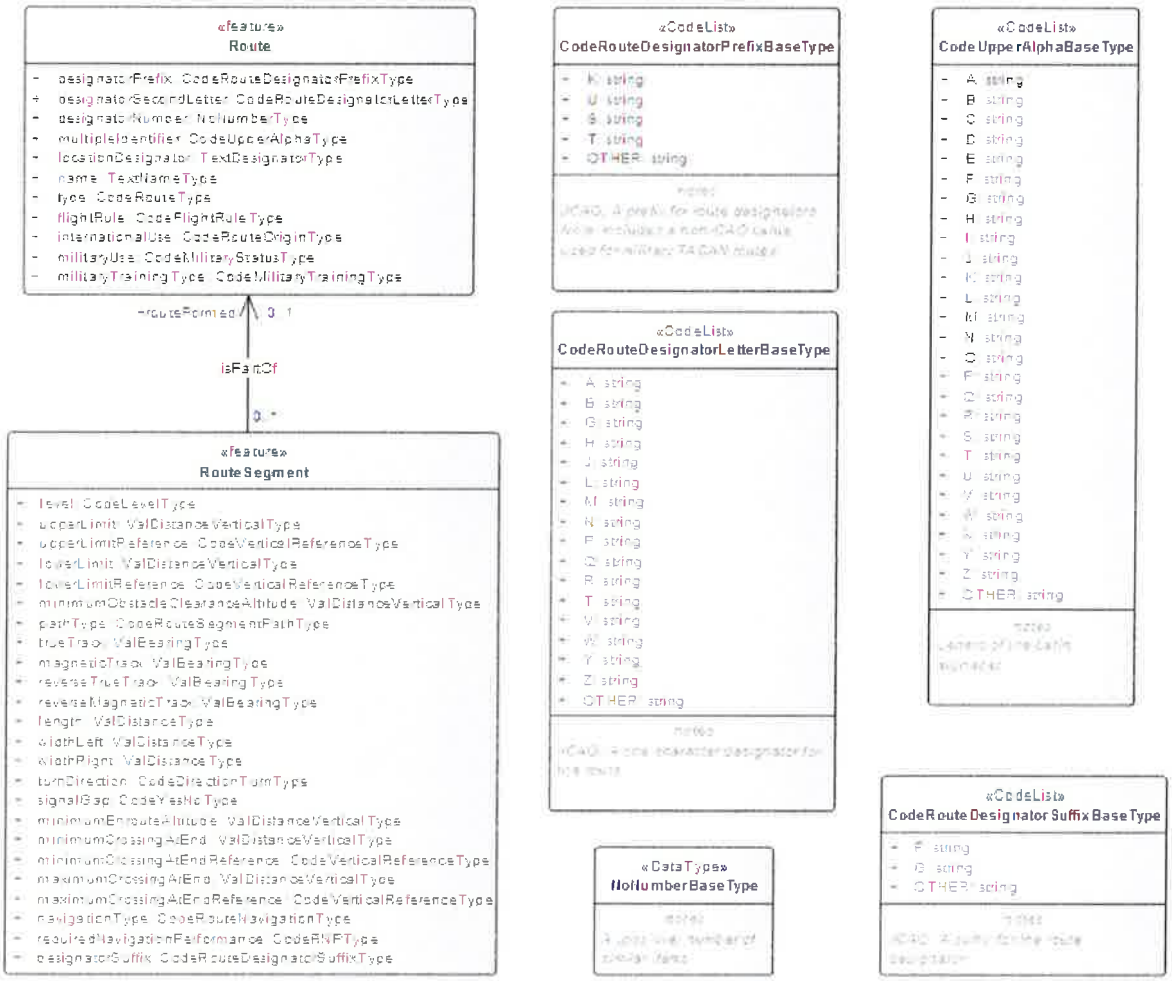
data set.

For Runway Direction, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are properties like identifier prefix, flight rules, designator etc.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:



2.1.6.a.3. BASIC DATA FOR ROUTE SEGMENT

For Route Segment, PANS-AIM requires some basic properties as part of the minimum AIP data set. This are: from point, to point, track, distance, upper limit, lower limit, MEA, MOCA, etc.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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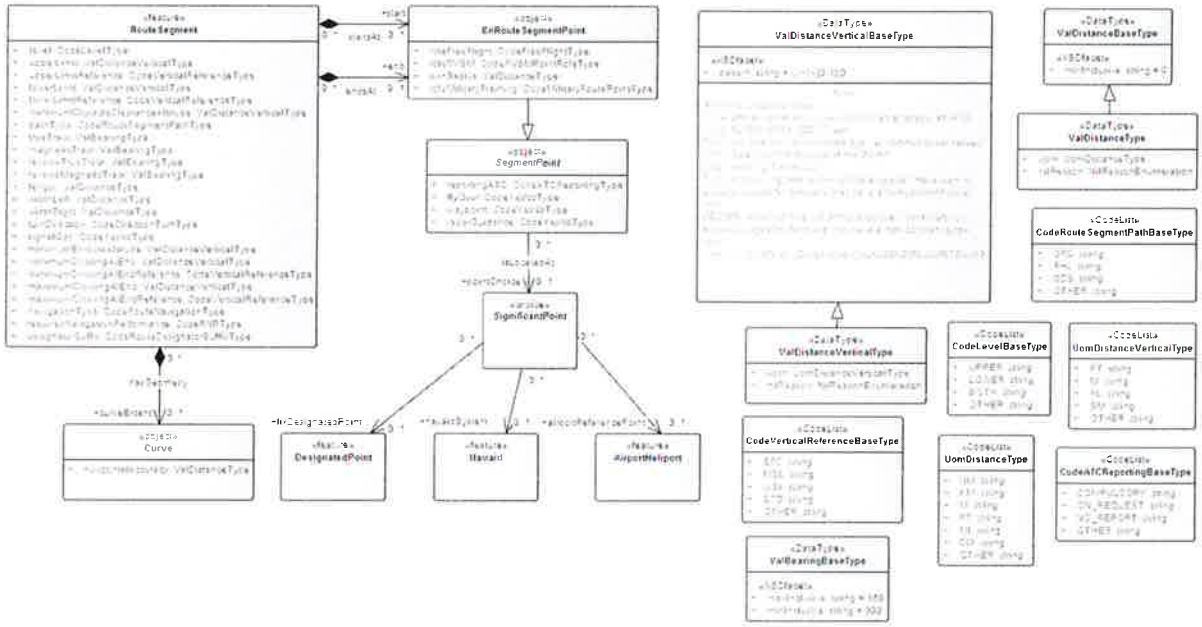
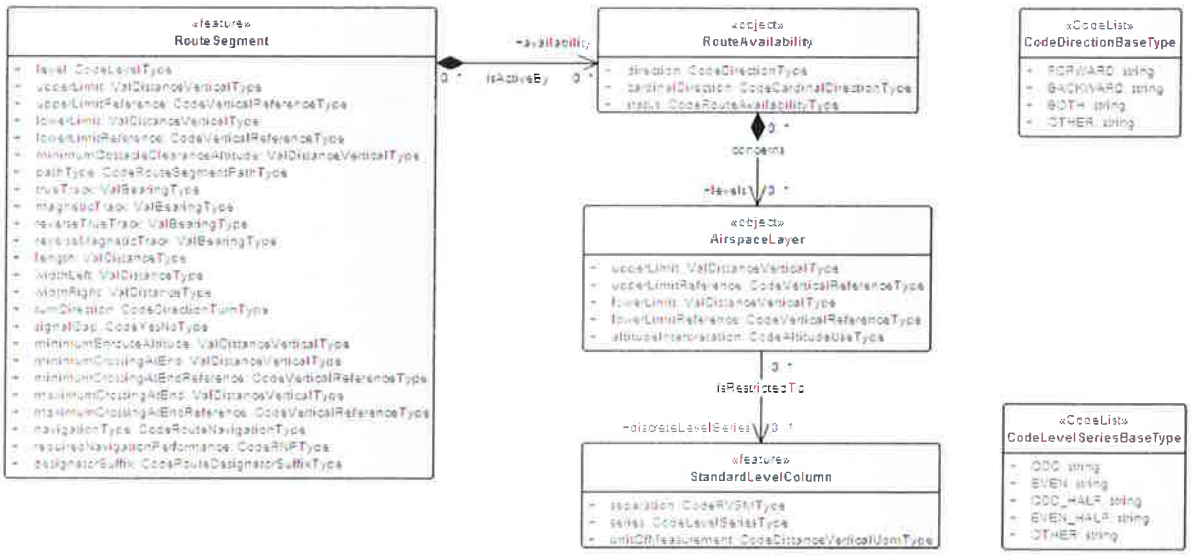


2.1.6.a.4. DIRECTIOIN OF CRUISE LEVELS

For Route Segment, PANS-AIM requires the direction of cruising level and reverse direction of cruising level as part of the minimum AIP data set.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:



2.1.6.a.5. CONTROLLING UNIT FOR ROUTE SEGMENT

The ATS unit providing service for an airspace is not part of the minimum AIP data set but required in ENR 3 of PANS-AIM: an indication of the controlling unit, its operating channel and, if applicable, its logon address, SATVOICE number, and any navigation, RCP and RSP specification(s) limitations.

Hence, in the scope of this guidelines it is considered conditional data.

The diagram below shows the AIXM classes, including the relevant data types,

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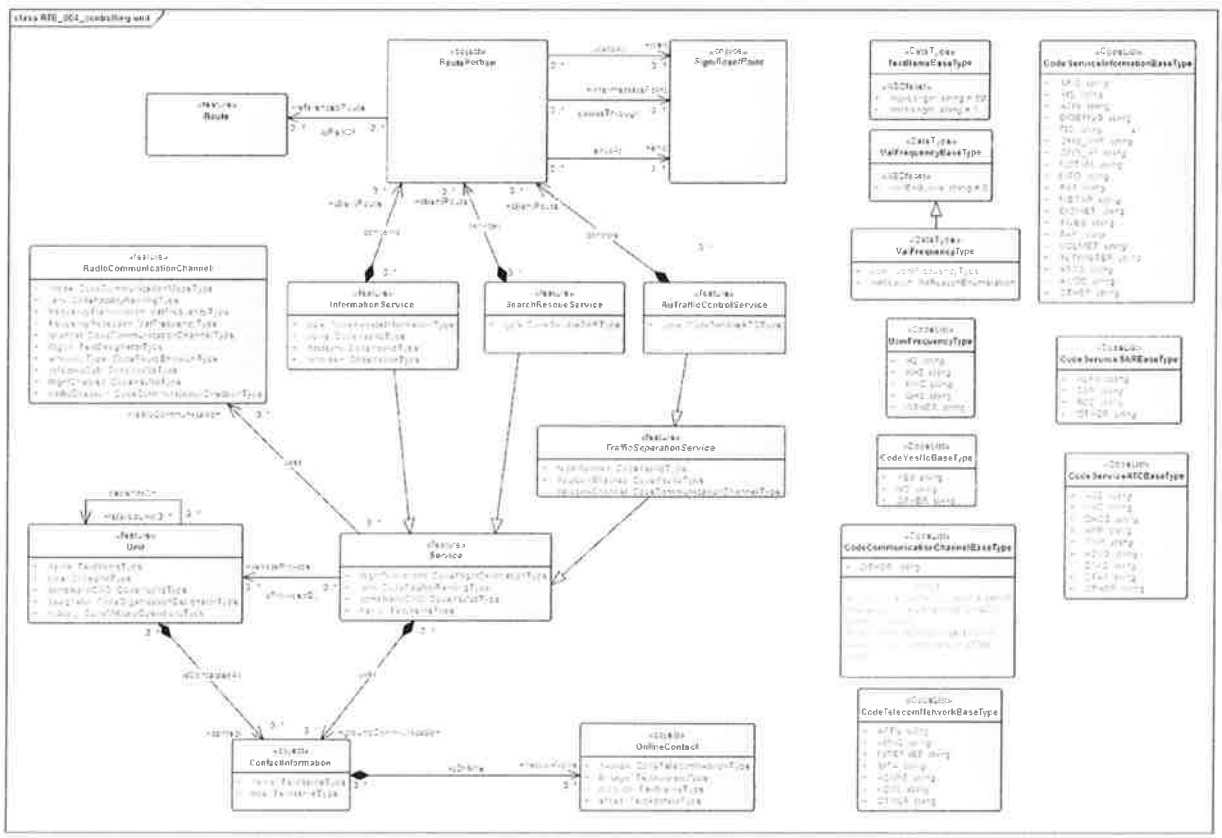
needed to encode that information.



2.1.6.a.6. CHANGE OVER POINT

PANS-AIM requires the change over point (COP) to be encoded in case the path of the route segment(s) is a VOR radial. This is applicable only for conventional routes, i.e. for ENR 3.1 Lower ATS Routes, ENR 3.2 Upper ATS Routes and ENR 3.4 Helicopter routes.

PANS-AIM defines the COP as:

The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omni directional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

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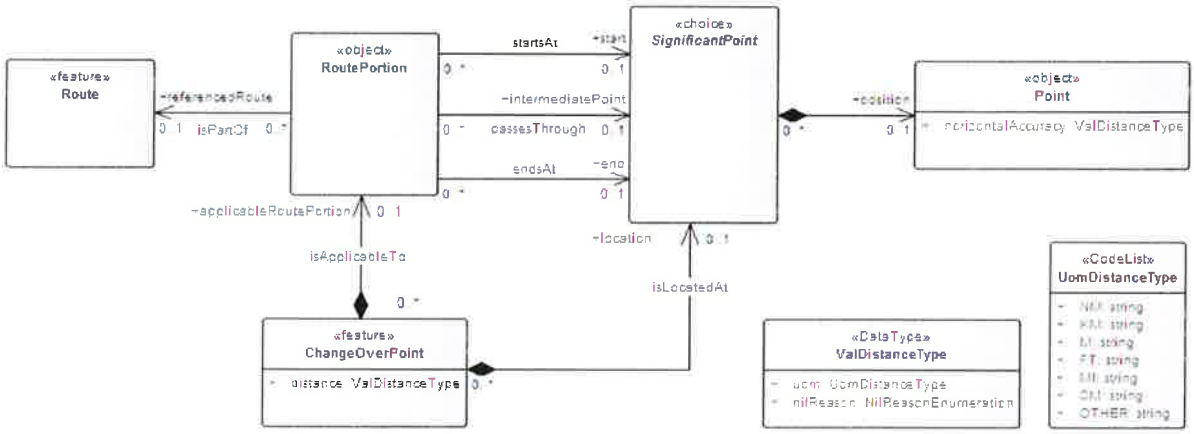

(b) AIXM CODING CHECKLIST

AIXM Feature / Object	AIXM Feature/Object Property	Complex Type or xlink:href to other Feature	AIP data set
Route	designatorPrefix		Mandatory, if applicable
	designatorSecondLetter		Mandatory
	designatorNumber		Mandatory
	multipleIdentifier		Mandatory, if applicable
	locationDesignator		Optional
	name		Optional
	type		Optional
	flightRule		According to PANS-AIM only relevant for "Other routes".
	internationalUse		Optional
	militaryUse		Optional
	militaryTrainingTy		Optional

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	pe		
	userOrganisation	xlink:href -> OrganisationAuthority	Optional
	annotation	Note	Optional
RouteSegment	level		Optional The level of a route segment (Upper, lower or both) is neither part of the PANS-AIM chapter 5.3.3.1.1 nor Appendix 1 (Aeronautical Data Catalogue) nor of Appendix 2. However, it is part of the coding guidelines as it is contained in the ARINC 424 Enroute Airways Records (ER); data field is named "Level (LEVEL)".
	upperLimit		Mandatory
	upperLimitReference		Mandatory
	lowerLimit		Mandatory
	lowerLimitReference		Mandatory
	minimumObstacleClearanceAltitude		Mandatory for ENR 3.1 Lower ATS Routes.

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	pathType		Optional However, according to PANS-AIM ENR 3 the pathType shall be the geodesic distance.
	trueTrack		Mandatory or magneticTrack coded
	magneticTrack		Mandatory or trueTrack to be coded
	reverseTrueTrack		Mandatory, if applicable
	reverseMagneticTrack		Mandatory, if applicable
	length		Mandatory
	widthLeft		Mandatory for ENR 3.1 Lower ATS Routes and ENR 3.2 Upper ATS Routes.
	widthRight		Mandatory for ENR 3.1 Lower ATS Routes and ENR 3.2 Upper ATS Routes.
	turnDirection		Optional
	signalGap		Optional
	minimumEnrouteAltitude		Mandatory for ENR 3.1 Lower ATS Routes.
	minimumCrossing		Optional

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	AtEnd		
	minimumCrossingAtEndReference		Optional
	maximumCrossingAtEnd		Optional
	maximumCrossingAtEndReference		Optional
	navigationType		Mandatory In general there seems to be issues regarding the modelling of the navigation specification for routes in AIXM and PANS-AIM. Issues: The PANS-AIM description is not clear in regard what is required. Just to specify if the route is an RNP or RNAV route or the specific RNP/RNAV specification, e.g. RNP 4 or RNAV 5? The navigationType attribute of AIXM only provides as values 'RNAV', 'CONV' and 'TACAN'. Using 'OTHER' may be used to define that it is a RNP. The specific navigation specification may

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			also be coded by using e.g. 'OTHER:RNAV5'. AIXM provides a dedicated attribute for the requiredNavigationPerformance that can be used to code specific RNP values, e,g. 'RNP4'. PANS-AIM in addition to this property also defines a "Navigation performance requirements" property. Recommendation to review both the PANS-AIM properties and descriptions and the AIXM concept for the navigation specification for Route.
	requiredNavigationPerformance		See property navigationType
	designatorSuffix		Mandatory, if applicable.
	start	EnRouteSegmentPoint	Mandatory
	routeFormed	xlink:href -> Route	Mandatory
	evaluationArea	ObstacleAssessmentArea	Optional

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	curveExtent	Curve	Optional
	end	EnRouteSegmentPoint	Mandatory
	availability	RouteAvailability	Mandatory to code the direction of the cruising level (even, odd, NIL).
	annotation	Note	Mandatory for information required in PANS-AIM for which no dedicated AIXM 5 property is available, viz: Accuracy for lenght Accuracy for minimumEnrouteAltitude Accuracy for minimumObstacleClearanceAltitude
RouteAvailability	timeInterval	Timesheet	Optional
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	direction		Mandatory
	cardinalDirection		Optional
	status		Optional
	levels	AirspaceLayer	Mandatory to code the

