MISB MOTION IMAGERY STANDARDS BOARD	MISB ST 1908.1
STANDARD	
Motion Imagery Metadata (MIMD): Imager System	25 June 2020

1 Scope

The Motion Imagery Metadata (MIMD) Model [1] includes information about Imagers hosted by Payloads (see MISB ST 1905 [2]). An Imager is a device for converting Scene Energy (e.g., visible, or infrared light) to an image. For example, a visible light camera is an Imager with lenses, filters, and a sensor array (e.g., CCD or CMOS). The scope of this standard is describing the modeling information about Imagers, their lenses, and other Imager aspects.

2 References

[1] MISB ST 1901.1 Motion Imagery Metadata (MIMD): Modeling Rules, Jun 2020.
[2] MISB ST 1905.1 Motion Imagery Metadata (MIMD): Platform, Jun 2020.
[3] MISB MISP-2020.1: Motion Imagery Handbook, Oct 2019.
[4] MISB ST 1904.1 Motion Imagery Metadata (MIMD): Base Attributes, Jun 2020.
[5] MISB ST 0601.16 UAS Datalink Local Set, Oct 2019.
[6] MISB ST 0801.8 Photogrammetry Metadata Set for Motion Imagery, Oct 2019.
[7] MISB ST 1907.1 Motion Imagery Metadata (MIMD): Payload, Jun 2020.
[8] MISB ST 1507.2 Motion Imagery Sensor Timing Metadata, Oct 2017.
[9] MISB ST 1204.2 Motion Imagery Identification System (MIIS) Core Identifier, Jun 2019.
[10] IETF RFC 4122 A Universally Unique IDentifier (UUID) URN Namespace, Jul 2005.

3 Revision History

Revision	Date	Summary of Changes
ST 1908.1	6/25/2020	• Restructured to enable auto-generation of Model Class and Model Enumeration sections • Corrected Center Wavelength definition in Filter class • Removed ZoomLevel attribute in Distortion class

4 Acronyms, Terms, Definitions

CCD Charge Coupled Device

CMOS	Complementary Metal–Oxide–Semiconductor
CP	Center Point
ESM	Electronic Support Measures
FWHM	Full Width-Half Maximum
GSCPO	Geo-Intelligence Sensor Common Pointing Orientation (see MISB ST 1907)
HSI	Hyper-Spectral Imaging
LIDAR	LIght Detection And Ranging
MIIS	Motion Imagery Identification System
MIMD	Motion Imagery Metadata
MISB	Motion Imagery Standards Board
MISP	Motion Imagery Standards Profile
MSI	Multi-Spectral Imaging
SAR	Synthetic Aperture Radar
SI	International System of Units
SLR	Single-Lens Reflex
ST	Standard
UML	Unified Modeling Language

5 Introduction

Many different types of Imagers exist for measuring/gathering data from different types of Scene Energy, such as Visible light, Infrared, SAR, ESM, LIDAR, HSI, MSI, Acoustical. See the Motion Imagery Handbook [3] for discussion on Scene Energy and Imagers.

Imagers have common attributes, but each Imager type defines specific metadata for their phenomenologies and methods of data collection. This standard only includes the model for Visible and Infrared Frame Imagers; future revisions will include models of other Imagers.

6 Imager System Overview

The Motion Imagery Handbook - Chapter 3 Imagers describes an Imager Processing Model which includes steps for: Scene Energy, Energy Adjustments, Sensing Process, Raw Measurements, Image Creation Process, Raw Image, Image Processing, and the resultant Image. Table 1 provides a summary of these steps for Visible and Infrared Frame Imagers.

