

1 Scope

The Motion Imagery Metadata (MIMD) Model [1] includes information about platforms that host payloads. The standard defines the modelling information about the different types of platforms and their specific attributes. The platform model includes classes for the Staging system and Payloads; for more information please refer to MISB ST 1906 [2] and MISB ST 1907 [3] respectively.

2 References

- [1] MISB ST 1903.1 Motion Imagery Metadata (MIMD): Model, Jun 2020.
- [2] MISB ST 1906.1 Motion Imagery Metadata (MIMD): Staging System, Jun 2020.
- [3] MISB ST 1907.1 Motion Imagery Metadata (MIMD): Payload, Jun 2020.
- [4] MISB MISP-2020.1: Motion Imagery Handbook, Oct 2019.
- [5] MISB ST 1904.1 Motion Imagery Metadata (MIMD): Base Attributes, Jun 2020.
- [6] MISB ST 0601.16 UAS Datalink Local Set, Oct 2019.
- [7] World Meteorological Organization WMO-No. 8.2014 Edition, Updated in 2017 Guide to Meteorological Instruments and Methods of Observation, 1 5 2017.
- [8] NGA NGA.STND.0065.Ed. 1 National System for Geospatial Intelligence Taxonomy (NTAX) Standard (<https://nsgreg.nga.mil/ntax/>), 12 April 2017.

3 Revision History

Revision	Date	Summary of Changes
ST 1905.1	6/25/2020	<ul style="list-style-type: none"> • Restructured to enable auto-generation of Model Class and Model Enumeration sections

4 Acronyms, Terms, Definitions

MIMD	Motion Imagery Metadata
MISB	Motion Imagery Standards Board
MISP	Motion Imagery Standards Profile
NGA	National Geospatial-Intelligence Agency

SI	International System of Units
ST	Standard
UML	Unified Modelling Language

5 Introduction

Platforms host payloads including Motion Imagery sensors. There are a wide variety of platforms with different requirements (e.g., traverse land, sea, or fly) and performing different functions (e.g., tracking, ISR) in different environments (e.g., air, water, high altitude). The simplest platform to describe is a handheld camera; the “platform” is the person without a known position or orientation. An example complex platform is a remote-controlled or automated system with multiple payloads and weapons in a hostile environment. With a remote-controlled platform, operators need information about the environment, the propulsion unit status, on-board storage and more. Analysts use this information to fully understand the situation when collecting the Motion Imagery.

Different types of platforms need and produce different types of information but also share similar types of information. For example, airborne platforms need different types of altitude (e.g., AGL) while a surface platform does not; however, both platform types need position and orientation information.

The MIMD Model for platforms provides attributes and classes to support the wide range of platform types and environments.

6 Platforms Overview

Platforms host one or more payloads and likely include power systems and weapons. Platforms operate in an environment, such as in the air, on the ground and water surface, or under water. The platform may transition from one environment to another during its operation.

Platform characteristics include administrative, position, orientation, locomotion, environment, weapons, payloads, and other devices. The administrative data provides identity, operational information, and status. The position data describes where the platform is located on or around the earth and includes position kinematics. The orientation data describes the direction the platform is facing in all three dimensions and includes orientation kinematics. The locomotion data describes the method and status of the powerplant for moving and orientating the platform (e.g., power levels, fuel levels). Environment data describes the medium(s) and their status (e.g., air temperatures, water temperatures, air pressure). Weapons data describes weapons and their status on the platform. The payloads data describes the on-board sensors, their status, and relevant information for sensor data exploitation. Other devices include on-board storage, transmitters, receivers, encoders, etc. Some of these characteristics are future additions to the Platform class.

7 Model Classes

7.1 Platform Class

Figure 1 shows the UML class diagram for the MIMD Platform. The Platform class provides administrative attributes, along with a Stage class list (see MISB ST 1906), Payload class list (see MISB ST 1907), Atmosphere class, and SurfaceWater class.