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			direction of the cruising level (even, odd, NIL).
AirspaceLayer	upperLimit		Optional
	upperLimitReference		Optional
	lowerLimit		Optional
	lowerLimitReference		Optional
	altitudeInterpretation		Optional
	discreteLevelSeries	xlink:href -> StandardLevelColumn	Mandatory to code the direction of the cruising level (even, odd, NIL).
	annotation	Note	Optional
EnRouteSegmentPoint	reportingATC		Mandatory
	flyOver		Optional
	waypoint		Optional
	radarGuidance		Optional
	facilityMakeup	PointReference	Optional
	extendedServiceVolume	xlink:href -> RadioFrequencyArea	Optional
	annotation	Note	Optional
	roleFreeFlight		Optional
	roleRVSM		Optional
	turnRadius		Optional

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	roleMilitaryTraining		Optional
	pointChoice_fixDesignatedPoint	xlink:href -> DesignatedPoint	Mandatory or pointChoice_navaidSystem or pointChoice_airportReferencePoint
	pointChoice_navaidSystem	xlink:href -> Navaid	Mandatory or pointChoice_fixDesignatedPoint or pointChoice_airportReferencePoint
	pointChoice_airportReferencePoint	xlink:href -> AirportHeliport	Mandatory or pointChoice_fixDesignatedPoint or pointChoice_navaidSystem
ChangeOverPoint	distance		Mandatory , if applicable
	applicableRoutePortion	RoutePortion	Mandatory , if COP is coded.
	annotation	Note	Mandatory
AirTrafficControlService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional
	call-sign	CallsignDetail	Optional

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	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Optional
	annotation	Note	Optional
	radarAssisted		Optional
	dataLinkEnabled		Optional
	dataLinkChannel		Optional
	type		Optional
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientAirspace	xlink:href -> Airspace	N/A
	clientRoute	RoutePortion	Conditional
	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	N/A
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A
	aircraftLocator	xlink:href -> DirectionFinder	N/A
InformationService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional

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	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional
	call-sign	CallsignDetail	Optional
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Optional
	annotation	Note	Optional
	type		Optional
	voice		Optional
	dataLink		Optional
	recorded		Optional
	navaidBroadcast	xlink:href -> VOR	Optional
	clientAirspace	xlink:href -> Airspace	N/A
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientRoute	RoutePortion	Conditional
	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	N/A
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A

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SearchRescue Service	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional
	call-sign	CallsignDetail	Optional
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Optional
	annotation	Note	Optional
	type		Optional
	clientAirspace	xlink:href -> Airspace	N/A
	clientRoute	RoutePortion	Conditional
Unit	name		Conditional, if serviceProvider is encoded.
	type		Optional
	compliantICAO		Optional
	designator		Optional
	military		Optional
	position	ElevatedPoint	Optional

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	airportLocation	xlink:href -> AirportHeliport	Optional
	ownerOrganisation	xlink:href -> OrganisationAuthority	Optional
	contact	ContactInformation	Optional
	relatedUnit	UnitDependency	Optional
	availability	UnitAvailability	Optional
	annotation	Note	Optional
RadioCommunicationChannel	mode		Optional
	rank		Optional
	frequencyTransmission		Conditional, if radioCommunication is encoded,
	frequencyReception		Conditional, if radioCommunication is encoded,
	channel		Optional
	logon		Optional
	emissionType		Optional
	selectiveCall		Optional
	flightChecked		Optional
	trafficDirection		Optional
	location	ElevatedPoint	Optional
	availability	RadioCommunicationOperationalStatus	Optional

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	annotation	Note	Optional

(c) CODING RULES

2.1.6.c.1. Coding Rules for Route Basic Data

Req. ID	Data Encoding Rule	Justification
RTE-101	**Route.designatorSecondLetter** is mandatory.	Minimum AIP data set
RTE-102	**Route.designatorNumber** is mandatory.	Minimum AIP data set
RTE-103	**Route.flightRule** is mandatory	Minimum AIP data set
RTE-104	A **Route** must have at least one **RouteSegment**.	Data consistency
RTE-105	The route designator shall be compliant with the rules defined by ICAO Annex 11, Appendix 1, section 2. The rule consists therefore of the following parts:- The route designator consists at most of 6 uppercase characters and ciphers.- The designator starts with one or two uppercase characters and is followed by a number between 1 and 999 without leading zeros and may end with an additional character.- Of the three possible characters the first one is optional and may be 'K', 'U' or 'S'.- Of the three possible characters the second one is mandatory and may be 'A', 'B', 'G', 'H', 'J', 'L', 'M', 'N', 'P', 'Q', 'R', 'T', 'V', 'W', 'Y' or 'Z'.- Of the three possible characters the third one (after the number) is optional and may be 'F', 'G', 'Y' or 'Z'.- The following characters are not allowed in any position: 'C', 'D', 'E', 'I', 'O' and 'X'.	ICAO Annex 11 [1]
RTE-108	Inside an AIP data set, the **RouteSegment** associated with the same **Route** should be encoded in one direction (a) no point should be the start of two distinct **RouteSegment** and	Data consistency

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	(b) no point should be the end of two distinct **RouteSegment.**	
RTE-109	If a Route is continues in a neighbouring State/Territory, then the same order of encoding the **RouteSegment** should be applied - when considering the AIP Data Set for two adjacent State/Territory (a) no point should be the start of two distinct **RouteSegment** associated with the same Route and (b) no point should be the end of two distinct **RouteSegment** associated with the same Route.	Data consistency
RTE-106	The value 'OTHER' shall not be used for **Route.designatorPrefix**.	AIXM 4.5 / ICAO Standard
RTE-107	The value 'OTHER' shall not be used for **Route.multipleIdentifier.**	AIXM 4.5 / ICAO Standard
RTE-108	The value 'OTHER' shall not be used for **Route.designatorSecondLetter**.	AIXM 4.5 / ICAO Standard
RTE-109	The **Route.designatorNumber** must be an integer between 1 and 999.	ICAO Annex 11

2.1.6.c.2. Coding Rules for Route Segment Basic Data

Req. ID	Data Encoding Rule	Justification
RSG-101	**RouteSegment.navigationType** is mandatory.	Minimum AIP data set
RSG-102	**RouteSegment.start** is mandatory.	Minimum AIP data set
RSG-103	**RouteSegment.end** is mandatory.	Minimum AIP data set
RSG-104	**RouteSegment.start.EnRouteSegmentPoint.reportingATC** is mandatory.	Minimum AIP data set
RSG-105	**RouteSegment.end.EnRouteSegmentPoint.reportingATC** is mandatory.	Minimum AIP data set
RSG-106	Either **RouteSegment.trueTrack** or **RouteSegment.magneticTrack** shall be provided	Minimum AIP data set

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	where **RouteSegment.availability.RouteAvailability.direction** value equal-to "FORWARD".	
RSG-107	Either **RouteSegment.reverseTrueTrack** or **RouteSegment.reverseMagneticTrack** shall be provided where **RouteSegment.availability.RouteAvailability.direction** value equal-to "BACKWARD".	Minimum AIP data set
RSG-108	**RouteSegment.length** is mandatory.	Minimum AIP data set
RSG-109	**RouteSegment.pathType** is mandatory.	Minimum AIP data set
RSG-110	The **RouteSegment.pathType** should have value equal-to 'GDS'.	PANS-AIM ENR 3
RSG-111	The accuracy of the length of the route segment shall be encoded as **RouteSegment.annotation.Note.propertyName** value equal-to 'length'	Minimum AIP data set
RSG-112	**RouteSegment.upperLimit** is mandatory.	Minimum AIP data set
RSG-113	**RouteSegment.upperLimitReference** is mandatory.	Data consistency
RSG-114	Either **RouteSegment.lowerLimit** or **RouteSegment.minimumEnrouteAltitude** shall be provided.	Minimum AIP data set
RSG-115	If **RouteSegment.lowerLimit** is specified, then **RouteSegment.lowerLimitReference** is mandatory.	AIXM Model / Minimal data rule
RSG-116	For ENR 3.1 Lower ATS routes **RouteSegment.level** shall be equal-to 'LOWER'	Data completeness
RSG-117	For ENR 3.2 Upper ATS routes **RouteSegment.level** shall be equal-to 'UPPER'	Data completeness
RSG-118	If **RouteSegment.level** is equal-	Minimum AIP data set

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	to 'LOWER' then, **RouteSegment.minimumObstacleClearanceAltitude** is mandatory.	
RSG-119	If **RouteSegment.level** is equal-to 'LOWER' or 'UPPER' then, **RouteSegment.widthLeft** and **RouteSegment.widthRight** is mandatory for	PANS-AIM ENR 3.1 & ENR 3.2
RSG-120	**RouteSegment.widthLeft** and **RouteSegment.widthRight** shall have the same **uom**.	Data consistency
RSG-121	**RouteSegment.requiredNavigationPerformance** is mandatory.	Minimum AIP data set
RSG-122	If **RouteSegment.minimumCrossingAtEnd** is specified, then **RouteSegment.minimumCrossingAtEndReference** is mandatory.	AIXM Model / Minimal data rule
RSG-123	If **RouteSegment.minimumCrossingAtEnd** is specified, then **RouteSegment.minimumCrossingAtEndReference** is mandatory.	AIXM Model / Minimal data rule
RSG-124	**RouteSegment.lowerLimit** shall not be equal-to 'FLOOR' or 'CELLING' or 'UNL'.	EAD / Data consistency
RSG-125	**RouteSegment.upperLimit** shall not be equal-to 'FLOOR' or 'CELLING' or 'GND'.	EAD / Data consistency
RSG-126	**RouteSegment.minimumObstacleClearanceAltitude** shall not be equal-to 'FLOOR' or 'CELLING' or 'UNL'.	EAD / Data consistency
RSG-127	**RouteSegment.minimumEnrouteAltitude** shall not be equal-to 'FLOOR' or 'CELLING' or 'UNL'.	EAD / Data consistency
RSG-128	The value 'OTHER' shall not be used for **RouteSegment.level.**	AIXM4.5 / Standard
RSG-129	The value 'OTHER' shall not be used	AIXM4.5 / Standard

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	for **RouteSegment.lowerLimit.uom**	
RSG-130	The value 'OTHER' shall not be used for **RouteSegment.upperLimit.uom**	AIXM4.5 / Standard
RSG-131	The value 'OTHER' shall not be used for **RouteSegment.widthLeft.uom**	AIXM4.5 / Standard
RSG-132	The value 'OTHER' shall not be used for **RouteSegment.widthRight.uom**	AIXM4.5 / Standard
RSG-133	The value 'OTHER' shall not be used for **RouteSegment.length.uom**	AIXM4.5 / Standard
RSG-134	Each **RouteSegment** shall have assigned **routeFormed** value.	AIXM Model / Minimal data rule
RSG-135	If the **RouteSegment.lowerLimit.uom** has the value 'FL' or 'SM', then the attribute **RouteSegment.lowerLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency
RSG-136	If the **RouteSegment.upperLimit.uom** has the value 'FL' or 'SM', then the attribute **AirspaceVolume.upperLimitReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency
RSG-137	If the **RouteSegment.minimumCrossingAtEnd.uom** has the value 'FL' or 'SM', then the attribute **RouteSegment.minimumCrossingAtEndReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency
RSG-138	If the **RouteSegment.maximumCrossingAtEnd.uom** has the value 'FL' or 'SM', then the attribute **RouteSegment.maximumCrossingAtEndReference** must have the value 'STD'.	AIXM 4.5 Business Rules / Data consistency

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RSG-139	When translated to use the same unit of measurement and the same vertical reference, **RouteSegment.lowerLimit** must be lower than or equal to **RouteSegment.upperLimit.**	Data consistency
RSG-140	The **EnRouteSegmentPoint.pointChoice** used as **RouteSegment.start** or **RouteSegment.start** may not be other than a **DesignatedPoint** or a **Navaid** or an **AirportHeliport.**	Data consistency
RSG-141	The accuracy value of the **RouteSegment.length** shall be 0.1 km or less.	PANS-AIM
RSG-142	The value of the **RouteSegment.length** shall be published with at least 1 decimal of KM or NM resolution.	PANS-AIM
RSG-143	The accuracy value of the **RouteSegment.minimumEnrouteAltitude** shall be 50 m or less.	PANS-AIM
RSG-144	The accuracy value of the **RouteSegment.minimumObstacleClearanceAltitude** shall be 50 m or less.	PANS-AIM
RSG-145	The value of the **RouteSegment.minimumEnrouteAltitude** shall be published with at least 50 m or 100 ft resolution.	PANS-AIM
RSG-146	The value of the **RouteSegment.minimumObstacleClearanceAltitude** shall be published with at least 50 m or 100 ft resolution.	PANS-AIM
RSG-901	Two consecutive route segments (of the same **Route)** should have vertical limits that, if not overlapping, should not be further away than 1000 FT. For example, if segment 1 is FL245 to FL295 and	EAD Rule

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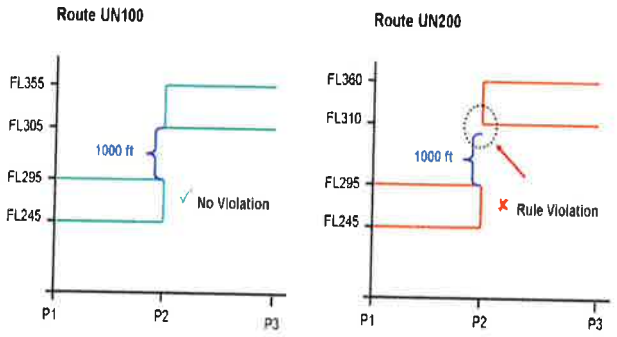
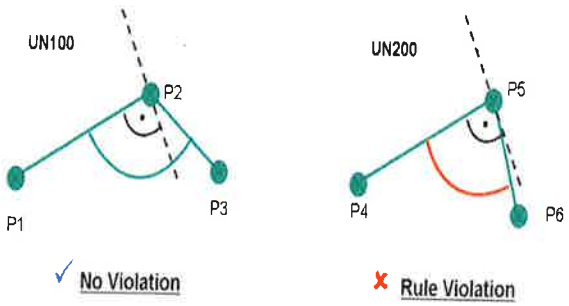
	segment 2 is FL310 to FL490, (this rule will need to be adjusted based on operational experience). 	
RSG-902	The angle between two consecutive segments of the same route cannot exceed 90 degrees. 	EAD Rule
RSG-903	At the border (defined as a buffer area of 2 km on each side) between two areas of responsibility, route segments should be continued by route segments of the same or another **Route**.	EAD Rule
RSG-904	Route segments of the same **Route** should be consecutive (no gaps): not more than two significant points should be either the start or the end of a single route segment.	EAD Rule
RSG-905	Route segments of the same **Route** should be consecutive: no segment should be described in the opposite order of significant points (start instead of end and vice-versa) compared to the adjacent segments.	EAD Rule
RSG-906	Route segments of the same **Route** should be consecutive (no	EAD Rule

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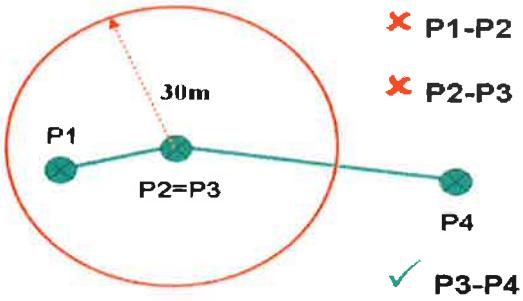
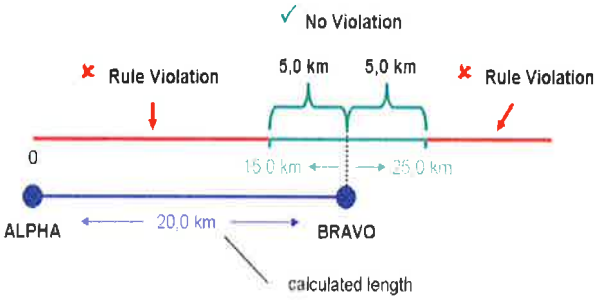
	multiple branches): no significant point should appear on 3 or more segments, either as start or as end point.	
RSG-907	The position of the **SignificantPoint** used as the beginning of the **RouteSegment** must be separated by at least 30m (1 sec of arc) from the position of the **SignificantPoint** used as the end of the **RouteSegment.**  	EAD Rule
RSG-908	**widthLeft** and **widthRight** must have a value between 0.5 NM and 10 NM.	EAD Rule
RSG-909	The value of **EnRouteSegmentPoint.reportingATC** for **RouteSegment.start** and **RouteSegment.end** of any two consecutive segments of the same route must be consistent.	EAD Rule
RSG-910	The difference between **length** and the calculated length of the related **RouteSegment** cannot exceed 5 KM.  	EAD Rule
RSG-911	The difference between Initial **trueTrack** and the calculated initial true track of the	EAD Rule

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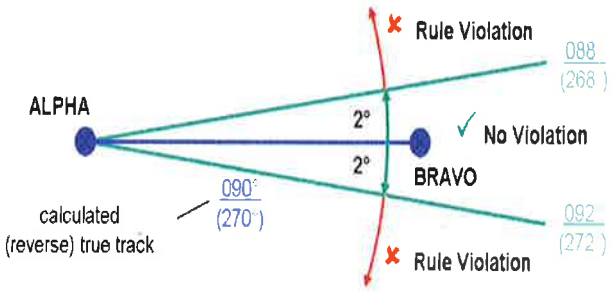
	related **RouteSegment** cannot exceed 2 degrees. The difference between **reverseTrueTrack** and the calculated reverse initial true track of the related **RouteSegment** cannot exceed 2 degrees.  	