Table 1: Summary of Imager Processing Model for Visible and Infrared Frame Imagers

Image Processing Model Steps	Summary
Scene Energy	The Scene Energy is electromagnetic energy with wavelengths in the range of 380nm to 1mm
Energy Adjustments (Uncontrolled)	Uncontrolled energy adjustments depend on the electromagnetic wavelength and the environment the energy passes through before arriving at the sensor. For example, in hot environments air currents will bend light due to turbulence; certain wavelengths of infrared light do not transmit well through the atmosphere.
Energy Adjustments (Controlled)	Controlled energy adjustments are part of the sensing system such as focus, zoom, and filtering. Components producing energy adjustments are lenses, aperture, filters, mirrors, and diffraction gratings
Sensing Process	The Sensing Process uses a device (e.g., CCD) to measure the scene energy after both uncontrolled and controlled energy adjustments. The measuring device may have many attributes providing information about how the measurement is performed along with the timing of the measurements.
Raw Measurements	Raw Measurements are the output of the sensor processing and the input into the image creation process
Image Creation Process	The Image Creation Process produces a rectangular Raw Image from the Raw Measurements
Raw Image	The Raw Image is the output of the Image Creation Process and the input into the Image Processing
Image Processing	The Image Processing either augments or manipulates one or more of the Raw Images (spatially or temporally) for the purpose of formatting or enhancing the [final] Image
[final] Image	The [final] Image is what the users sees

An Imager System has two physical sub-systems: Optics and Imager. The Optics sub-system performs Controlled Energy Adjustments (green shaded in Table 1) by focusing, zooming, filtering, limiting, and stabilizing the scene energy. The Imager sub-system performs the Sensing Process, Image Creation Process, and Image Processing (blue shaded in Table 1) by measuring the Scene Energy and post processing the results.

Figure 1 illustrates an Optics and Imager sub-system of an Imager System. At the top is a typical single-lens reflex (SLR) camera comprised of two sub-systems: the Optics, or lens system, and the Imager. The Optics sub-system has filters, an aperture, and lenses to focus, zoom, and adjust the scene energy. The Imager sub-system contains a sensor array with post-processing electronics that measures and processes the adjusted scene energy. The Imager system produces a rectangular Image with rows and columns of picture elements (i.e., pixels).

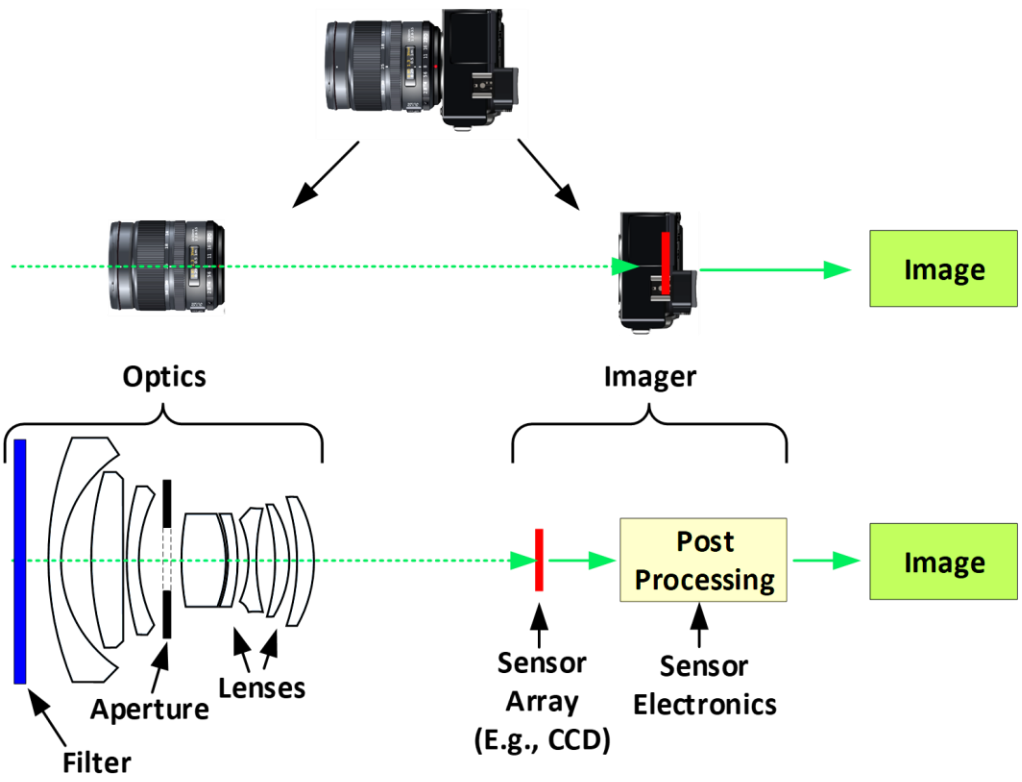

Figure 1: Imaging System

Individually, the Optics and Imager sub-systems provide a wealth of metadata; together the two combined as one system produces additional derivable metadata items called Conjunction metadata.