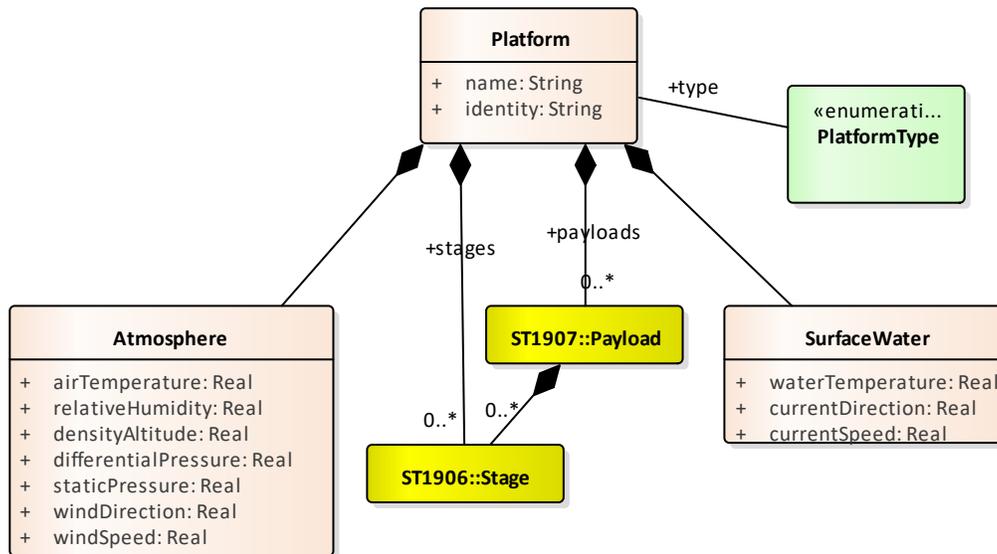


Figure 1: Platform Class Model

The Atmosphere class provides attributes about the atmospheric conditions along with the orientation of the platform for the given conditions. The SurfaceWater class provides attributes about the water conditions along with the orientation of the platform for the given conditions. Platforms, such as a ship, may report both Atmosphere and SurfaceWater conditions in the same MIMD packets.

Per discussion in MISB ST 1901, MIMD classes support the Report-On-Change (reference the Motion Imagery Handbook [4]) and include MIMD Base Attributes (reference MISB ST 1904 [5]), which use attribute identifiers 1-32.

Table 1 lists the attributes for the Platform class.

Table 1: Platform Class Attributes¹

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	name	String	N/A	N/A	N/A	100	None	7.1.1
34	identity	String	N/A	N/A	N/A	100	None	7.1.2
35	type	PlatformType	N/A	N/A	N/A	N/A	None	7.1.3
36	atmosphere	Atmosphere	N/A	N/A	N/A	N/A	None	7.1.4
37	surfaceWater	SurfaceWater	N/A	N/A	N/A	N/A	None	7.1.5
38	stages	LIST<Stage>	--	--	N/A	N/A	None	7.1.6
39	payloads	LIST<Payload>	--	--	N/A	N/A	None	7.1.7

7.1.1 Attribute 33 – name

The *name* attribute specifies a label for the platform. The name is a word or set of words for which the platform is known. For example, “Enterprise” is the name of a U.S. Navy aircraft carrier.

7.1.2 Attribute 34 – identity

The *identity* attribute specifies an organization’s identifier for the platform. The identity is the organizations code, number, word, or set of words for which the platform is identified. The identity should be unique to the platform. For example, “Enterprise” is the name of a U.S. Navy aircraft carrier; however, there are several ships with that same name. Using the identifier “CVN-65”, uniquely identifies a specific ship.

7.1.3 Attribute 35 – type

This attribute is an enumeration. Section 8.1 defines the PlatformType enumeration.

The *type* attribute specifies the kind of platform from the PlatformTypes enumeration.

7.1.4 Attribute 36 – atmosphere

This attribute is a composite relationship to the Class Atmosphere. Section 7.2 defines the Atmosphere class.

7.1.5 Attribute 37 – surfaceWater

This attribute is a composite relationship to the Class SurfaceWater. Section 7.3 defines the SurfaceWater class.

7.1.6 Attribute 38 – stages

This attribute is a list of Stage classes. MISB ST 1906 defines the Stage class.

¹ For consistency across the MIMD suite of documents, MISB ST 1901 defines the label designations for the columns in the attribute tables.

Platforms that move in a nominal primary direction (e.g., ships and planes but not quadcopters) define their forward direction down the x-axis, the y-axis on the left-hand side, and z in the upward direction. Non-directional platforms may choose any sensible orientation, so that the z-axis points in the upwards direction.