2.1.6.c.3. Coding Rules for Route Cruising Levels

Req. ID	Data Encoding Rule	Justification
RSG-301	Each **Route.Segement** shall have as minimum one and as maximum two related **RouteAvailability.direction**.	Minimum AIP data set
RSG-302	The value of the **RouteAvailability.direction** of the same **Route.Segement** may not have the same value.	Data consistency
RSG-303	For each **RouteAvailability** one and only one **discreteLevelSeries** shall be provided.	Minimum AIP data set
RSG-304	For **RouteAvailability.direction** the values 'BOTH' and 'OTHER' shall not be used.	Data consistency

2.1.6.c.4. Coding Rules for Route Segment Controlling Unit

Req. ID	Data Encoding Rule	Justific

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		ation
RTE-402	Each **Service** related to a **RouteSegment** should have a **radioCommunication** with coded **RadioCommunicationChannel.frequencyTransmission** and **RadioCommunicationChannel.frequencyReception** (if applicable)	PANS-AIM ENR 3
RTE-404	Data link logon address should be encoded if available.	PANS-AIM ENR 3
RTE-405	If any, SATVOICE number, and any navigation, RCP and RSP specification(s) limitations should be encoded using **Note**.	PANS-AIM ENR 3

2.1.6.c.5. Coding Rules for Route Change Over Point

Req. ID	Data Encoding Rule	Justification
RSG-501	The **SignificantPoint** used as **start** of the **RoutePortion** as **ChangeOverPoint** shall be either a **Navaid.type** equal-to 'VOR_DME' or 'TACAN' or 'VORTAC'.	Data consistency
RSG-502	The **SignificantPoint** used as **end** of the **RoutePortion** as **ChangeOverPoint** shall be either a **Navaid.type** equal-to 'VOR_DME' or 'TACAN' or 'VORTAC'.	Data consistency
RSG-503	If a **SignificantPoint** is used for the **ChangeOverPoint.location** it shall be a **Point**.	Data consistency
RSG-504	The **ChangeOverPoint.distance** shall be the distance from the **start** of the related **RoutePortion**.	Data consistency

2.1.6.c.6. Coding Rules for Designated Point (en-route) Basic Data

Req. ID	Data Encoding Rule	Justification
DPN-101	The **DesignatedPoint.designator** attribute is mandatory.	Minimum AIP

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		data set
DPN-102	The **DesignatedPoint.type** attribute is mandatory.	AIXM 4.5 / Minimal data rule
DPN-103	The **DesignatedPoint.name** attribute should be provided.	Minimum AIP data set
DPN-104	Designated points with an ICAO 5 letter name-code should be recorded as **DesignatedPoint.type** equal-to 'ICAO'.	Data consistency
DPN-105	In case of a Designated points with an ICAO 5 letter name-code the **designator** and the **name** attribute shall carry the same value.	ICAO Annex 11
DPN-106	ARINC 424 Naming conventions shall be applied for designator and name, in case the designated point does not have a 5LCN as defined by ICAO ANNEX 11 (except for VFR reporting point).	Data harmonisation
DPN-107	If **DesignatedPoint.type** equal-to ('ICAO' , 'COORD' , 'OTHER') then there should not exists any other designated point with **type** of ('ICAO' , 'COORD' , 'OTHER') located within 1NM.	Data consistency
DPN-108	If **DesignatedPoint.type** equal-to 'ICAO', then **DesignatedPoint.designator** should be unique world-wide.	ICAO Annex 11
DPN-109	The **DesignatedPoint.location** property is mandatory.	Minimum AIP data set
DPN-110	The **Point.horizontalAccuracy** attribute is mandatory.	Minimum AIP data set
DPN-111	If coded, the value of the **horizontalAccuracy** for the **DesignatedPoint** used in the enroute environment (i.e is used as **EnRouteSegmentPoint)** shall be 100 M or less.	PANS-AIM
DPN-112	Coordinates of **DesignatedPoint** used in the enroute environment (i.e is used as **EnRouteSegmentPoint)** shall be published with at	PANS-AIM

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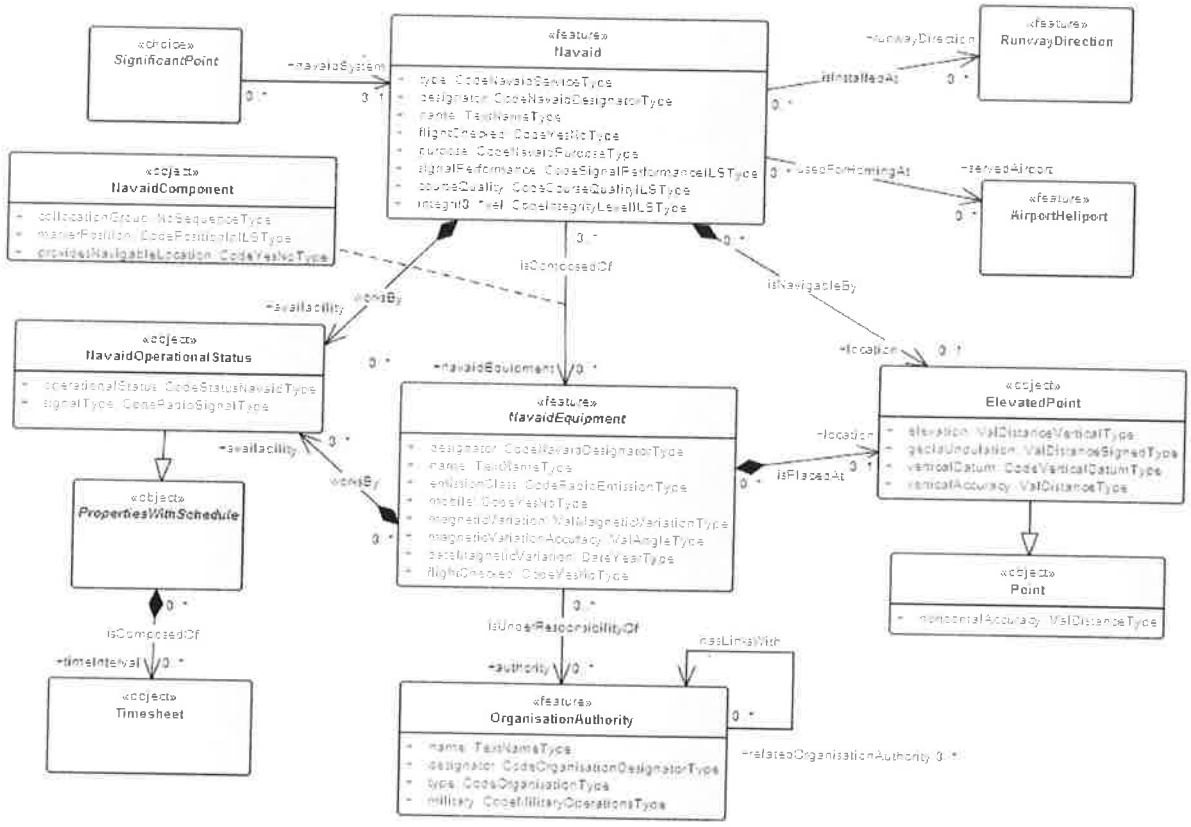
	least 4 decimals resolution.	
DPN-113	Coordinates of **DesignatedPoint** used in the terminal environment (i.e is used as **TerminalSegmentPoint)** shall be published with at least 5 decimals resolution.	PANS-AIM

(7) Radio navigation aids/systems data

(a) CODING GUIDELINES

2.1.7.a.1. NAV AID CLASSES

The figure below shows the main AIXM 5 classes used for the navaid concept.



2.1.7.a.2. Basic Data for Navaid

For Radio navigation aid, PANS-AIM requires some basic properties as part of the minimum AIP data set. These are: type, identification, name, aerodrome served, etc.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:

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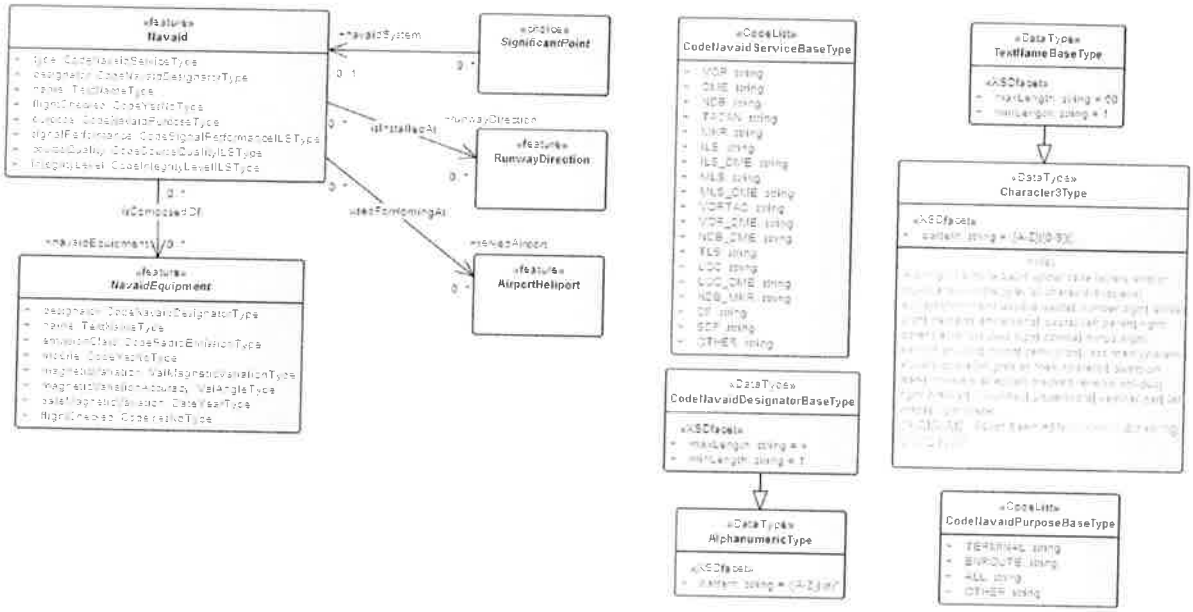
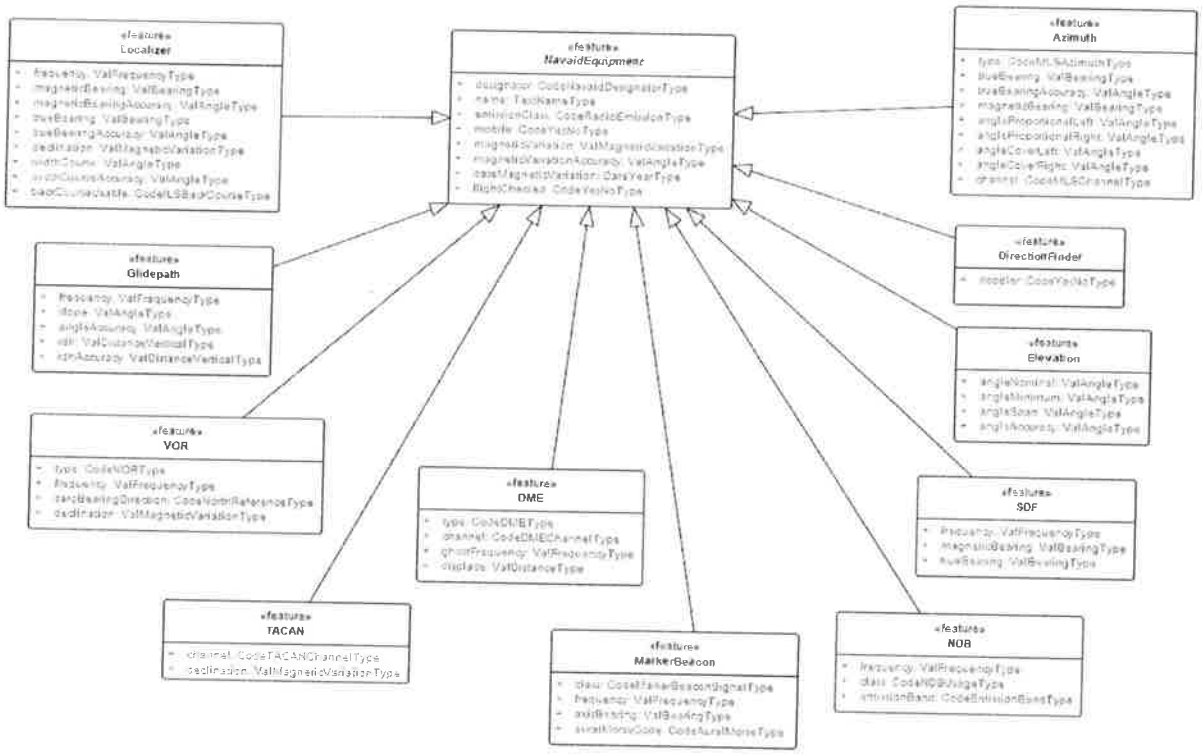


2.1.7.a.3. Navaid Equipment

The NavaidEquipment class is specialised into: Azimuth, DME, DirectionFinder, Elevation, Glidepath, Localizer, MarkerBeacon, NDB, SDF, TACAN and VOR.

The specific coding guidelines for each of the specialised classes are described in the following figure:



2.1.7.a.4. Landing Systems & Navaid Collocation

This information is not directly required by PANS-AIM. However, there are two main concepts where navaids are composed of more than one navaid component.

Navaid Collocation (e.g. VOR/DME, VORTAC)

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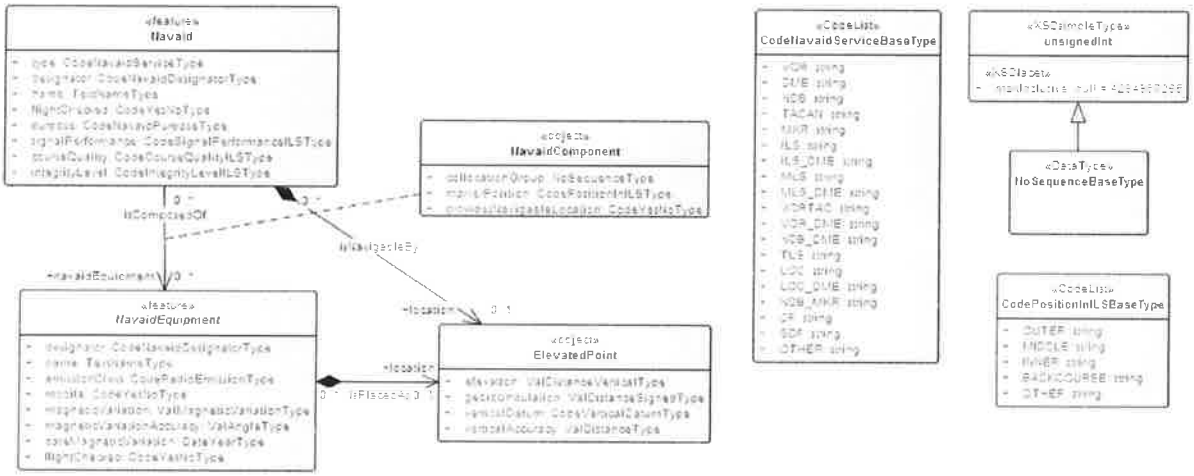
Landing System (e.g. ILS, Localizer only system, MLS)

The AIXM 5 possibilities to code such information shall be elaborated in this topic.

The following diagram shows the classes and data types needed to encode that information.

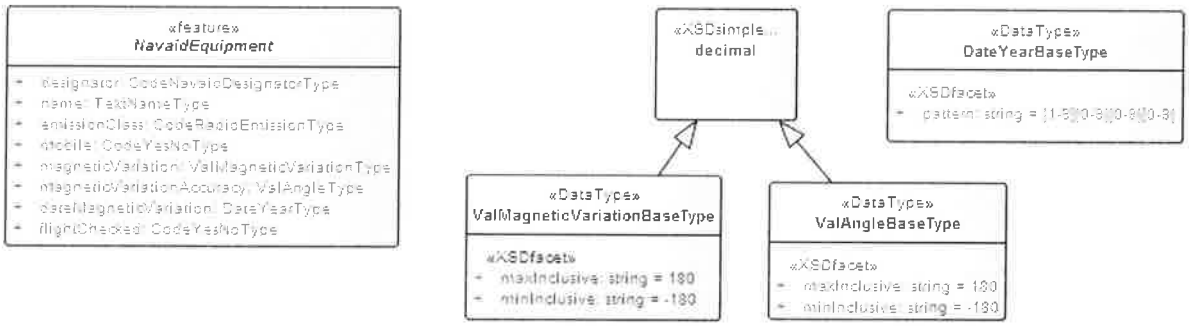


2.1.7.a.5. Magnetic Variation

PANS-AIM requires the magnetic variation for all radio navigation aids without limitation to a particular type of navaid (see chapter 5.3.3.1 of PANS AIM and ENR 4.1). However, PANS-AIM Appendix 1 (Aeronautical Data Catalogue) requires the magnetic variation only for ILS and NDB.

In AIXM 5, the magnetic variation is coded on the specialised classes of the abstract NavaidEquipment class (see also topic Navaid Equipment).

Several attributes are used.



2.1.7.a.6. Navaid Position & Elevation

PANS-AIM requires as part of the minimum AIP data set the position for radio navigation and landing aids to be provided.

For some navaids (DME and GBAS), PANS-AIM also requires the elevation to be coded. AD 2.19/AD 3.18: elevation of the transmitting antenna of DME, elevation of GBAS reference point, etc.

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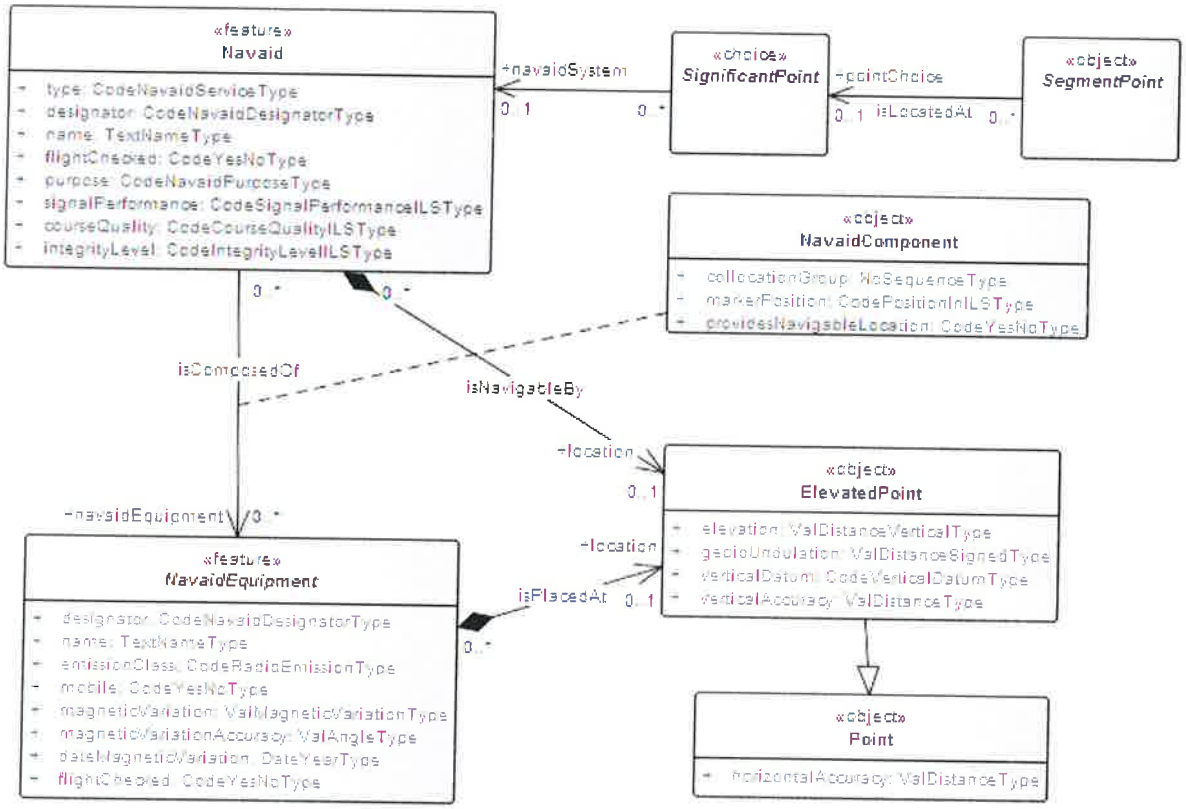
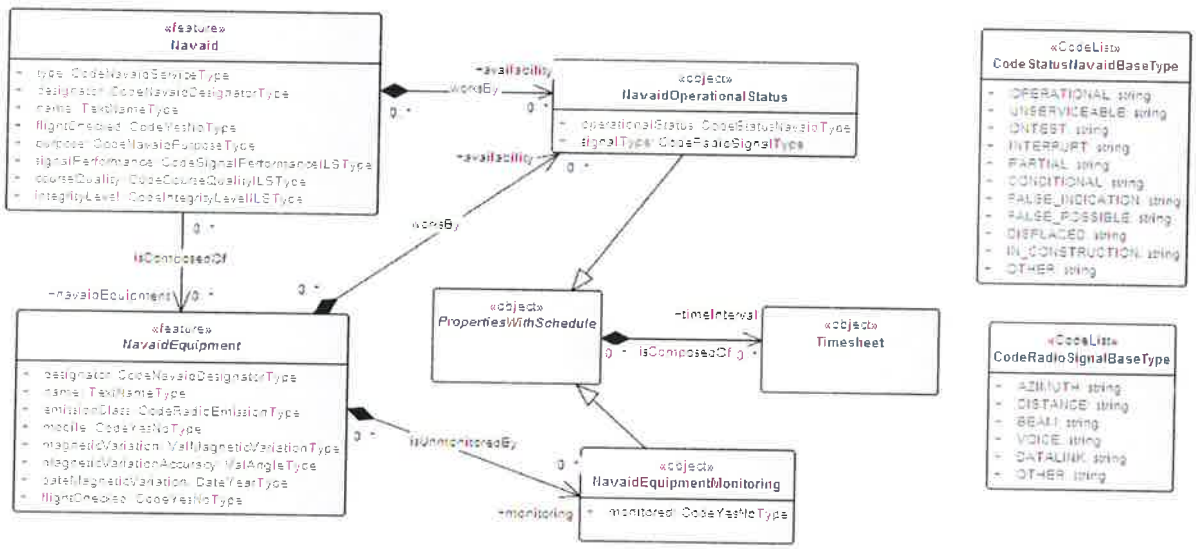
The diagram below shows the AIXM classes relevant for the encoding.