Overall, the Imager System informational groups are: Optics, Imager, Conjunction, and Administrative. The Optics and Imager group includes the Optics and Sensor sub-systems information described above. The Conjunction group is the union of information in combining the Optics and Sensor sub-systems. The Administrative group includes an Imager's identification and other management information.

With many Imager Systems different vendors build the Optics sub-system and the Imager sub-system, and neither knows about the other's metadata. The Imaging System integrator brings together the separate Optics and Imager groups as Conjunction and Administrative metadata.

7 Model Classes

Figure 2 shows the UML class diagram for the Imager System class. As discussed in Section 6 the model has four informational groupings: Optics, Imager, Conjunction, and Administrative. The Optics and Imager groupings are in the Optics class and Imager class, respectively. The Conjunction grouping is the combination of the FieldOfView and Calibration classes; these attributes cannot be determined until integration of the two sub-systems. The Administrative grouping is the combination of the attributes in the ImagerSystem class and the Motion Imagery Identification System (MIIS) class and its children.

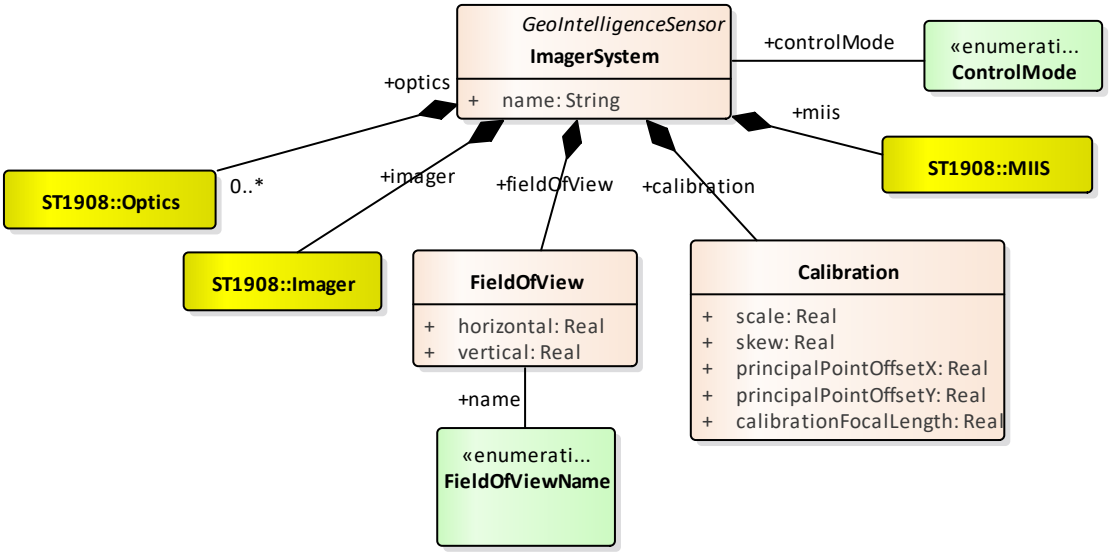

Figure 2: Imager System Class Model

Per discussion in MISB ST 1901, MIMD classes support the Report-On-Change (reference the Motion Imagery Handbook [3]) and include MIMD Base Attributes (see MISB ST 1904 [4]), which use attribute identifiers 1-32.

7.1 ImagerSystem Class

Table 2 lists the attributes for the ImagerSystem class.