MISB ST 1906 defines the Stage class and all its child classes.

7.1.7 Attribute 39 – payloads

This attribute is a list of Payload classes. MISB ST 1907 defines the Payload class.

7.2 Atmosphere Class

The Atmosphere class defines attributes for air conditions external to the platform. Table 2 lists the attributes for the Atmosphere class.

Table 2: Atmosphere Class Attributes²

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	airTemperature	Real	-128.0	127.0	1.0	N/A	°C	7.2.1
34	relativeHumidity	Real	0.0	100.0	0.1	N/A	%	7.2.2
35	densityAltitude	Real	-900.0	40 000.0	0.3	N/A	m	7.2.3
36	differentialPressure	Real	0.0	5 000.0	--	N/A	hPa	7.2.4
37	staticPressure	Real	0.0	5 000.0	--	N/A	hPa	7.2.5
38	windDirection	Real	0.0	TWO_PI	--	N/A	rad	7.2.6
39	windSpeed	Real	0.0	200.0	--	N/A	m/s	7.2.7

7.2.1 Attribute 33 – airTemperature

The UAS Datalink LS Item 39, Outside Air Temperature, in MISB ST 0601 [6] defines the *airTemperature*.

7.2.2 Attribute 34 – relativeHumidity

The UAS Datalink LS Item 55, Relative Humidity, in MISB ST 0601 defines the *relativeHumidity*.

7.2.3 Attribute 35 – densityAltitude

The UAS Datalink LS Item 103, Density Altitude Extended, in MISB ST 0601 defines the *densityAltitude*.

² For consistency across the MIMD suite of documents, MISB ST 1901 defines the label designations for the columns in the attribute tables. Attribute table items starting and ending with underscores (e.g., *_NAME_*) are constant values listed in MISB ST 1901.

7.2.4 Attribute 36 – differentialPressure

The UAS Datalink LS Item 49, Differential Pressure, in MISB ST 0601 defines the *differentialPressure*. The SI unit for pressure is Pascals, however, per the World Meteorological Organization’s (WMO) Guide to Meteorological Instruments and Methods of Observation [7], when reporting atmospheric pressure, the preferred SI prefix is hecto; therefore, atmospheric pressure measures in the MIMD Model are in hectopascals (hPa). The WMO has chosen hPa as the preferred measure since 1 millibar = 1 hPa, where the millibar is the legacy unit for measuring atmospheric pressure.

7.2.5 Attribute 37 – staticPressure

The UAS Datalink LS Item 37, Static Pressure, in MISB ST 0601 defines the *staticPressure*. See Note 4 for information about the use of the hectoPascals (hPa) units.

7.2.6 Attribute 38 – windDirection

The UAS Datalink LS Item 35, Wind Direction, in MISB ST 0601 defines the *windDirection*. The MIMD model uses radians instead of degrees for all angles.

7.2.7 Attribute 39 – windSpeed

The UAS Datalink LS Item 36, Wind Speed, in MISB ST 0601 defines the *windSpeed*. This standard increases the Maximum Wind Speed above the largest known wind speed.

7.3 SurfaceWater Class

The SurfaceWater class defines attributes for water conditions external to the platform when the platform is on the surface of water. Table 3 lists the attributes for the SurfaceWater class.

Table 3: SurfaceWater Class Attributes³

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	waterTemperature	Real	-10.0	100.0	1.0	N/A	°C	7.3.1
34	currentDirection	Real	0.0	TWO_PI	--	N/A	rad	7.3.2
35	currentSpeed	Real	0.0	200.0	--	N/A	m/s	7.3.3

7.3.1 Attribute 33 – waterTemperature

The *waterTemperature* is the temperature measurement of the water at or near the surface next to the Platform. The minimum range extends lower than the lower bound for freezing sea water (-2° C).

³ For consistency across the MIMD suite of documents, MISB ST 1901 defines the label designations for the columns in the attribute tables. Attribute table items starting and ending with underscores (e.g., `_NAME_`) are constant values listed in MISB ST 1901.

7.3.2 Attribute 34 – currentDirection

The *currentDirection* is the angle relative to true north the water current is flowing from the present platform position outward.

7.3.3 Attribute 35 – currentSpeed

The *currentSpeed* is the magnitude of the current’s velocity.