2.1.7.a.7. Hours of Operation for Navaid

PANS-AIM requires as part of the minimum AIP data set the hours of operation for radio navigation aids (for both enroute and terminal radio navigation and landing aids).

The diagram below shows the AIXM classes, including the relevant data types and code lists, needed to encode that information.



2.1.7.a.8. Facility coverage

In PANS-AIM ENR 4.1 "Radio navigation aids — en-route" and AD 2.19/AD 3.18 "Radio navigation and landing aids" require for the AIP data set that "the facility

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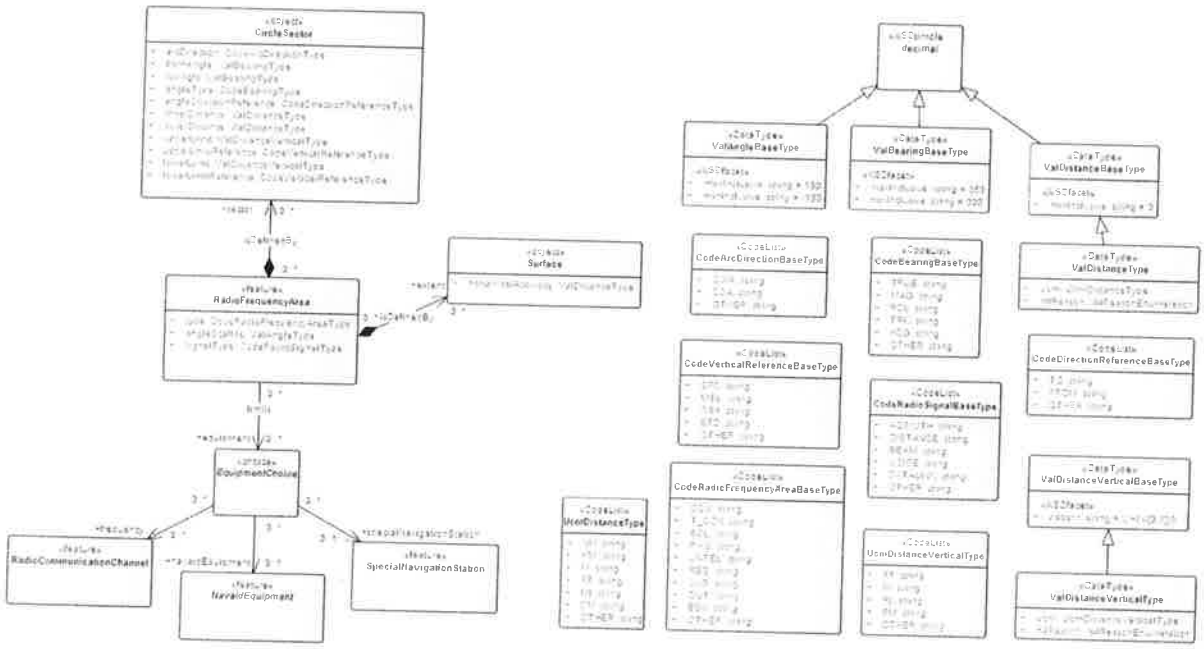
coverage shall be indicated in the remarks column".

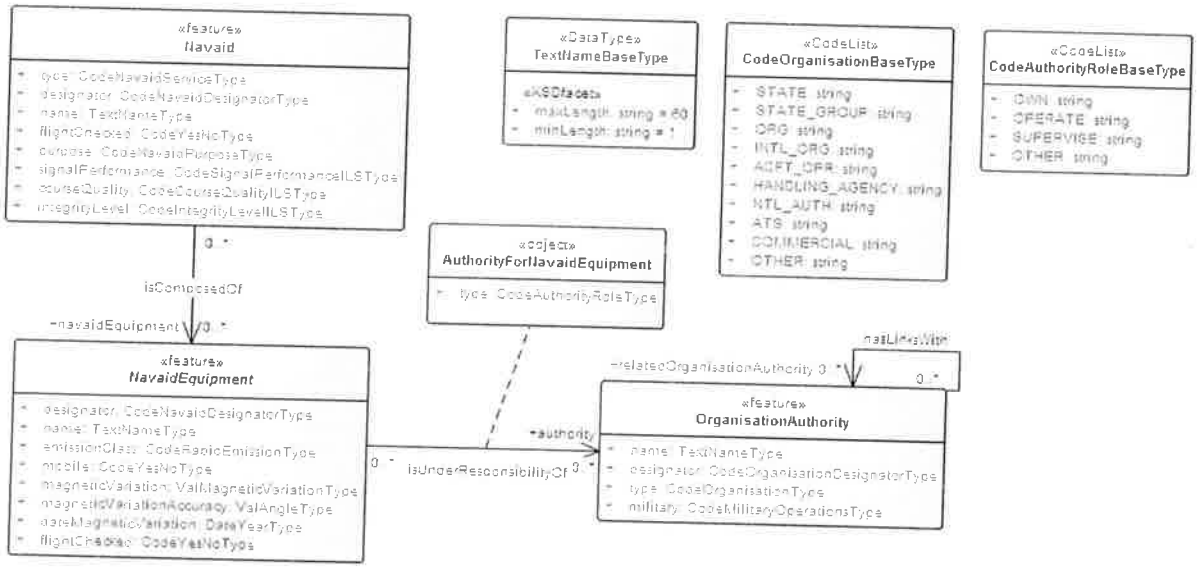


2.1.7.a.9. Operating Authority for Navaid

PANS-AIM ENR 4.1 "Radio navigation aids — en-route" and AD 2.19/AD 3.18 "Radio navigation and landing aids" require for the AIP data set that "if the operating authority of the facility is other than the designated governmental agency, the name of the operating authority shall be indicated in the remarks column".

PANS-AIM requires a description of the service responsible for the provision of telecommunication and navigation facilities to be published in GEN 3.4 "Communication services". This section of PANS-AIM is not part of the AIP data set.

The diagram below shows the AIXM classes, including the relevant data types and code lists, that may be used to code that information.



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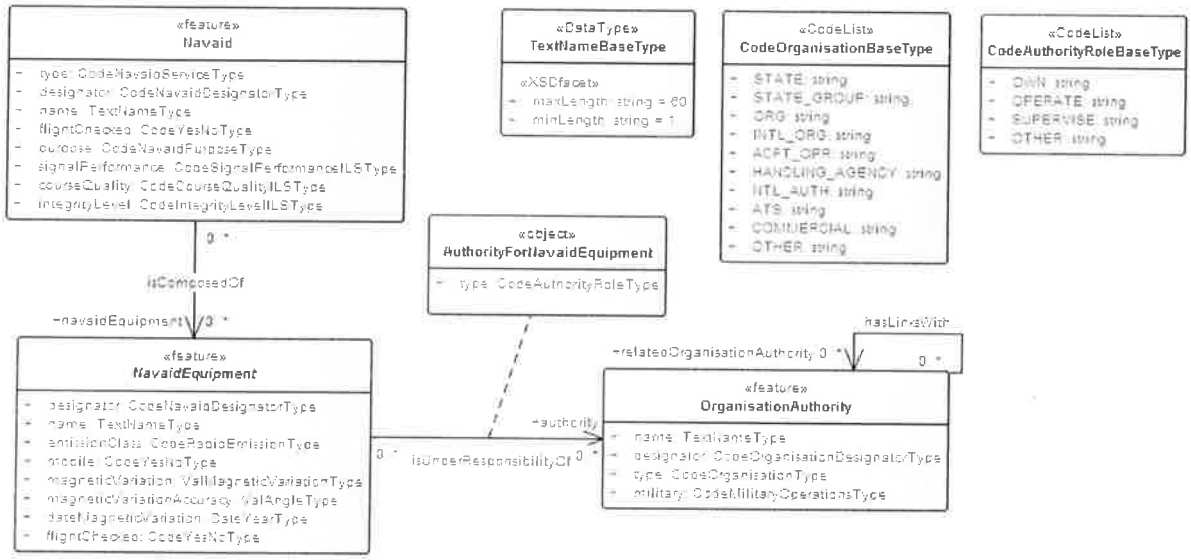
2.1.7.a.10. Navaid Distance to Runway Centreline Point

The diagram below shows the AIXM classes, including the relevant data types and code lists, needed to encode that information:



(b) AIXM CHECKLIST

The following table provided a complete overview of the AIXM 5 features/objects and properties relevant for the coding of navaids which will be published as part of an PANS-AIM defined AIP data set.

The table also gives an indication if the property is mandatory for an AIP data set and under which conditions.

AIXM Feature/ Object	AIXM Feature/ Object Property	Complex Type or xlink : href to other Feature	AIP data set
Navaid	type		Mandatory
	designator		Conditional, (see coding guidelines for Navaid [NAV])
	name		Mandatory
	flightChecked		Optional
	purpose		Conditional, (see coding guidelines for Basi c Data for

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			Navaid)
	signalPerformance		Mandatory only for ILS, LOC and MLS navaid types
	courseQuality		Optional
	integrityLevel		Optional
	touchDownLiftOff	xlink:href -> TouchDownLiftOff	Optional
	navaidEquipment	NavaidComponent	Mandatory
	location	ElevatedPoint	Mandatory
	runwayDirection	xlink:href -> RunwayDirection	Conditional, (see coding guidelines for Navaid [NAV])
	servedAirport	xlink:href -> AirportHeliport	Conditional, (see coding guidelines for Navaid [NAV])
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Mandatory for: DOC (unless coded using the RadioFrequency Area feature)
NavaidComponent	collocationGroup		Conditional, (see coding guidelines for Navaid [NAV])
	markerPosition		Conditional, (see coding guidelines for Navaid [NAV])
	providesNavigableLocation		Conditional, (see coding guidelines for Navaid [NAV])

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	annotation	Note	Optional
	theNavaidEquipment	xlink:href -> NavaidEquipment	Conditional, (see coding guidelines for Navaid [NAV])
NavaidOperationalStatus	timeInterval	Timesheet	Mandatory
	annotation	Note	Optional
	specialDateAuthority	xlink:href -> OrganisationAuthority	Optional
	operationalStatus		Mandatory
	signalType		Optional
DME	designator		Mandatory
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Optional
	magneticVariationAccuracy		Optional
	dateMagneticVariation		Optional
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperation	Mandatory

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		alStatus	
	annotation	Note	Optional
	type		Optional
	channel		Mandatory
	ghostFrequency		Optional
	displace		Optional
Glidepath	designator		Optional
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Optional
	magneticVariationAccuracy		Optional
	dateMagneticVariation		Optional
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional
	frequency		Mandatory
	slope		Mandatory

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	angleAccuracy		Mandatory
	rdh		Mandatory
	rdhAccuracy		Mandatory
Localizer	designator		Mandatory
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Mandatory
	magneticVariationAccuracy		Mandatory
	dateMagneticVariation		Mandatory
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional
	frequency		Mandatory
	magneticBearing		Mandatory
	magneticBearingAccuracy		Mandatory
	trueBearing		Mandatory
	trueBearingAccur		Mandatory

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	acy		
	declination		Mandatory
	widthCourse		Optional
	widthCourseAccuracy		Optional
	backCourseUsable		Optional
MarkerBeacon	designator		Conditional, (see coding guidelines for Marker Beacon)
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Optional
	magneticVariationAccuracy		Optional
	dateMagneticVariation		Optional
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional

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	class		Optional
	frequency		Mandatory
	axisBearing		Optional
	auralMorseCode		Conditional, (see coding guidelines for Marker Beacon)
NDB	designator		Mandatory
	name		Mandatory
	emissionClass		Optional
	mobile		Mandatory
	magneticVariation		Mandatory
	magneticVariationAccuracy		Mandatory
	dateMagneticVariation		Mandatory
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional
	frequency		Mandatory
	class		Optional

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	emissionBand		Optional
TACAN	designator		Mandatory
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Optional
	magneticVariationAccuracy		Optional
	dateMagneticVariation		Optional
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional
	channel		Mandatory
	declination		Mandatory
VOR	designator		Mandatory
	name		Mandatory
	emissionClass		Optional
	mobile		Optional
	magneticVariation		Optional

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	magneticVariationAccuracy		Optional
	dateMagneticVariation		Optional
	flightChecked		Optional
	location	ElevatedPoint	Mandatory
	authority	AuthorityForNavaidEquipment	Mandatory
	monitoring	NavaidEquipmentMonitoring	Optional
	availability	NavaidOperationalStatus	Mandatory
	annotation	Note	Optional
	type		Optional
	frequency		Mandatory
	zeroBearingDirection		Mandatory
	declination		Mandatory
NavaidEquipmentDistance	distance		Optional
	distanceAccuracy		Optional
	annotation	Note	Optional
	theNavaidEquipment	xlink:href -> NavaidEquipment	Optional
RadioFrequencyArea	type		Optional
	angleScallop		Optional

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	signalType		Optional
	sector	CircleSector	Optional
	extent	Surface	Optional
	annotation	Note	Optional
AuthorityForNavaidEquipment	type		Optional
	annotation	Note	Optional
	theOrganisationAuthority	xlink:href -> OrganisationAuthority	Optional

(c) CODING RULES

2.1.7.c.1. Coding Rules for Navaid Basic Data

Req. ID	Data Encoding Rule	Justification
NAV-101	The **Navaid.type** attribute is mandatory.	Minimum AIP data set
NAV-102	The **Navaid.name** attribute is mandatory.	Minimum AIP data set
NAV-103	The **Navaid.designator** attribute is mandatory.	Minimum AIP data set
NAV-903	The **Navaid.purpose** attribute is mandatory.	Operational Need
NAV-104	If the **Navaid.purpose** is equal-to 'TERMINAL' or 'ALL' at least one of the following shall be coded **Navaid.servedAirport** and/or the **Navaid.servedRunwayDirection.**	Minimum AIP data set (for Airport) PANS-AIM (Runway Direction)
NAV-105	If the **Navaid.purpose** is equal-to 'ENROUTE' neither the **Navaid.servedAirport** nor the **Navaid.servedRunwayDirection** shall be	Data consistency

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	coded.	
NAV-106	Each instance of a **Navaid** shall be composed as a minimum of one **NavaidEquipment.**	Data consistency

2.1.7.c.2. Coding Rules for VOR

Req. ID	Data Encoding Rule	Justification
VOR-101	The **VOR.designator** attribute is mandatory.	Minimum AIP data set
VOR-102	The **VOR.name** attribute is mandatory.	Minimum AIP data set
VOR-103	The **VOR.frequency** attribute is mandatory.	Minimum AIP data set
VOR-104	The **VOR.zeroBearingIndication** attribute is mandatory.	Minimum AIP data set
VOR-105	The **VOR.location** property is mandatory.	Minimum AIP data set
VOR-105	The **VOR.declination** attribute is mandatory.	PANS-AIM
VOR-107	The **VOR.designator** shall not be duplicated within 600 NM of the location of the VOR.	EAD / ICAO Annex 11
VOR-108	The value of the **VOR.frequency** must be in the interval '108.000' to '117.975' 'MHz'.	EAD / ICAO Annex 10

2.1.7.c.3. Coding Rules for DME

Req. ID	Data Encoding Rule	Justification
DME-101	The **DME.designator** attribute is mandatory.	Minimum AIP data set
DME-102	The **DME.name** attribute is mandatory.	Minimum AIP data set
DME-103	The **DME.channel** attribute is mandatory.	Minimum AIP data set
DME-104	For DME **ElevatedPoint.elevation** is mandatory.	Minimum AIP data set

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DME-115	The **DME.location** property is mandatory.	Minimum AIP data set
DME-105	For DME **ElevatedPoint.accuracy** should be provided.	PANS-AIM
DME-106	For DME **ElevatedPoint.verticalDatum** should be provided.	PANS-AIM
DME-107	No more than one **DME** may be co-located with same **VOR**.	EAD / Data consistency
DME-108	A **DME** and a **TACAN** cannot be collocated to the same **VOR**.	EAD / Data consistency
DME-109	The **DME.designator** shall not be duplicated within 600 NM of the location of the DME.	EAD / ICAO Annex 11
DME-110	If **DME.channel** is not specified, then **DME.ghostFrequency** must be specified.	EAD
DME-111	**DME.ghostFrequency** cannot be specified if the **DME** is collocated with a VOR or is part of an ILS or MLS system.	EAD / ICAO Annex 11
DME-112	**DME.ghostFrequency** must be consistent with the **DME.channel** value, according to Table A, ICAO Annex 10, Vol. 1.	EAD / ICAO Annex 11
DME-113	The value of the **DME.channel** must be paired with the **VOR.frequency** of the related VOR, as described by Table A, ICAO Annex 10, Vol.1.	EAD / ICAO Annex 10
DME-114	The geographical distance between the **DME.location** and the **VOR.location** which are used to compose the same **Navaid** must be: a) less than 30 metres if the **VOR** is located at an aerodrome/heliport (connected through **Navaid.servedAirport**) and has **VOR.type** equal-to 'DVOR'; b) less than 80 metres if the **VOR** is located at an aerodrome/heliport (connected through **Navaid.servedAirport**) and has **VOR.type** equal-to 'DVOR';	EAD

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	c) less than 600 metres if the **VOR** is not located at an aerodrome/heliport (not connected through **Navaid.servedAirport**).	