Table 2: ImagerSystem Class Attributes (extends GeoIntelligenceSensor)

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	name	String	N/A	N/A	N/A	127	None	7.1.1
34	controlMode	ControlMode	N/A	N/A	N/A	N/A	None	7.1.2
35	optics	LIST<Optics>	--	--	N/A	N/A	None	7.1.3
36	imager	Imager	N/A	N/A	N/A	N/A	None	7.1.4
37	fieldOfView	FieldOfView	N/A	N/A	N/A	N/A	None	7.1.5
38	calibration	Calibration	N/A	N/A	N/A	N/A	None	7.1.6
39	miis	MIIS	N/A	N/A	N/A	N/A	None	7.1.7

7.1.1 Attribute 33 – name

The *name* attribute is the same as the UAS Datalink LS Item Tag 11 in MISB ST 0601 [5], which defines the Image Source Sensor.

7.1.2 Attribute 34 – controlMode

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

The *controlMode* attribute is the operational status of a sensor.

7.1.3 Attribute 35 – optics

This attribute is a list of Optics classes. Section 7.2 defines the Optics class.

7.1.4 Attribute 36 – imager

This attribute is a composite relationship to the Class Imager. Section 7.9 defines the Imager class.

7.1.5 Attribute 37 – fieldOfView

This attribute is a composite relationship to the Class FieldOfView. Section 7.7 defines the FieldOfView class.

7.1.6 Attribute 38 – calibration

This attribute is a composite relationship to the Class Calibration. Section 7.8 defines the Calibration class.

7.1.7 Attribute 39 – mIIS

This attribute is a composite relationship to the Class MIIS. Section 7.17 defines the MIIS class.

7.2 Optics Class

The Optics class describes information about a lens set, filters, aperture, and stabilization of the optics system. Figure 3 shows the UML for the Optics class and its children.

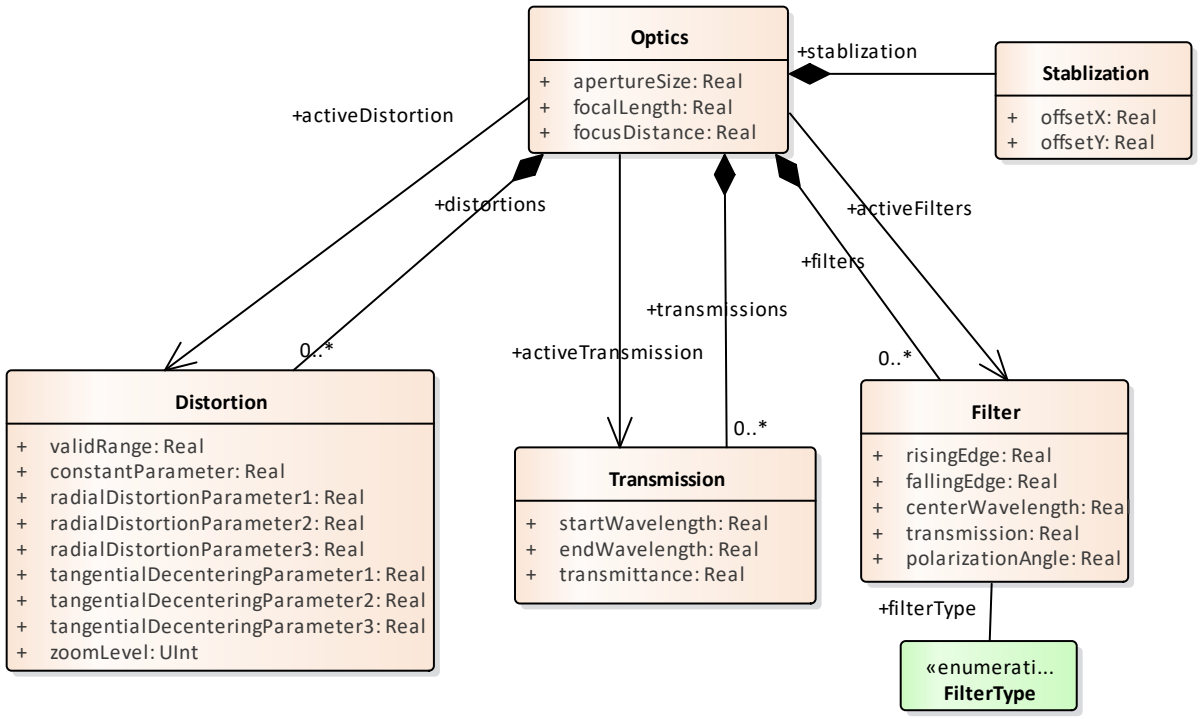

Figure 3: Optics Class

Table 3 lists the attributes for the Optics class.

