

Support Flight data exchanges required by GADSS/LADR

CR Number (ID): 155		Submission Date: Click or tap to enter a date	
GENERAL INFORMATION (AUTHOR TO COMPLETE)			
Author	LEPORI Hubert		
Brief Description (Subject)	This CR proposes to add to FIXM Core a couple of flight data elements exchanged in the context of GADSS/LADR.		
Priority*	<input type="checkbox"/> Immediate	<input type="checkbox"/> High	<input type="checkbox"/> Medium <input checked="" type="checkbox"/> Low
Scale*	<input type="checkbox"/> Major	<input type="checkbox"/> Medium	<input checked="" type="checkbox"/> Minor
Expected Impact to Implementers*	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input checked="" type="checkbox"/> Low <input type="checkbox"/> None
Target FIXM Component(s)	<input checked="" type="checkbox"/> FIXM Logical Model <input type="checkbox"/> FIXM Application <input checked="" type="checkbox"/> FIXM XML Schemas <input type="checkbox"/> Other Specify...		
Target FIXM Release	<input checked="" type="checkbox"/> FIXM Core Version 4.3.0 <input type="checkbox"/> Application Version		
Related FIXM CRs			
Motivation / Change Reason	<input type="checkbox"/> Requirement <input type="checkbox"/> Functionality/Operability <input checked="" type="checkbox"/> Maintenance <input type="checkbox"/> Defect <input type="checkbox"/> Other Specify....		

* Optional fields; FIXM Secretariat may update during review

MOTIVATION / CHANGE REASON DESCRIPTION (AUTHOR TO COMPLETE)

GADSS, the Global Aeronautical Distress & Safety System, has been designed by ICAO following the tragedies of Malaysia Airlines flight 370 and Air France flight 447 which highlighted limitations in the current air navigation system that hampered timely identification and localisation of aircraft in distress.

The objectives of the GADSS are to:

- Ensure timely detection of aircraft in distress (to timely initiate SAR actions)
- Ensure tracking of aircraft in distress and timely and accurate location of end of flight (to accurately direct SAR actions)
- Enable efficient and effective SAR operations
- Ensure timely retrieval of Flight Recorder Data

GADSS is described in ICAO's GADSS Concept of Operations, Version 6.0, published in 2017.

The **Location of an Aircraft in Distress Repository (LADR)** is a component of the GADSS. LADR is a centralized repository of location information resulting from activations of aircraft distress tracking systems. LADR is specified in ICAO Doc 10150 Edition 1 "Manual on the Functional Specifications for the Location of an Aircraft in Distress Repository (LADR)", published in 2021.

ICAO Doc 10150 Edition 1 specifies the data elements that are exchanged between LADR stakeholders. These data elements include flight data elements, some of which are already captured in FIXM Core 4.2.0.

ICAO Doc 10150 requirement	Corresponding property in FIXM Core 4.2.0																													
<div>Appendix A to Chapter 3</div> <div>Mandatory Data Elements</div> <div>The table below defines the mandatory data elements to be provided by a LADR data contributor.</div> <div>Table 3-A-1. Mandatory data elements</div> <table><tr><th>Field</th><th>Format</th><th>LADR functionality</th><th>Example</th></tr><tr><td>Latitude</td><td>N/S DD MM.M'</td><td>Establish domain by geo referencing.</td><td>N45°30.1'</td></tr><tr><td>Longitude</td><td>E/W DDD MM.M'</td><td>Establish domain by geo referencing.</td><td>W073°33.9'</td></tr><tr><td>3LD</td><td>TTT</td><td>Establish State of the Operator domain.</td><td>MXA</td></tr><tr><td>Aircraft registration (with Nationality Mark)</td><td>TTTTTTT</td><td rowspan="4">Particular aircraft identification. (Completion of at least one field from the possible options to identify the aircraft is required.)</td><td>XA-BJH</td></tr><tr><td>Aircraft 24-bit address</td><td>TTTTTT</td><td>AC82EC</td></tr><tr><td>Selective calling system (SELCAL)</td><td>TTTTTT (TTTT)</td><td>ABCDEF (ABCD)</td></tr><tr><td>Flight call sign and flight number</td><td>TTTTTT</td><td>BAW1234</td></tr></table>	Field	Format	LADR functionality	Example	Latitude	N/S DD MM.M'	Establish domain by geo referencing.	N45°30.1'	Longitude	E/W DDD MM.M'	Establish domain by geo referencing.	W073°33.9'	3LD	TTT	Establish State of the Operator domain.	MXA	Aircraft registration (with Nationality Mark)	TTTTTTT	Particular aircraft identification. (Completion of at least one field from the possible options to identify the aircraft is required.)	XA-BJH	Aircraft 24-bit address	TTTTTT	AC82EC	Selective calling system (SELCAL)	TTTTTT (TTTT)	ABCDEF (ABCD)	Flight call sign and flight number	TTTTTT	BAW1234	<div>Flight.emergency.lastContact.position.position.position.pos</div> <div>Flight.operator.designatorIcao</div> <div>Flight.aircraft.registration</div> <div>Flight.aircraft.aircraftAddress</div> <div>Flight.aircraft.capabilities.communication.selectiveCallingCode</div> <div>Flight.flightIdentification.aircraftIdentification</div>
Field	Format	LADR functionality	Example																											
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Flight call sign and flight number	TTTTTT		BAW1234																											

However, other flight data elements specified ICAO Doc 10150 Edition 1 are not currently supported in FIXM Core 4.2.0.