2.1.7.c.4. Coding Rules for TACAN

Req. ID	Data Encoding Rule	Justification
TCN-101	The **TACAN.designator** attribute is mandatory.	Minimum AIP data set
TCN-102	The **TACAN.name** attribute is mandatory.	Minimum AIP data set
TCN-103	The **TACAN.channel** attribute is mandatory.	Minimum AIP data set
TCN-104	The **TACAN.location** property is mandatory.	Minimum AIP data set
TCN-105	For TACAN **ElevatedPoint.elevation** is mandatory.	Minimum AIP data set
TCN-106	For TACAN **ElevatedPoint.accuracy** should be provided.	PANS-AIM
TCN-107	For TACAN **ElevatedPoint.verticalDatum** should be provided.	PANS-AIM
TCN-108	**TACAN.designator** shall not be **duplicated** within 600 NM of the location of the TACAN	EAD / ICAO Annex 11
TCN-109	No more than one **TACAN** may be co-located with same **VOR**.	EAD / Data consistency
TCN-110	The value of the **TACAN.channel** must be paired with the **VOR.frequency** of the related VOR; the channel-frequency pairing table is identical to the one for DME-VOR, as contained in Table A, ICAO Annex 10, Vol.1.	EAD / Data consistency

2.1.7.c.5. Coding Rules for NDB

Req. ID	Data Encoding Rule	Justification
NDB-101	The **NDB.designator** attribute is mandatory.	Minimum AIP

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		data set
NDB-102	The **NDB.name** attribute is mandatory.	Minimum AIP data set
NDB-103	The **NDB.frequency** attribute is mandatory.	Minimum AIP data set
NDB-104	The **NDB.location** property is mandatory.	Minimum AIP data set
NDB-105	The **NDB.magneticVariation** attribute is mandatory.	Minimum AIP data set
NDB-105	The **NDB.dateMagneticVariation** attribute should be provided.	PANS-AIM
NDB-106	The **NDB.magneticVariationAccuracy** attribute should be provided.	PANS-AIM
NDB-107	The **NDB.designator** shall not be duplicated within 600 NM of the location of the NDB.	EAD / ICAO Annex 11
NDB-108	The value of the **NDB.frequency** must be in the interval '190' to '1750' 'KHz'.	EAD / ICAO Annex 10
NDB-109	If **NDB.class** equal-to 'L' and related **RadioFrequencyArea.type** equal-to 'COV' then **CircleSector.outerDistance** cannot exceed 60km.	EAD

2.1.7.c.6. Coding Rules for Marker Beacon

Req. ID	Data Encoding Rule	Justification
MKR-101	The **MarkerBeacon.designator** attribute is mandatory for en-route markers.	Minimum AIP data set
MKR-110	The **MarkerBeacon.auralMorseCode** attribute is mandatory for markers forming part of an ILS facility.	Minimum AIP data set
MKR-102	The **MarkerBeacon.name** attribute is mandatory.	Minimum AIP data set
MKR-103	The **MarkerBeacon.frequency** attribute is mandatory.	Minimum AIP data set
MKR-104	The **MarkerBeacon.location** attribute is	Minimum AIP

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	mandatory.	data set
MKR-105	The **NDB.designator** shall not be duplicated within 600 NM of the location of the NDB.	EAD / ICAO Annex 11
MKR-106	The value of the **MarkerBeacon.frequency** must be '75' 'MHz'.	EAD
MKR-107	The value of the **NavaidComponent.markerPosition** must be different for each **MarkerBeacon** that is used as **NavaidComponent** of the same **Navaid** instance which type is equal-to 'ILS' or 'ILS_DME' or 'LOC' or 'LOC_DME' .	EAD
NDB-108	The geographical distance between the **MarkerBeacon.location** and the **NDB.location** used as **NavaidEquipment** for the same **Navaid** instance must be less than 100 metres.	EAD
MKR-109	No more than one **MarkerBeacon** may be co-located with same **NDB**.	EAD

2.1.7.c.7. Coding Rules for ILS

Req. ID	Data Encoding Rule	Justification
ILZ-101	The **Localizer.designator** attribute is mandatory.	Minimum AIP data set
ILZ-102	The **Localizer.magnetic Variation** attribute is mandatory.	Minimum AIP data set
ILZ-103	The **Localizer.dateMagn eticVariation** attribute s hould be provided.	PANS-AIM
ILZ-104	The **Localizer.magnetic**	PANS-AIM

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	VariationAccuracy attribute should be provided.	
ILZ-105	The **Localizer.frequency** attribute is mandatory.	Minimum AIP data set
IGP-101	The **Glidepath.frequency** attribute is mandatory.	Minimum AIP data set
ILZ-106	The **Localizer.location** property is mandatory.	Minimum AIP data set
IGP-102	The **Glidepath.location** property is mandatory.	Minimum AIP data set
IGP-103	The **Glidepath.slope** property is mandatory.	PANS-AIM
IGP-104	The **Glidepath.angleAccuracy** property should be provided.	PANS-AIM
IGP-105	The **Glidepath.rdh** property is mandatory.	PANS-AIM
IGP-106	The **Glidepath.rdhAccuracy** property should be provided.	PANS-AIM
ILZ-107	Either the **Localizer.magneticBearing** or the **Localizer.trueBearing** attribute shall be provided.	Minimum AIP data set
ILZ-108	If the **Localizer.magneticBearing** is provided then the **Localizer.magneticBearingAccuray** should be provided.	PANS-AIM
ILZ-109	If	PANS-AIM

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	the **Localizer.trueBearing** is provided then also the **Localizer.trueBearingAccuray** should be provided.	
ILZ-110	The **Localizer.declination** attribute should be provided.	PANS-AIM
NAV-901	If **Navaid.type** equal-to 'ILS' or 'ILS_DME' or 'LOC' or 'LOC_DME', 'MLS', MLS_DME' the **Navaid.signalPerformance** shall be provided.	PANS-AIM
NAV-902	The **Navaid.signalPerformance** and the related **RunwayDirection.precisionAppraochGuidance** shall be consistent.	Data consistency
ILZ-111	The **Localizer.backCourseUsable** attribute should be provided.	PANS-AIM
ILZ-112	If **Navaid.type** equal-to 'ILS' or 'ILS_DME' or 'LOC' or 'LOC_DME' it must have exactly one **NavaidEquipment** which is a **Localizer**.	EAD / Data consistency
NAV-903	If **Navaid.type** equal-to 'ILS' or 'ILS_DME' it must have exactly one **NavaidEquipment** which is a **Glidepath**.	Data consistency
NAV-904	If **Navaid.type** equal-to 'ILS_DME' or 'LOC_DME' it must have	Data consistency

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	exactly one **NavaidEquipment** which is a **DME**.	
ILZ-113	The **Localizer.location** must be plausibly close (less than 1 KM) to that of the end of the related (through **Navaid.runwayDirection**) **RunwayDirection**.	EAD / Data consistency
ILZ-114	The difference between **Localizer.magneticBearing** and the related **RunwayDirection.magneticBearing** (through **Navaid.runwayDirection**) cannot exceed 10 degrees.	EAD / ICAO Doc 8168, PANS OPS
ILZ-115	The difference between **Localizer.trueBearing** and **Localizer.magneticBearing** has to be consistent with the value of the **AirportHeliport.magneticVariation** of the related **AirportHeliport** (through **Navaid.servedAirport**), taking in consideration the current date and the annual rate of change (**AirportHeliport.magneticVariationChange**).	EAD
ILZ-116	The value of the **Localizer.frequency** has to lie between '108' 'MHz' and '111.975' 'MHz'	EAD/ ICAO Annex 10, Vol. 1
IGP-107	The **Glidepath.location**	EAD

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	must be plausibly close (less than 1 KM) to that of the threshold of the related (through **Navaid.runwayDirection**) **RunwayDirection**.	
IGP-108	The value of the **Glidepath.frequency** has to lie between '328.6' 'MHz' and '335.4' 'MHz'.	EAD/ ICAO Annex 10, Vol. 1
IGP-109	The value of the **Glidepath.slope** has to lie between '1' and '5' degrees.	EAD/ ICAO Annex 10, Vol. 1
IGP-110	The value of the **Glidepath.rdh** has to lie between '10' and '25' 'M' (metres).	EAD/ ICAO Annex 10, Vol. 1

2.1.7.c.8. Coding Rules for MLS

Req. ID	Data Encoding Rule	Justification
MLS-101	The **Azimuth.designator** attribute is mandatory.	Minimum AIP data set
MLS-102	The **Azimuth.channel** attribute is mandatory.	Minimum AIP data set
MLS-103	The **Azimuth.location** property is mandatory.	Minimum AIP data set
MLS-104	The **Elevation.location** property is mandatory.	Minimum AIP data set
MLS-105	The **Elevation.angleNominal** attribute is mandatory.	PANS-

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		AIM
MLS-106	The **Elevation.angleAccuracy** attribute should be provided.	PANS-AIM
MLS-107	The **Elevation.angleMinimum** attribute should be provided.	PANS-AIM
MLS-108	Either the **Azimuth.magneticBearing** or the **Azimuth.trueBearing** attribute shall be provided.	Minimum AIP data set
MLS-109	If the **Azimuth.magneticBearing** is provided then the **Azimuth.magneticBearingAccuray** should be provided.	PANS-AIM
MLS-110	If the **Azimuth.trueBearing** is provided then also the **Azimuth.trueBearingAccuray** should be provided.	PANS-AIM
MLS-111	If **Navaid.type** equal-to 'MLS or 'MLS_DME' the **Navaid.signalPerformance** shall be provided.	PANS-AIM
MLS-112	The **Navaid.signalPerformance** and the related **RunwayDirection.precisionAppraochGuidance** shall be consistent.	Data consistency
MLS-113	If **Navaid.type** equal-to 'MLS' or 'MLS_DME' it must have exactly one **NavaidEquipment** which is an **Azimuth**.	Data consistency
MLS-114	If **Navaid.type** equal-to 'MLS' or 'MLS_DME' it must have exactly one **NavaidEquipment** which is an **Azimuth**.	Data consistency
MLS-115	The value of the **DME.channel** of the related **DME** must be paired with the **Azimuth.Channel** as described by Table A, ICAO Annex 10, Vol.1.	EAD
MLS-116	The **Azimuth.location** must be plausibly close (less than 1 KM) to that of the end of the related (through **Navaid.runwayDirection**) **RunwayDirection**.	EAD / Data consistency
MLS-117	The difference	EAD /

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	between **Azimuth.magneticBearing** and the related **RunwayDirection.magneticBearing** (through **Navaid.runwayDirection**) cannot exceed 10 degrees.	ICAO Doc 8168, PANS OPS
MLS-118	The difference between **Azimuth.trueBearing** and **Azimuth.magneticBearing** has to be consistent with the value of the **AirportHeliport.magneticVariation** of the related **AirportHeliport** (through **Navaid.servedAirport**), taking in consideration the current date and the annual rate of change (**AirportHeliport.magneticVariationChange**).	EAD
MLS-119	The **Elevation.location** must be plausibly close (less than 1 KM) to that of the threshold of the related (through **Navaid.runwayDirection**) **RunwayDirection**.	EAD
MLS-120	**Elevation.angleNominal** must be greater than **Elevation.angleMinimum**.	EAD/ ICAO Annex 10, Vol. 1

2.1.7.c.9. Coding Rules for Navaid Magnetic Variation

Req. ID	Data Encoding Rule	Justification
NAV-301	For **VOR** or **TACAN** having a specified **magneticVariation** and **dateMagnteicVariation,** these values have to coincide with those of the **AirportHeliport** related to the **Navaid** the **VOR** or **TACAN** is a **NavaidEquipment** of.	EAD
NAV-302	If **magneticVariation** is specified, then **dateMagnteicVariation** is mandatory.	EAD / Data consistency
NAV-303	If **magneticVariation** is specified, then **magneticVariationAccuracy** should be	PANS-AIM

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	provided.	

2.1.7.c.10. Coding Rules for Navaid Position and Elevation

Req. ID	Data Encoding Rule	Justification
NAV-401	The **Navaid.location** property is mandatory.	Minimum AIP Data set
NAV-402	The **NavaidEquipment.location** property is mandatory.	Minimum AIP Data set
NAV-403	If **Navaid.navaidEquipment** is a 'DME' the related **ElevatedPoint.elevation** and **ElevatedPoint.verticalAccuracy** is mandatory.	Minimum AIP Data set
NAV-404	If **Navaid.navaidEquipment** is a "GBAS" the related **ElevatedPoint.elevation** and **ElevatedPoint.verticalAccuracy** is mandatory.	Minimum AIP Data set
NAV-405	The **location** of the **NavaidEquipment** which is coded with **NavaidComponent.providesNavigableLocation** is 'YES', has to be exactly the same as the **location** of the related **Navaid**.	Data consistency
NAV-406	Only one **NavaidEquipment** a Navaid is composed of, may be coded with **NavaidComponent.providesNavigableLocation** is 'YES'.	Data consistency
NAV-408	The coordinates of the **Navaid.location** of an Aerodrome Navaid and the coordinates of the **Navaid.Equipment**, the **Navaid** is composed of shall be published with at least 5 decimals resolution.	PANS-AIM
NAV-409	The value of the **Navaid.location.ElevatedPoint.horizontaAccuracy** of an Aerodrome **Navaid** shall be 3 M or less, unless it is	PANS-AIM

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	a GBAS Ref point.	
NAV-410	The value of the **Navaid.location.ElevatedPoint.horizontaAccuracy** of a GBAS Ref point **Navaid** shall be 1 M or less.	PANS-AIM
NAV-411	The coordinates of the **Navaid.location** of an Enroute Navaid and the coordinates of the **Navaid.Equipment** the **Navaid** is composed of shall be published with at least 4 decimals resolution.	PANS-AIM
NAV-412	The value of the **Navaid.location.ElevatedPoint.horizontaAccuracy** of an Enroute **Navaid** shall be 100 M or less.	PANS-AIM
NAV-413	If **Navaid.type** equal-to 'DME VOR_DME , NDB_DME, ILS_DME, LOC_DME' the value of the **Navaid.location.ElevatedPoint.elevation** shall be published with at least 30m (100 ft) resolution, unless it is DME/P.	PANS-AIM
NAV-419	If the **DME.type** is not equal-to "PRECISION" the **DME.location.ElevatedPoint.elevation** shall be published with at least 30m (100 ft) resolution.	PANS-AIM
NAV-420	If the **DME.type** equal-to 'PRECISION' the **DME.location.ElevatedPoint.elevation** shall be published with at least 3 m (10 ft) resolution.	PANS-AIM
NAV-414	If **Navaid.type** equal-to 'DME VOR_DME , NDB_DME, ILS_DME, LOC_DME' and the related **DME.type** equal-to 'PRECISION' the value of the **Navaid.location.ElevatedPoint.elevation** shall be published with at least 3 m (10 ft) or less resolution.	PANS-AIM
NAV-415	If **Navaid.type** is a GBAS Reference point the value of the **Navaid.location.ElevatedPoint.elevation** shall be published with at least 1m (1 ft) resolution.	PANS-AIM
NAV-416	If **Navaid.type** equal-to 'DME VOR_DME , NDB_DME, ILS_DME, LOC_DME' the value of the **Navaid.location.ElevatedPoint.verticalAccuracy** sh all be 30 m (100 ft) or less, unless it is DME/P.	PANS-AIM
NAV-417	If **Navaid.type** equal-to 'DME VOR_DME', 'NDB_DME', 'ILS_DME', 'LOC_DME' and the related **DME.type** equal-	PANS-

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	to 'PRECISION' the value of the **Navaid.location.ElevatedPoint.verticalAccuracy** sh all be 3 m or less.	AIM
NAV-418	If **Navaid.type** is a GBAS Reference point the value of the **Navaid.location.ElevatedPoint.verticalAccuracy** sh all be 0,25 m or less.	PANS-AIM
NAV-411	If the **DME.type** is not equal-to "PRECISION" the value of the **DME.location.ElevatedPoint.verticalAccuracy** shall be published with at least 30m (100 ft) resolution,	PANS-AIM
NAV-422	If the **DME.type** equal-to 'PRECISION' the value of the **DME.location.ElevatedPoint.verticalAccuracy** shall be published with at least 3 m (10 ft) resolution.	PANS-AIM
NAV-423	The coordinates of the **Navaid.location** of a Navaid used in the **EnRouteSegmentPoint** shall be published with at least 5 decimals resolution.	PANS-AIM
NAV-424	The coordinates of the **Navaid.location** of a Navaid used in the **TerminalSegmentPoint** shall be published with at least 5 decimals resolution.	PANS-AIM

2.1.7.c.11. Coding Rules for Navaid Hours of Operation

Req. ID	Data Encoding Rule	Justification
NAV-501	Either the **availability** of the **Navaid** or the **availability** of all the instances of **NavaidEquipment** the Navaid is composed of is mandatory.	Minimum AIP Data set
NAV-502	The **availability** of a **NavaidEquipment** shall only be coded in case of a **Navaid** is composed of more than one **NavaidEquipment,** whereas at least one of them has a different availability than the others.	Data consistency
NAV-503	If for a **Navaid** composed of more than one **NavaidEquipment**, the **availability** of one of its **NavaidEquipment** is coded, the **availability** shall be coded for all other **NavaidEquipment** instances of that **Navaid** as	Data consistency

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	well.	
NAV-504	If a **Navaid** is composed of more than one **NavaidEquipment,** and the availbilty coded for the instances of **NavaidEquipment** are not exactly the same the **availabililty** of the **Navaid** shall not be coded.	Data consistency
NAV-505	If a **Navaid** is composed of one single **NavaidEquipment** the **availability** shall only be coded for the **Navaid,**	Data consistency
NAV-506	If a **Navaid** is composed of more than one **NavaidEquipment** all having exactly the same availability, the **availability** shall only be coded for the **Navaid,** (it is not necessary to copy it for each instance of **NavaidEquipment).**	Data consistency