Table 3: Optics Class Attributes[1]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	apertureSize	Real	0.0	100.0	1.0E-4	N/A	m	7.2.1
34	focalLength	Real	0.0	100.0	1.0E-4	N/A	m	7.2.2
35	activeDistortion	REF<Distortion>	N/A	N/A	N/A	N/A	None	7.2.3
36	activeTransmission	REF<Transmission>	N/A	N/A	N/A	N/A	None	7.2.4
37	activeFilters	REF<Filter>[]	N/A	N/A	N/A	N/A	None	7.2.5
38	focusDistance	Real	0.0	100.0	--	N/A	Km	7.2.6
39	distortions	LIST<Distortion>	--	--	N/A	N/A	None	7.2.7
40	transmissions	LIST<Transmission>	--	--	N/A	N/A	None	7.2.8
41	filters	LIST<Filter>	--	--	N/A	N/A	None	7.2.9
42	stabilization	Stabilization	N/A	N/A	N/A	N/A	None	7.2.10

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

7.2.1 Attribute 33 – apertureSize

The *apertureSize* attribute is the diameter size of the lens aperture. Computing the f-stop value requires both the diameter (d) and focal length (f), $f_{stop} = \frac{f}{d}$. Using, $d = \frac{f}{f_{stop}}$ computes the diameter (i.e., aperture size) from the focal length and f-stop value.

7.2.2 Attribute 34 – focalLength

The *focalLength* attribute is the optical focal length provided by the lens set.

7.2.3 Attribute 35 – activeDistortion

This attribute is a directed association (or reference) to Class Distortion. Section 7.3 defines the Distortion class.

The *activeDistortion* attribute references the current Distortion instance in use. The activeDistortion is a reference into the list in the Distortion class instances.

7.2.4 Attribute 36 – activeTransmission

This attribute is a directed association (or reference) to Class Transmission. Section 7.4 defines the Transmission class.

The *activeTransmission* attribute references the current Transmission instance in use. The activeTransmission is a reference into the list in the Transmission class instances.

7.2.5 Attribute 37 – activeFilters

This attribute is a directed association (or reference) to Class Filter. Section 7.5 defines the Filter class.

The *activeFilters* attribute is an array of references of filters in use. Each value in the array is a reference to an element in the Filters lists. All Filters identified in the activeFilters array are cumulative in the order specified in the array. The first filter in the array is closest to the detector group.

7.2.6 Attribute 38 – focusDistance

The *focusDistance* attribute is an estimated distance from the front of the lens to an in-focus object in the scene. Lenses may have tests performed to relate the lens's focus settings to the distance of an in-focus object. While using the lens, if the focus setting is known, the focusDistance is reportable. This value ranges from zero to the expected maximum hyper-focal distance of 100.0 Km.

7.2.7 Attribute 39 – distortions

This attribute is a list of Distortion classes. Section 7.3 defines the Distortion class.

7.2.8 Attribute 40 – transmissions

This attribute is a list of Transmission classes. Section 7.4 defines the Transmission class.

7.2.9 Attribute 41 – filters

This attribute is a list of Filter classes. Section 7.5 defines the Filter class.

7.2.10 Attribute 42 – stabilization

This attribute is a composite relationship to the Class Stabilization. Section 7.6 defines the Stabilization class.

7.3 Distortion Class

The Distortion class attributes describe the distortion parameters of a lens. If a system uses different discrete zoom levels, each zoom level will have different Distortion values. Table 4 lists the attributes for the Distortion class.