8 Model Enumerations

8.1 PlatformType Enumeration

The NSG Taxonomy [8] (NTAX) provides many of the items in the PlatformType Enumeration; please refer to this reference for each item’s detailed description. The Enumeration contains general items (e.g., Aircraft) and specific items within the general item’s category (e.g., FixedWingAircraft). Producers should use the most specific item that best describes their platform.

Table 4: Enumeration Values for PlatformType

Id	Name	Description
1	Aircraft	See NTAX for detailed description
2	FixedWingAircraft	See NTAX for detailed description
3	FixedWingMannedAircraft	See NTAX for detailed description
4	FixedWingUAV	See NTAX for detailed description
5	RotaryWingAircraft	See NTAX for detailed description
6	RotaryWingMannedAircraft	See NTAX for detailed description
7	RotaryWingUAV	See NTAX for detailed description
8	GroundVehicle	See NTAX for detailed description
9	ArmouredCombatVehicle	See NTAX for detailed description
10	ArmouredGroundPlatform	See NTAX for detailed description
11	ArmouredRecoveryVehicle	See NTAX for detailed description
12	HalfTrackedArmouredVehicle	See NTAX for detailed description
13	HeavyArmouredCombatVehicle	See NTAX for detailed description
14	LightArmouredCombatVehicle	See NTAX for detailed description
15	LightTank	See NTAX for detailed description
16	MainBattleTank	See NTAX for detailed description
17	ArtilleryCommandVehicle	See NTAX for detailed description
18	EngineeringVehicle	See NTAX for detailed description
19	ArmouredBridgeLauncher	See NTAX for detailed description
20	CraneVehicle	See NTAX for detailed description
21	EarthMovingEquipment	See NTAX for detailed description
22	Bulldozer	See NTAX for detailed description
23	Grader	See NTAX for detailed description
24	MobileExcavator	See NTAX for detailed description

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25	MultipurposeEarthMover	See NTAX for detailed description
26	Scraper	See NTAX for detailed description
27	Trencher	See NTAX for detailed description
28	GroundAmbulance	See NTAX for detailed description
29	ArmouredTrackedAmbulance	See NTAX for detailed description
30	ArmouredWheeledAmbulance	See NTAX for detailed description
31	TruckWheeledAmbulance	See NTAX for detailed description
32	PetroleumOilLubVehicle	See NTAX for detailed description
33	PetroleumOilLubPipeLayer	See NTAX for detailed description
34	PetroleumOilLubTanker	See NTAX for detailed description
35	UnmannedGroundVehicle	See NTAX for detailed description
36	WheeledCargoTransport	See NTAX for detailed description
37	CargoTruck	See NTAX for detailed description
38	DumpTruck	See NTAX for detailed description
39	SemiTrailerTruck	See NTAX for detailed description
40	Trailer	See NTAX for detailed description
41	TruckTractor	See NTAX for detailed description
42	UtilityTruck	See NTAX for detailed description
43	MaritimeVessel	See NTAX for detailed description
44	AmphibiousTransporter	See NTAX for detailed description
45	BridgeSupportBoat	See NTAX for detailed description
46	Ferry	See NTAX for detailed description
47	Hulk	See NTAX for detailed description
48	NavalAuxiliaryShip	See NTAX for detailed description
49	NavalCombatantCraft	See NTAX for detailed description
50	NavalCombatantShip	See NTAX for detailed description
51	NavalSubmarine	See NTAX for detailed description
52	NavalSupportCraft	See NTAX for detailed description
53	Pontoon	See NTAX for detailed description
54	Spacecraft	See NTAX for detailed description
55	Satellite	See NTAX for detailed description
56	SpaceLaunchVehicle	See NTAX for detailed description
57	Automobile	Platform is a four-wheeled commercial vehicle for carrying people (e.g., sedan, SUV, hatchback)
58	MotorCycle	Platform is a two or three wheeled motorized bike
59	Cycle	Platform is a two or three wheeled human powered bike
60	Animal	Platform is a living creature for body mounted sensor(s)
61	Human	Platform is a person for handheld or body mounted sensors(s)
62	Structure	Platform is a building or other structure for mounting sensor(s)
63	Pole	Platform is a pole (e.g., telephone pole or sensor tower), statically mounted in the ground