2.1.7.c.12. Coding Rules for Navaid Coverage

Req. ID	Data Encoding Rule	Justification
NAV-801	A facility coverage should be provided for each **NavaidEquipment** at least as **NavaidEquipment.annotation**.	PANS-AIM
NAV-802	If **RadioFrequencyArea.type** equal-to 'COV' then **CircleSector.outerDistance** is mandatory.	EAD
NAV-803	If **RadioFrequencyArea.type** equal-to 'SCL' then **RadioFrequencyArea.angleScallop** is mandatory.	EAD
NAV-804	**CircleSector.outerDistance** must be greater than **CircleSector.innerDistance.**	EAD
NAV-805	If **CircleSector.upperLimit** is specified, then **CircleSector.upperLimitReference** is mandatory.	AIXM 4.5 /Minimal data rule
NAV-806	If **CircleSector.lowerLimit** is specified, then **CircleSector.lowerLimitReference** is mandatory.	AIXM 4.5 /Minimal data rule

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NAV-807	If the unit of measurement of **CircleSector.upperLimit** has the value 'FL' or 'SM', then the attribute **CircleSector.upperLimitReference** must have the value 'STD' (standard pressure).	AIXM 4.5 Business Rules / Minimal data rule
NAV-808	If both **CircleSector.lowerLimit** and **CircleSector.upperLimit** are specified, then the value of the lower limit must be smaller than or equal to the value of the upper limit (when converted to a common unit of measurement and reference system).	EAD
NAV-809	If the unit of measurement of **CircleSector.lowerLimit** has the value 'FL' or 'SM', then the attribute **CircleSector.lowerLimitReference** must have the value 'STD' (standard pressure).	AIXM 4.5 Business Rules / Minimal data rule
NAV-810	**RadioFrequencyArea.angleScallop** may be specified only for **VOR** or **TACAN**.	EAD
NAV-811	The **RadioFrequencyArea.angleScallop** may be specified only if **RadioFrequencyArea.type** is 'SCL' or 'COV'.	EAD
NAV-812	If a **CircleSector** is defined for a **RadioFrequencyArea** the **CircleSector.fromArc** is mandatory.	Data consistency
NAV-814	If a **CircleSector** is defined for a **RadioFrequencyArea** the **CircleSector.toArc** is mandatory.	Data consistency
NAV-813	If a **CircleSector** is defined for a **RadioFrequencyArea** the **CircleSector.arcDirection** is mandatory.	Data consistency
NAV-814	If a **CircleSector** is defined for a **RadioFrequencyArea** the **angleDirectionReference** is mandatory, unless a full circle is described.	Data consistency
NAV-815	If a **CircleSector** is defined for a **RadioFrequencyArea** the **CircleSector.type** is mandatory, unless a full circle is described.	Data consistency

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NAV-816	Each **RadioFrequencyArea** shall have assigned **type** value	AIXM 4.5 /Minimal data rule
NAV-817	Each **CircleSector** with **upperLimit.uom** equal-to ('FL', 'SM') shall have **upperLimit** value expressed with 2 or 3 digits	ICAO Annex 11
NAV-818	Each **CircleSector** with **lowerLimit.uom** equal-to ('FL', 'SM') shall have **lowerLimit** value expressed with 2 or 3 digits	ICAO Annex 11
NAV-819	If the inner limit of a limitation is "0', i.e. begins at the Navaid, the **innerDistance** attribute should be encoded like that and not be left "uncoded".	Data consistanc y

2.1.7.c.13. Coding Rules for Navaid Operating Authority

Req. ID	Data Encoding Rule	Justification
NAV-701	Each **NavaidEquipment** should have at least one related **OrganisationAuthority**.	PANS-AIM
NAV-702	The **OrganisationAuthority** related to a **NavaidEquipment** shall have at least the **name** attribute coded.	PANS-AIM

2.1.7.c.14. Coding Rules for Navaid relative position

Req. ID	Data Encoding Rule	Justification
NAV-601	If coded, the **NavaidEquipmentDistance.distance** shall be published with a resolution of 1 m or 1 ft.	PANS-AIM
NAV-602	If coded the **NavaidEquipmentDistance.distanceAccura cy** shall have value of 3 m or less.	PANS-AIM
NAV-603	If the **NavaidEquipmentDistance.distance** is coded the **NavaidEquipmentDistance.distanceAccura**	Data completeness

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	cy shall be coded.	
NAV-604	If the **NavaidEquipmentDistance.distance** is coded a related **NavaidEquipment** has to be coded.	AIXM 4.5 / Minimal data rule

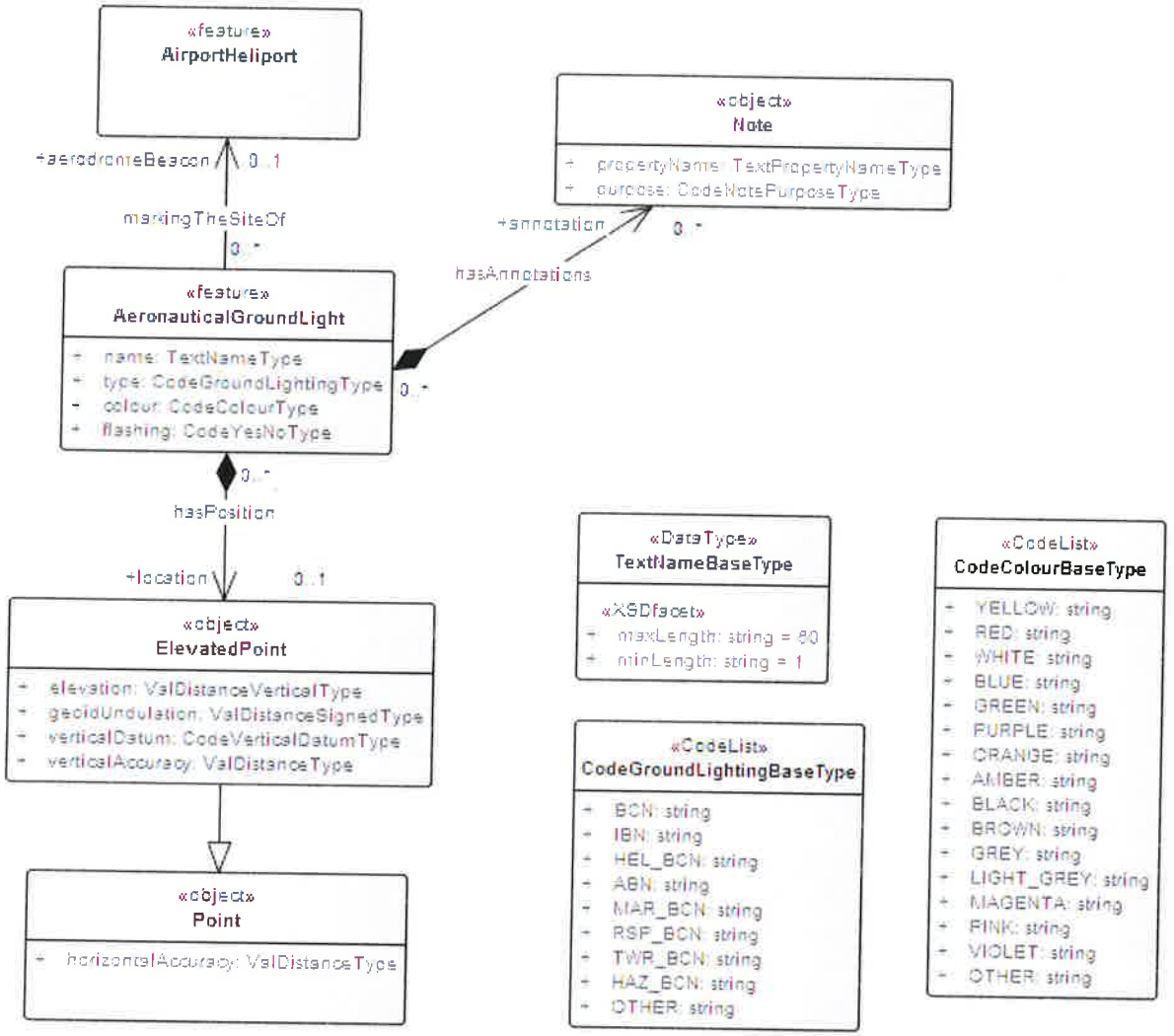
(8) Coding Rules for Aeronautical Ground Light

(a) CODING GUIDELINES

2.1.8.a.1. Basic Data for Aeronautical Ground Light

This section contain the coding guidelines for the minimum and conditional data items of the Aeronautical Ground Lights subject as defined in PANS-AIM.

The figure below shows the main AIXM 5 classes used for the aeronautical ground light concept.



(b) AIXM CHECKLIST

AIXM Feature/Object	AIXM Feature/Object	Complex Type or Xlink :href to	AIP data set

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	Property	other feature	
AeronauticalGroundLight	name		Mandatory
	type		Mandatory
	colour		Mandatory
	flashing		Mandatory
	structureBeacon	xlink:href -> VerticalStructure	Optional
	aerodromeBeacon	xlink:href -> AirportHeliport	Mandatory, if applicable
	location	ElevatedPoint	Optional
	annotation	Note	Mandatory for information required by PANS-AIM for which there is no dedicated AIXM property, viz: Intensity of the light of the beacon The hours of operation of the beacon

(c) **CODING RULES**

Req. ID	Data Encoding Rule	Justification
AGL-101	The **AeronauticalGroundLight.name** attribute is mandatory.	PANS-AIM
AGL-102	The **AeronauticalGroundLight.type** attribute is mandatory.	PANS-AIM
AGL-103	The **AeronauticalGroundLight.location** property is mandatory.	PANS-AIM
AGL-104	The intensity of the light shall be provided in	PANS-AIM

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	thousands of candelas	
AGL-105	The characteristics of the signal shall be provided.	PANS-AIM
AGL-106	The operational hours shall be provided.	PANS-AIM
AGL-107	If **AeronauticalGroundLight.type** is equal-to 'HEL-BCN', 'IBN', 'TWR-BCN' or 'ABN', then it must be related to an **AirportHeliport** and the position given by **AeronauticalGroundLight.location** must be plausibly close (less than 20 KM) to that of the **ARP** of the related **AirportHeliport**.	EAD
AGL-108	If **AeronauticalGroundLight.type** equal-to 'HEL-BCN', 'IBN', 'TWR-BCN' or 'ABN', then **AeronauticalGroundLight.type** and **name** of the related **AirportHeliport** must match.	EAD
AGL-109	If **AeronauticalGroundLight.type** equal-to 'ABN' (Aerodrome Beacon), then the **type** of the referenced **AirportHeliport** must be 'AD' or 'AH'.	EAD
AGL-110	If **AeronauticalGroundLight.type** equal-to 'HBCN' (Heliport Beacon), then **type** of the referenced **AirportHeliport** must be 'HP'.	EAD

(9) HOLDING PATTERN (HPT)

(a) CODING GUIDELINES

2.1.9.a.1. En-route holding

This section contains the coding guidelines for the minimum and conditional data items of the En-route Holding subject. Holding pattern as defined in PANS-AIM is:

A predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

According to PANS-AIM "ENR 3.6 En-route Holding" may be left blank and a reference to the data set availability shall be provided when the AIP Data Set is provided.

The figure below shows the basic structure of a holding pattern1:

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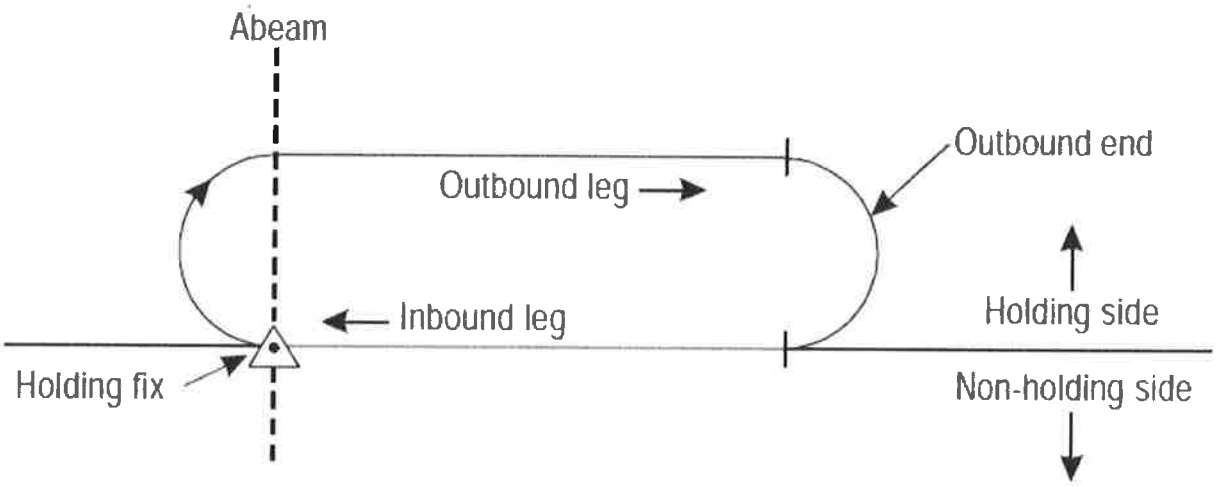
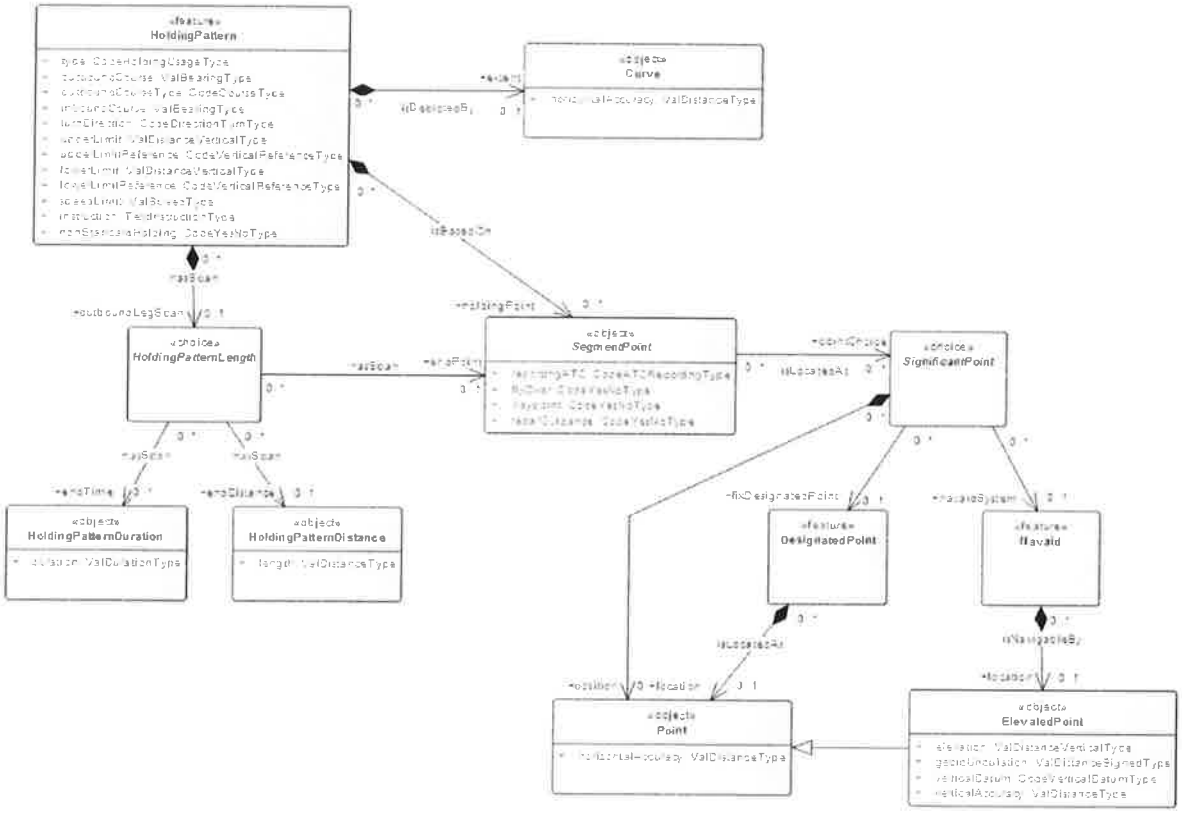
A. Holding pattern (right turns)



The figure below shows the main AIXM 5 classes used for the holding concept.



The HoldingPattern may be controlled by a Unit providing a Service that uses a certain radioCommunication.

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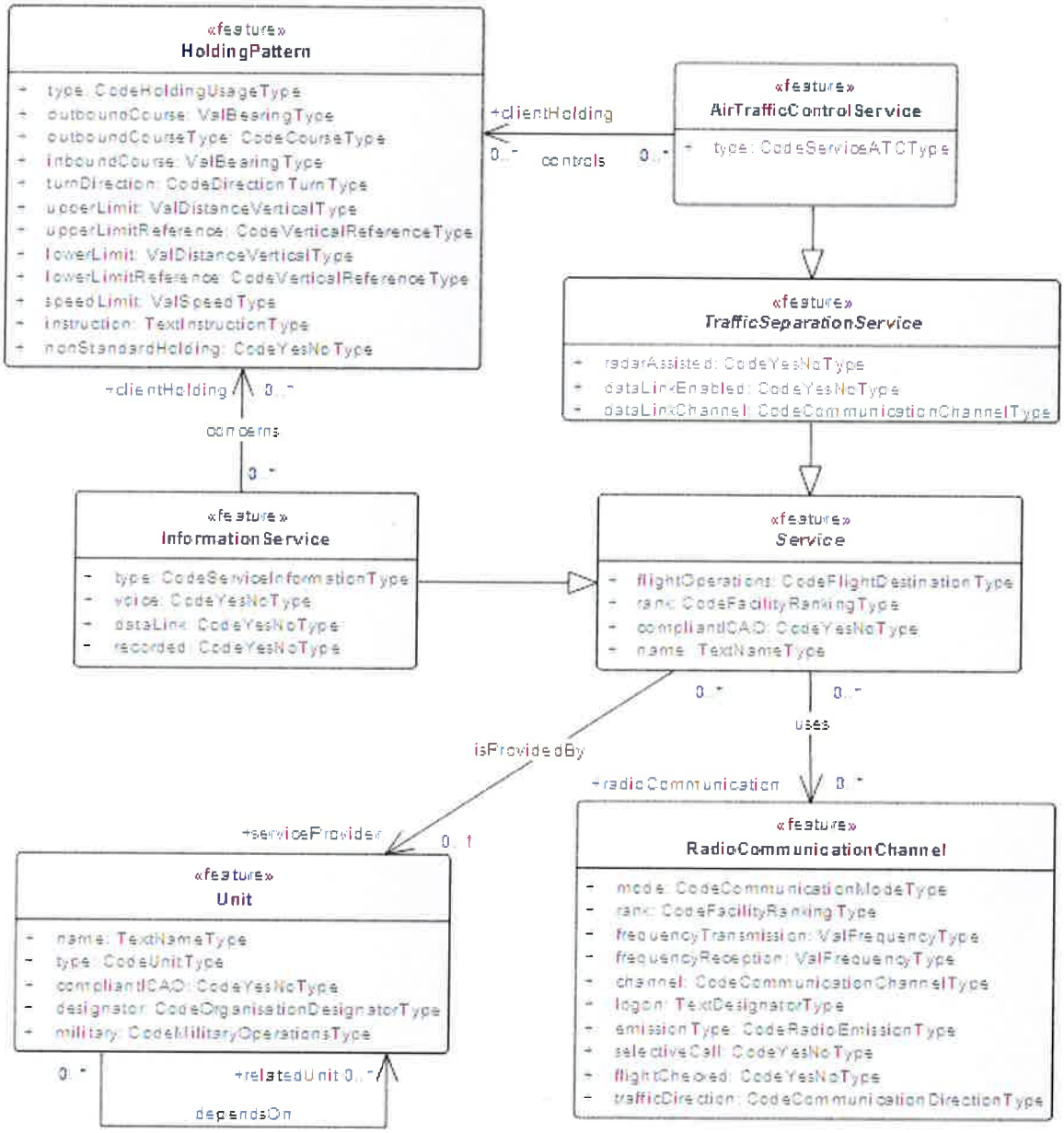

2.1.9.a.2. Basic Data for En-route Holding

Based on PANS-AIM "ENR 3.6 En-route Holding", the following information is considered conditional data for the AIP data set:

1) holding identification (if any) and holding fix (navigation aid) or waypoint with geographical coordinates in degrees, minutes and seconds;

2) inbound track;

3) direction of the procedure turn;

4) maximum indicated airspeed;

5) minimum and maximum holding level;

6) time/distance outbound.