Table 4: Distortion Class Attributes[2]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	validRange	Real	--	--	--	N/A	mm	7.3.1
34	constantParameter	Real	--	--	--	N/A	mm/mm	7.3.2
35	radialDistortionParameter1	Real	--	--	--	N/A	mm/mm^3	7.3.3
36	radialDistortionParameter2	Real	--	--	--	N/A	mm/mm^5	7.3.4
37	radialDistortionParameter3	Real	--	--	--	N/A	mm/mm^7	7.3.5
38	tangentialDecenteringParameter1	Real	--	--	--	N/A	mm/mm^2	7.3.6
39	tangentialDecenteringParameter2	Real	--	--	--	N/A	mm/mm^2	7.3.7
40	tangentialDecenteringParameter3	Real	--	--	--	N/A	1/mm^2	7.3.8

7.3.1 Attribute 33 – validRange

MISB ST 0801 [6] section 6.4.5, titled Radial Distortion Metadata, defines Valid Range of Radial Distortion and four Radial Distortion Parameters.

7.3.2 Attribute 34 – constantParameter

Refer to the description of attribute 33, *validRange*, for the details of this attribute.

7.3.3 Attribute 35 – radialDistortionParameter1

Refer to the description of attribute 33, *validRange*, for the details of this attribute.

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

7.3.4 Attribute 36 – radialDistortionParameter2

Refer to the description of attribute 33, *validRange*, for the details of this attribute.

7.3.5 Attribute 37 – radialDistortionParameter3

Refer to the description of attribute 33, *validRange*, for the details of this attribute.

7.3.6 Attribute 38 – tangentialDecenteringParameter1

The MISB ST 0801 section 6.4.6, titled Tangential-Decentering, defines three Tangential / Decentering Parameters.

7.3.7 Attribute 39 – tangentialDecenteringParameter2

Refer to the description of attribute 38, *tangentialDecenteringParameter1*, for the details of this attribute.

7.3.8 Attribute 40 – tangentialDecenteringParameter3

Refer to the description of attribute 38, *tangentialDecenteringParameter1*, for the details of this attribute.

7.4 Transmission Class

The [Optical] Transmission class describes the transmission wavelengths for a lens. Table 5 lists the attributes for the Transmission class.

Table 5: Transmission Class Attributes[3]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	startWavelength	Real	0.0	1 000.0	1.00E-06	N/A	µm	7.4.1
34	endWavelength	Real	0.0	1 000.0	1.00E-06	N/A	µm	7.4.2
35	transmittance	Real	0.0	100.0	0.1	N/A	%	7.4.3

7.4.1 Attribute 33 – startWavelength

Each Transmission instance defines the *transmittance* amount of scene energy that will pass through the optics for the given wavelength range. The wavelength range is from the *startWavelength* to the *endWavelength*.

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

7.4.2 Attribute 34 – endWavelength

Refer to the description of attribute 33, *startWavelength*, for the details of this attribute.

7.4.3 Attribute 35 – transmittance

Refer to the description of attribute 33, *startWavelength*, for the details of this attribute.

7.5 Filter Class

The Filter class attributes describe an optical filter. The activeFilters array in the Optics class lists which filters are in use and the order of the filters. The Filter class provides options for diverse types of filtering methods. Table 6 lists the attributes for the Filter class.

Table 6: Filter Class Attributes[4]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	filterType	FilterType	N/A	N/A	N/A	N/A	None	7.5.1
34	risingEdge	Real	0.0	1 000.0	1.00E-06	N/A	µm	7.5.2
35	fallingEdge	Real	0.0	1 000.0	1.00E-06	N/A	µm	7.5.3
36	centerWavelength	Real	0.0	1 000.0	1.00E-06	N/A	µm	7.5.4
37	transmission	Real	0.0	100.0	0.1	N/A	%	7.5.5
38	polarizationAngle	Real	0.0	PI	1.0	N/A	rad	7.5.6

7.5.1 Attribute 33 – filterType

This attribute is an enumeration. Section 8.2 defines the FilterType enumeration.

The *filterType* attribute is an enumerated value to identify which filter the class instance represents. This class supports several types of filtering and their associated attributes.