Table 3-B-1. Optional data elements

Field	Format	LADR functionality	Example
Accuracy of position data		Optional if available from the ADT system.	
Altitude (ft)	NNNN	Optional field; either altitude in m or ft (recommended).	35000
Altitude (m)	NNNN		10000
Altitude source	XXXX	Required if <i>altitude</i> data supplied.	BARO GNSS
Groundspeed (kt)	NNN	Optional field.	350
Groundspeed (km/h)	NNN	Optional field.	550
Heading	DDD°	Optional field.	090
Emergency locator transmitter (ELT) Hex ID	HHHHHHHHHHHHHHH	Carried ELT devices (may be more than one per aircraft).	1234567890ABCDE

The purpose of this CR is to close this gap.

This CR, although not related to FF-ICE, is linked to globally applicable ICAO requirements, and is therefore considered in scope of FIXM Core, in line with Appendix A “Eligibility criteria for FIXM Core” of the FIXM Strategy v2.0.

Note: The implementation of LADR, which is underway as of the writing of this CR, will use FIXM Core 4.2.0 and an extension as a starting point, but newer versions of FIXM will be gradually considered as appropriate, when these versions become available. Promoting the missing flight data elements listed above to FIXM Core 4.3.0 will simplify the description of the information sent to / from LADR, by removing the need for an extension.

PROPOSED CHANGE (AUTHOR TO COMPLETE)

In order to cover the elements listed in the table above, it is proposed:

- To add the following property to FIXM Core model element **LastPositionReport**
 - **horizontalAccuracy**
 - Definition = *The difference between the measured horizontal coordinates of the aircraft and its true position referenced to the same geodetic datum expressed as a circular error at 95 percent probability. [FIXM]*
 - Datatype = fb:Distance
 - Multiplicity = 0..1
 - **altitude**
 - Definition = *The vertical distance, at the last known position, of the aircraft considered as a point, measured from mean Sea level (MSL). [FIXM]*
 - Datatype = fb:Altitude

- Multiplicity = 0..1
 - **groundspeed**
 - Definition = *The speed of the aircraft relative to the surface of the earth at the last known position. [FIXM]*
 - Datatype = fb:GroundSpeed
 - Multiplicity = 0..1
 - **heading**
 - Definition = *The direction, at the last known position, in which the longitudinal axis of the aircraft was pointed. [FIXM]*
 - Datatype = fb:Bearing
 - Multiplicity = 0..1
- To add the following property to FIXM Core model element **Altitude**
 - **source**
 - Definition = *The source of the altitude. [FIXM]*
 - Stereotype = <<XSDDattribute>> (so that the property is turned into to an attribute in XSD, like the uom)
 - Datatype = AltitudeSource (see description below)
 - Multiplicity = 0..1
- To create a new <<enumeration>> **AltitudeSource**
 - Definition = *Code indicating the source of the altitude.*
 - Enumerated values
 - BAROMETRIC = *This value indicates that the source is Barometric.*
 - GNSS = *This value indicates that the source is the Global Navigation Satellite System.*
 - Location: in package Base.Measure
- To add the following property to FIXM Core model element **SurvivalCapabilities**
 - **carriedEltHexIdentifier**
 - Definition = *The identifier of an emergency locator transmitter carried by aircraft. [FIXM]*
 - Datatype = EltHexIdentifier (see description below)
 - Multiplicity = 0..*
- To create a new model element **EltHexIdentifier**
 - Stereotype = <<XSDDsimpleType>>
 - Restricts CharacterString
 - Pattern = ([A-Z]|[0-9]){15}
 - Definition = *The identifier of an emergency locator transmitter. [FIXM]*
 - Location = in package Flight.Aircraft

The semantic correspondences to the AIRM for these new properties would be as follows:

- SurvivalCapabilities.carriedEltHexIdentifier

- urn:aero:airm:1.0.0:LogicalModel:Abstract:Entity@identifier
- Altitude.source
 - AIRM change request
- LastPositionReport.altitude
 - urn:aero:airm:1.0.0:LogicalModel:DataTypes:GeometryTypes:FourDimensionalPointType@altitude
- LastPositionReport.horizontalAccuracy
 - urn:aero:airm:1.0.0:LogicalModel:DataTypes:GeometryTypes:FourDimensionalPointType@horizontalAccuracy
- LastPositionReport.groundspeed
 - urn:aero:airm:1.0.0:LogicalModel:Subjects:Flight:AircraftSpeed@groundSpeed
- LastPositionReport.heading
 - urn:aero:ses:eurocontrol:airm:1.0.0:LogicalModel:Subjects:Flight:AircraftDirection@heading

The proposed changes:

- Are only about adding new model elements / properties to FIXM Core;
- Will be explicitly declared as irrelevant in the FIXM's "FF-ICE Message" Application (because they are not exchanged in the context of FF-ICE)
- Will therefore not impact the FF-ICE implementers.

CCB SECRETARIAT	
External Standard Consistency Checked	<input type="checkbox"/> AIDX <input type="checkbox"/> AIRM
CR Status	<input checked="" type="checkbox"/> Proposed <input type="checkbox"/> Implemented <input type="checkbox"/> Withdrawn <input type="checkbox"/> Rejected
Decision Date	Click or tap to enter a date
Implemented in	Enter version in which this CR is first implemented.
Comments	Click or tap here to add any additional information or comments.

IMPLEMENTATION NOTES (CCB SECRETARIAT TO COMPLETE)

Modified the pattern associated with EltHexIdentifier to better represent hexadecimal digits ([0-9A-F]).

Modeled carriedEltHexIdentifier as a list rather than repeating element to better fit with FIXM representation of repeating simple types (evident throughout the Capabilities package).