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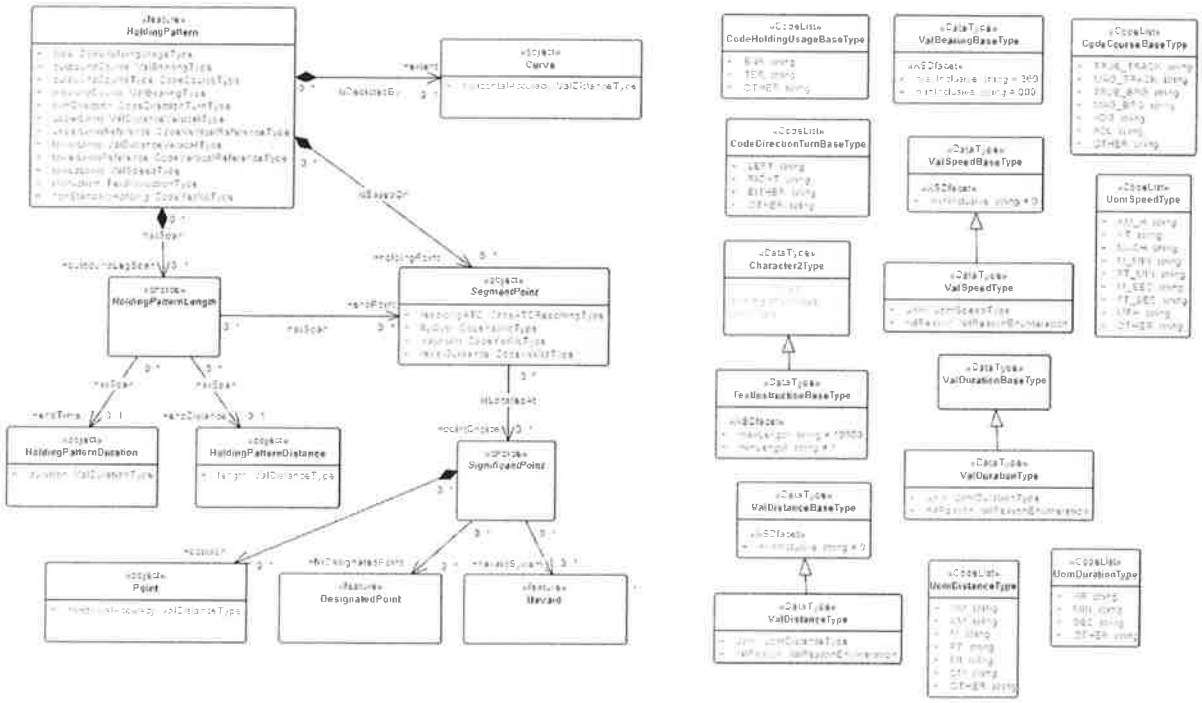
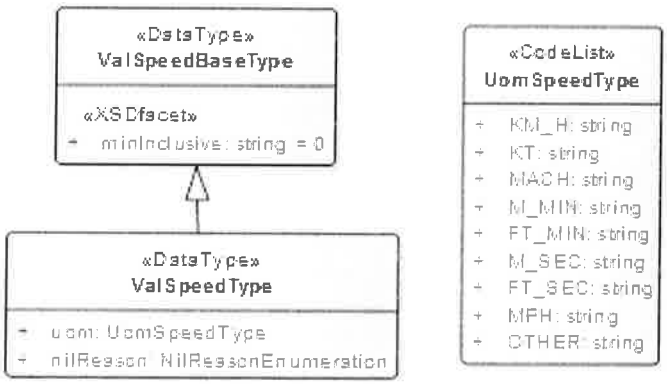


Holding Pattern Speed Limit

Maximum holding speeds may be established to keep an aircraft within the protected holding area.

The HoldingPattern.speedLimit attribute is used to code the speed limit imposed on the execution of the holding pattern.



Time/Distance Outbound

The span of the holding pattern (length of the outbound) may be coded as a choice of the HoldingPatternLength class, either as duration, length, or outbound to a significant point.

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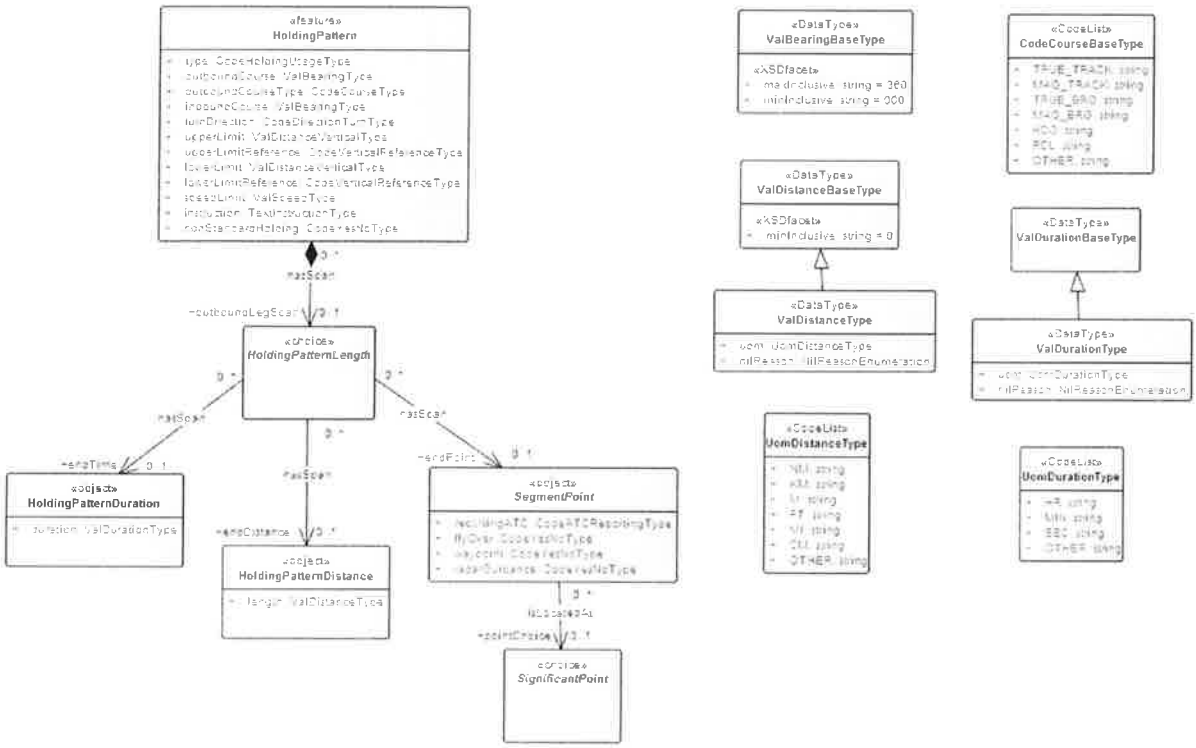
Case 1



Case 2:

The DME distance will be encoded as **DistanceIndication.distance** from the Navaid that is composed of the DME providing the limiting outbound distance.

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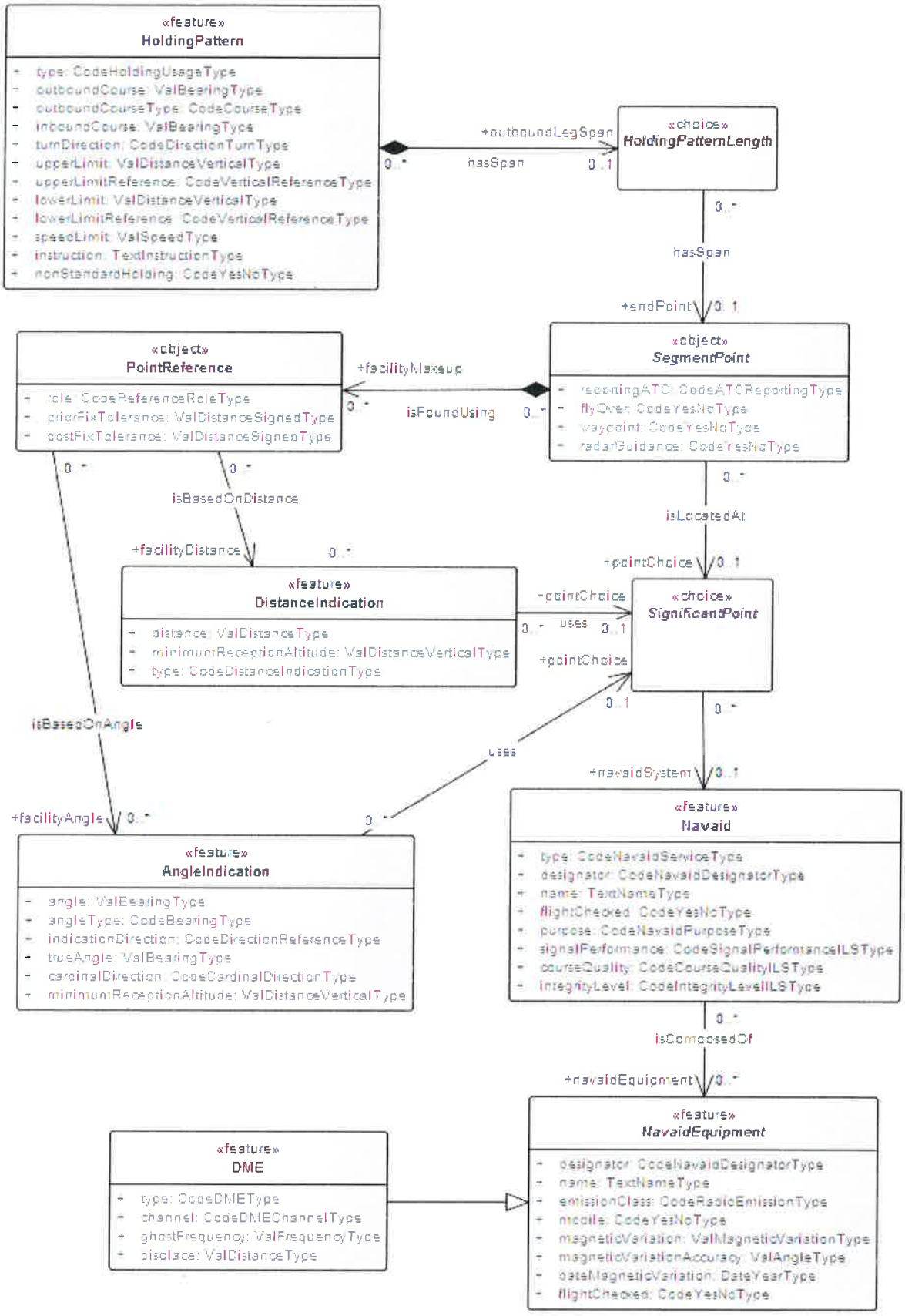

2.1.9.a.3. Controlling Unit for En-route Holding

PANS-AIM "ENR 3.6 En-route Holding" also requires as part of the conditional data for the AIP data set an:

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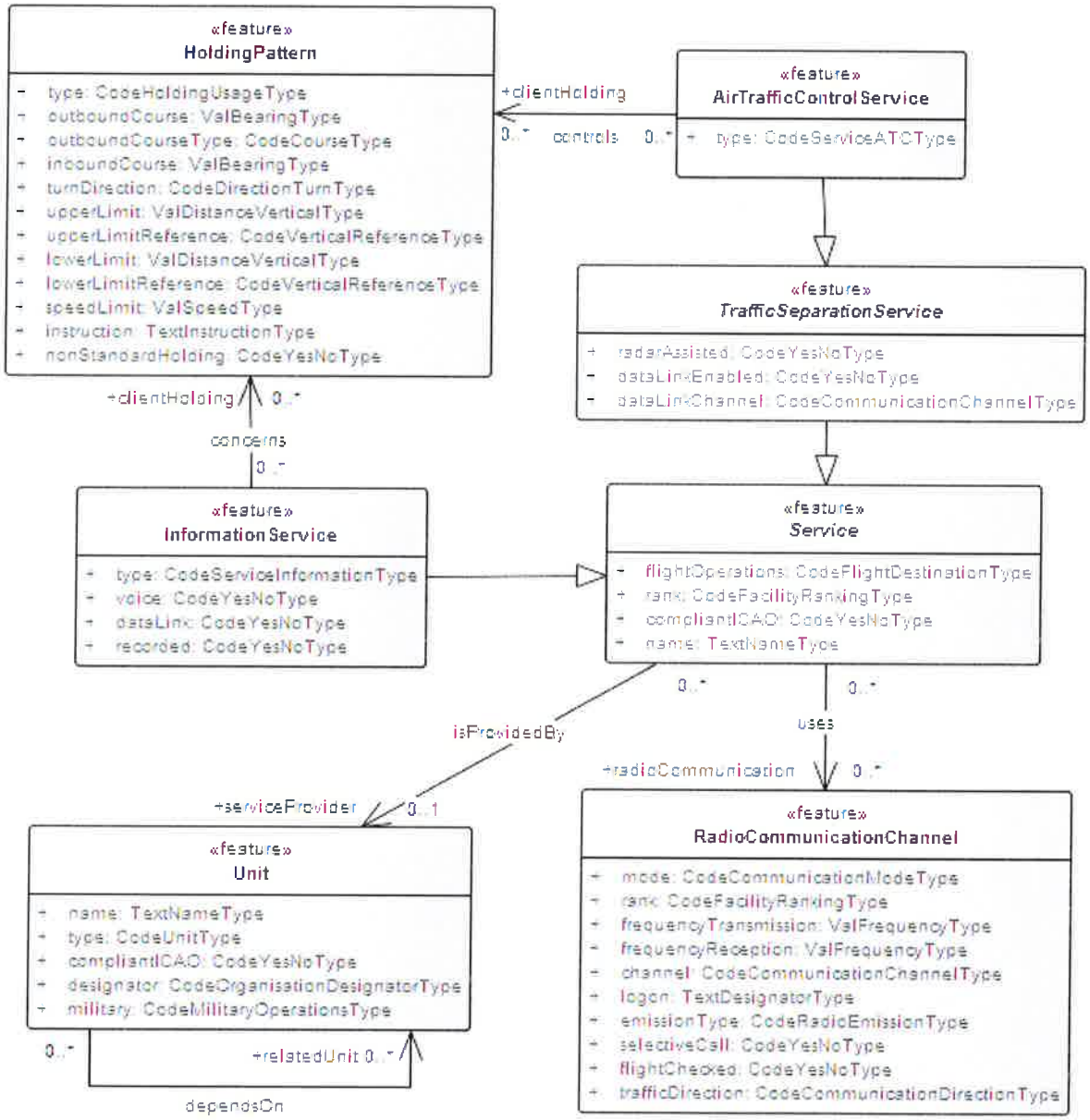
indication of the controlling unit and its operating frequency.