For the Band Pass and Notch filters, the wavelength rising and falling edge values are the Full Width-Half Maximum (FWHM) values.

Figure 4 shows illustrations of the four wavelength-based filters. The blue line in each graph shows the transmittance level for the filter along with graph lines for 100%, 50% transmittance. Each graph also shows a “Pass Region” for wavelengths of light which pass through the filter.

[4] For consistency across the MIMD suite of documents, MISB ST 1901 defines the label designations for the columns in the attribute tables. Capitalized attribute table items (e.g., PI) are constant values listed in MISB ST 1901.

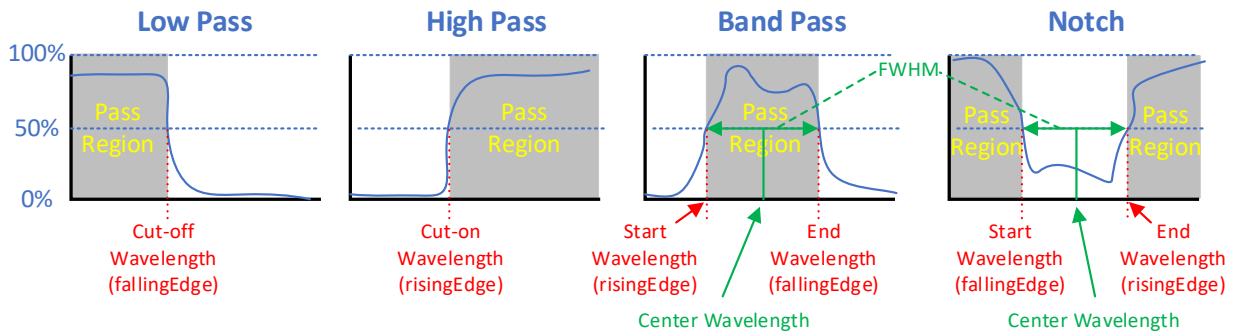

Figure 4: Four Wavelength-based Filters

With a Low Pass filter, the fallingEdge attribute defines the cut-off wavelength at 50% transmittance; the Low Pass filter does not use the risingEdge and centerWavelength, attributes.

With a High Pass filter the risingEdge attribute defines the cut-on wavelength at 50% transmittance; the High Pass filter does not use the fallingEdge and centerWavelength, attributes.

With a Band Pass filters, the risingEdge wavelength value is smaller than the fallingEdge value and the centerWavelength is middle wavelength of the pass region at FWHM. The transmission attribute value is the peak response value.

With a Notch filter, the fallingEdge is smaller than the risingEdge value and the centerWavelength is the middle wavelength of the blocking range at FWHM. The transmission attribute value is the minimum response value.

Table 7 summarizes the utilization of Filter class attributes for a given Filter instance type.

Table 7: Filter Types and their Class Attributes[5]

	Attributes				
Filter Name	Polarization	Rising Edge	Falling Edge	Center Wavelength	Transmission
Low Pass	Not defined	Not defined	Defined	Not defined	Defined
High Pass	Not defined	Defined	Not defined	Not defined	Defined
Band Pass	Not defined	Defined	Defined	Defined	Defined
Notch	Not defined	Defined	Defined	Defined	Defined
Polarization	Defined	Not defined	Not defined	Not defined	Not defined

7.5.2 Attribute 34 – risingEdge

The *risingEdge* and *fallingEdge* attributes define the bounds of the pass region of the filter. Depending on the filterType attribute, the risingEdge and fallingEdge define bands, notches, or high/low pass filters frequencies; see attribute 33.

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

7.5.3 Attribute 35 – fallingEdge

Refer to the description of attribute 34, *risingEdge*, for the details of this attribute.

7.5.4 Attribute 36 – centerWavelength

The *centerWavelength* attribute is the wavelength at the middle of the band pass region or middle of the notch region, depending on the type of filter; see attribute 33.

7.5.5 Attribute 37 – transmission

The *transmission* attribute is the ratio of the energy exiting the filter to the energy entering the filter (as a percentage) for the centerWavelength.