The diagram below shows the AIXM classes, including the relevant data types, needed to encode that information:



(b) AIXM CHECKLIST

AIXM Feature/Object	AIXM Feature/Object Property	Complex Type or xlink : href to other Feature	AIP data set
HoldingPattern	type		Optional
	outboundCourse		Optional

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	outboundCourseType		Optional
	inboundCourse		Mandatory
	turnDirection		Mandatory
	upperLimit		Mandatory
	upperLimitReference		Mandatory
	lowerLimit		Mandatory
	lowerLimitReference		Mandatory
	speedLimit		Mandatory
	instruction		Optional
	nonStandardHolding		Optional
	holdingPoint	SegmentPoint	Mandatory for AIP Data Set the relevant specialisation of SegmentPoint is the EnRouteSegmentPoint feature
	extent	Curve	Optional
	annotation	Note	Optional
	outboundLegSpan		Mandatory (choice of endTime or endDistance or endPoint)
HoldingPatternDistance	length		Conditional, if span defined by a distance

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	annotation	Note	Optional
HoldingPattern Duration	duration		Conditional, if span defined by a duration
	annotation	Note	Optional
EnRouteSegmentPoint	reportingATC		Optional
	flyOver		Optional
	waypoint		Optional
	radarGuidance		Optional
	facilityMakeup	PointReference	Optional
	extendedServiceVolume	xlink:href -> RadioFrequencyArea	Optional
	annotation	Note	Optional
	roleFreeFlight		Optional
	roleRVSM		Optional
	turnRadius		Optional
	roleMilitaryTraining		Optional
	pointChoice_fixDesignatedPoint	xlink:href -> DesignatedPoint	Mandatory or pointChoice_navaidSystem
	pointChoice_navaidSystem	xlink:href -> Navaid	Mandatory or pointChoice_fixDesignatedPoint
AirTrafficControlService	flightOperations		Optional
	rank		Optional

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	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional
	call-sign	CallsignDetail	Optional
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Optional
	annotation	Note	Optional
	radarAssisted		Optional
	dataLinkEnabled		Optional
	dataLinkChannel		Optional
	type		Optional
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientAirspace	xlink:href -> Airspace	N/A
	clientRoute	RoutePortion	N/A
	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	Conditional
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A

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	aircraftLocator	xlink:href -> DirectionFinder	N/A
InformationService	flightOperations		Optional
	rank		Optional
	compliantICAO		Optional
	name		Optional
	location	ElevatedPoint	Optional
	serviceProvider	xlink:href -> Unit	Conditional
	callSign	CallsignDetail	Optional
	radioCommunication	xlink:href -> RadioCommunicationChannel	Conditional
	groundCommunication	ContactInformation	Optional
	availability	ServiceOperationalStatus	Optional
	annotation	Note	Optional
	type		Optional
	voice		Optional
	dataLink		Optional
	recorded		Optional
	navaidBroadcast	xlink:href -> VOR	Optional
	clientAirspace	xlink:href -> Airspace	N/A
	clientAirport	xlink:href -> AirportHeliport	N/A
	clientRoute	RoutePortion	N/A

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	clientProcedure	xlink:href -> Procedure	N/A
	clientHolding	xlink:href -> HoldingPattern	Conditional
	clientAerialRefuelling	xlink:href -> AerialRefuelling	N/A
Unit	name		Conditional, if serviceProvider is encoded.
	type		Optional
	compliantICAO		Optional
	designator		Optional
	military		Optional
	position	ElevatedPoint	Optional
	airportLocation	xlink:href -> AirportHeliport	Optional
	ownerOrganisation	xlink:href -> OrganisationAuthority	Optional
	contact	ContactInformation	Optional
	relatedUnit	UnitDependency	Optional
	availability	UnitAvailability	Optional
	annotation	Note	Optional
RadioCommunicationChannel	mode		Optional
	rank		Optional
	frequencyTransmission		Conditional, if radioCommunication is encoded,

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	frequencyReception		Conditional, if radioCommunication is encoded,
	channel		Optional
	logon		Optional
	emissionType		Optional
	selectiveCall		Optional
	flightChecked		Optional
	trafficDirection		Optional
	location	ElevatedPoint	Optional
	availability	RadioCommunicationOperationalStatus	Optional
	annotation	Note	Optional

(c) CODING RULES

2.1.9.c.1. Coding Rules for Holding Pattern

Req. ID	Data Encoding Rule	Justification
HPT-101	The **HoldingPattern.type** attribute is mandatory.	PANS-AIM / ARINC 424 consistency
HPT-102	The **HoldingPattern.holdingPoint** property is mandatory.	Minimum AIP data set
HPT-103	The **HoldingPattern.inboundCourse** attribute is mandatory.	Minimum AIP data

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		set
HPT-104	The **HoldingPattern.turnDirection** attribute is mandatory.	Minimum AIP data set
HPT-105	The **HoldingPattern.speedLimit** attribute is mandatory.	Minimum AIP data set
HPT-106	The **HoldingPattern.upperLimit** attribute is mandatory.	Minimum AIP data set
HPT-107	If a value is provided for the **HoldingPattern.upperLimit** the **HoldingPattern.upperLimitReference** is mandatory.	Minimum AIP data set
HPT-108	The **HoldingPattern.lowerLimit** attribute is mandatory.	Minimum AIP data set
HPT-109	If a value is provided for the **HoldingPattern.lowerLimit**, the **HoldingPattern.lowerLimitReference** is mandatory.	Minimum AIP data set
HPT-110	The **HoldingPattern** shall have either an **outboundLegSpan_endTime** or **outboundLegSpan_endDuration** or **outboundLegSpan_endPoint.**	Minimum AIP data set
HPT-111	For **HoldingPattern.speedLimit** the values defining "vertical speed" indication shall not be used, these are equal-to 'M_MIN', 'FT_MIN', 'M_SEC', 'FT_SEC'.	Data consistency
HPT-112	For **HoldingPattern.turnDirection** the value equal-to 'EITHER' shall not be coded.	ARINC 424 consistency

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HPT-113	Coordinates of **HoldingPattern.holdingPoint** shall be published with at least 4 decimals resolution.	PANS-AIM
AHP-114	If coded, the value of the **horizontalAccuracy** of the **HoldingPattern.holdingPoint** shall be 100 M or less.	PANS-AIM

2.1.9.c.2. Coding Rules for Controlling Unit for En-route Holding

Req. ID	Data Encoding Rule	Justification
HPT-201	To each **HoldingPattern** at least one **Service** should be related.	PANS-AIM
HPT-202	Each **Service** related to a **HoldingPattern** should have a **serviceProvider** with a coded **Unit.name.**	PANS-AIM
HPT-203	Each **Service** related to a **HoldingPattern** should have a **radioCommunication** with coded **RadioCommunicationChannel.frequencyTransmission** and **RadioCommunicationChannel.frequencyReception** (if applicable).	PANS-AIM

(10) SERVICE AND UNIT

(a) CODING GUIDELINES

En-route services

For the AIP data set PANS-AIM contains several requirements for the provision of data regarding services provided by units. These services may be provided within Airspaces, for Route segments or Holding procedures. For more details see topics ATS Unit providing Service, Controlling Unit for Route Segment and Controlling Unit for En-route Holding.

The diagram below gives an overview of the en-route services (such as ATC, FIS, SAR, etc.) modelled in AIXM 5. Please note that this is not a complete "AIXM services concept" diagram, it is a partial diagram that shows just some of categories of services.

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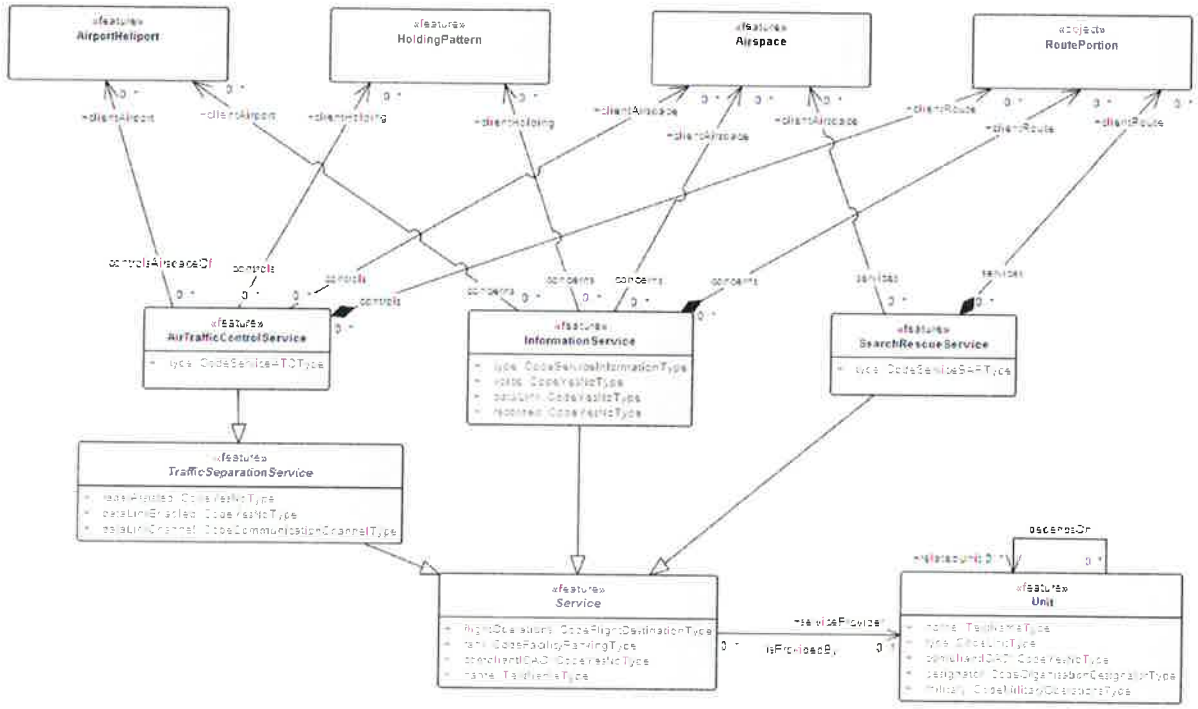
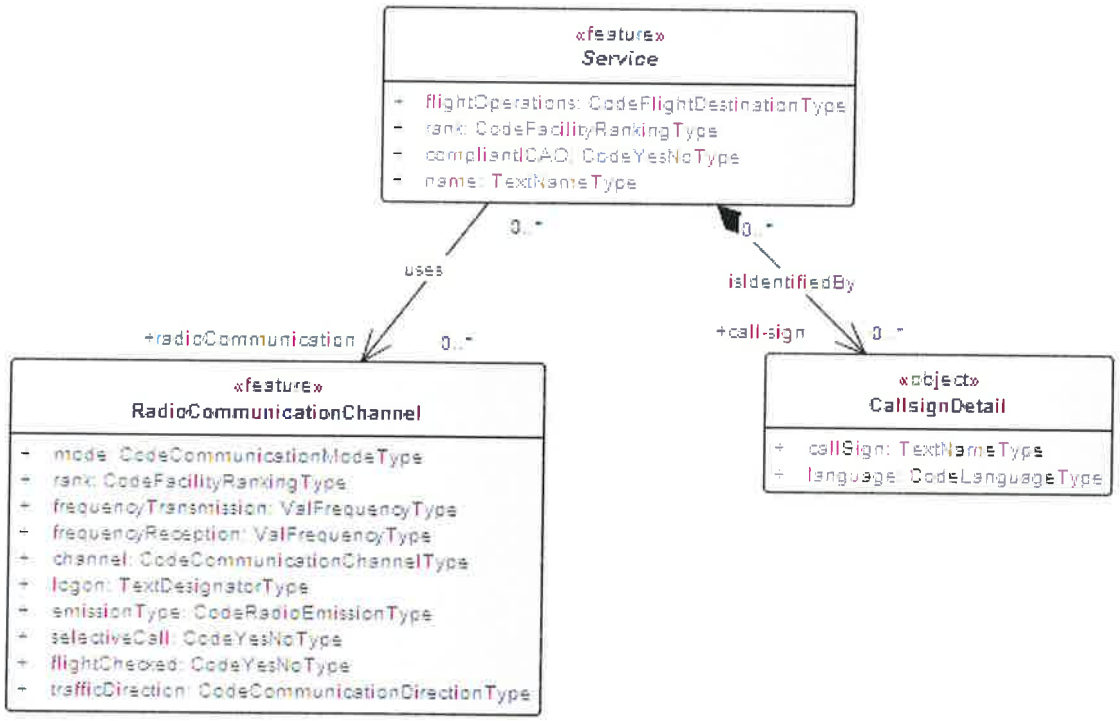


Service Unit

For the Service more details may be required such as call sign details and radio frequencies. The diagram below shows the main AIXM 5 features that may be used to code that information.



The hours of operation may be relevant as well. in this regard AIXM 5 provides the possibility to code hours of operation for the Unit that is providing the service, the Service itself and also the RadioCommunicationCchannel (frequency) the service is provided on.

For which feature the actual hours of operation are applicable and will be

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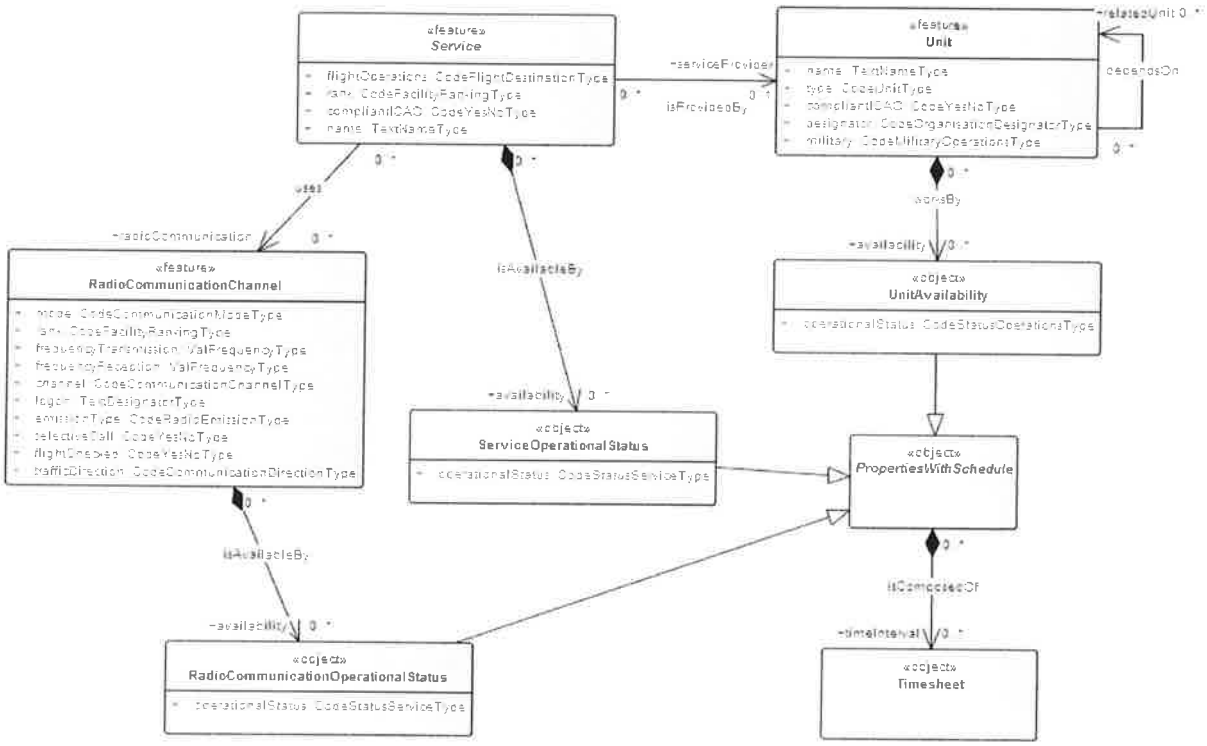
coded depends on the finally on the needs of the data provider. Although, PANS-AIM defines that hours of operation of the provided service shall be provided, for a data provider rather the opening hours of the unit or even when a particular frequency is operative may be relevant.

The diagram below shows the main AIXM 5 features that may be used to code that information:



2.1.10.a.1. Coding Rules for Service and Unit

Req. ID	Data Encoding Rule	Justification
SER-101	Each Service shall have assigned serviceProvider value	AIXM4.5 / Minimal data rule
UNI-101	Each Unit shall have assigned ownerOrganisation value	AIXM4.5 / Minimal data rule

(11) RADIO COMMUNICATION CHANNEL

(a) CODING guidelines

AIXM 5 defines the class **RadioCommunicationChannel** as follows:

A radio frequency band of sufficient width and associated identification data used for one- or two-way communication from or to a transmitter on the ground or in the air.

The diagram below shows the main AIXM 5 features that may be used to code the **RadioCommunicationChannel** concept:

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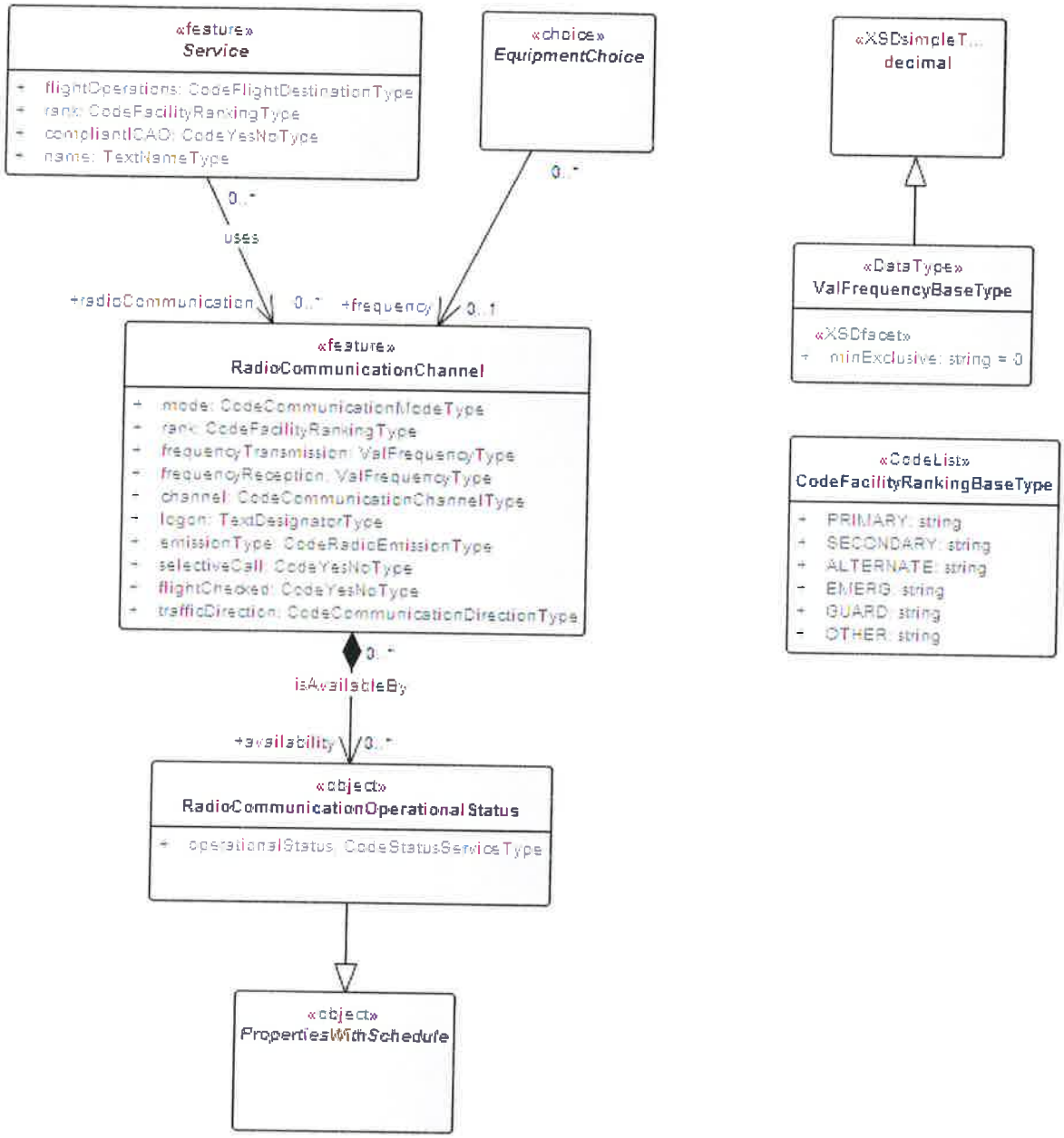

(b) Coding Rules for Radio Communication Channel

Req. ID	Data Encoding Rule	Justification
RCC-201	Each **RadioCommunicationChannel** shall have assigned **frequencyTransmission** value	AIXM 4.5 / Minimal data rule
RCC-101	**RadioCommunicationChannel.frequencyTransmission** and **RadioCommunicationChannel.frequencyReception** shall be encoded in case of two-way radio	Data harmonisati

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	communication is provided.	on
RCC-102	If a **Service** has more than one frequency **(radioCommunication),** specify its usage (e.g. by rank or other purpose distinction such as flight levels).	Data consis tency

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