Requirement	
ST 1908-01	Every item in the Filters list shall include the filterType attribute.

7.5.6 Attribute 38 – polarizationAngle

The *polarizationAngle* attribute is the degree of rotation around the direction light is traveling toward the filter plane. A reference coordinate system with its origin at the center of the filter and the top of the filter plane aligning with the top of the sensor's detector group enables defining this angle. The orientation is the same as the GSCPO, so the positive x-axis extends from the origin outward in the direction the light comes from; the y-axis is on the filter plane with the positive axis pointing towards the right side of the filter when looking outward on the x-axis; and the z-axis is on the filter plane and completes the right handed system by pointing to the bottom of the filter plane. The polarizationAngle is a measure clockwise relative to the positive y-axis. Figure 5 illustrates a Polarization filter, the axes, and the polarizationAngle (i.e., Polarization Angle).

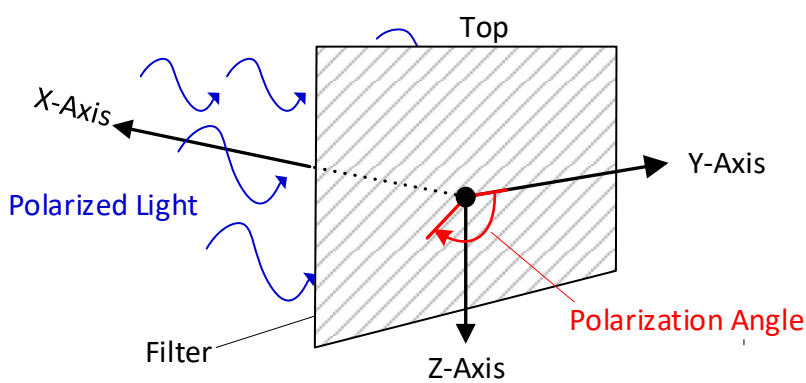

Figure 5: Polarization Filter Illustration

7.6 Stabilization Class

Table 8 lists the attributes for the Stabilization class.

Table 8: Stabilization Class Attributes[6]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	offsetX	Real	-100.0	100.0	1.00E-06	N/A	mm	7.6.1
34	offsetY	Real	-100.0	100.0	1.00E-06	N/A	mm	7.6.2

7.6.1 Attribute 33 – offsetX

The *offsetX* attribute is the amount of movement in the X direction of the lens for stabilization.

7.6.2 Attribute 34 – offsetY

The *offsetY* attribute is the amount of movement in the Y direction of the lens for stabilization.

7.7 FieldOfView Class

Table 9 lists the attributes for the FieldOfView class.

Table 9: FieldOfView Class Attributes[7]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	horizontal	Real	0.0	TWO_PI	1.7E-5	N/A	rad	7.7.1
34	vertical	Real	0.0	TWO_PI	1.7E-5	N/A	rad	7.7.2
35	name	FieldOfViewName	N/A	N/A	N/A	N/A	None	7.7.3

7.7.1 Attribute 33 – horizontal

The *horizontal* attribute is the same as the UAS Datalink LS Item Tag 16, in MISB ST 0601, but with the value's range expanded to a full 360 degrees.

7.7.2 Attribute 34 – vertical

The *vertical* attribute is the same as the UAS Datalink LS Item Tag 17, in MISB ST 0601, but with the value's range expanded to a full 360 degrees.

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

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

7.7.3 Attribute 35 – name

This attribute is an enumeration. Section 8.3 defines the FieldOfViewName enumeration.

The *name* attribute is the sensor's current lens name. This item is for generic guidance and does not correspond to a specific field of view value. Refer to other attributes for specific aperture angles.

7.8 Calibration Class

Table 10 lists the attributes for the Calibration class.

Table 10: Calibration Class Attributes[8]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	scale	Real	--	--	--	N/A	mm/mm	7.8.1
34	skew	Real	--	--	--	N/A	mm/mm	7.8.2
35	principalPointOffsetX	Real	--	--	--	N/A	mm	7.8.3
36	principalPointOffsetY	Real	--	--	--	N/A	mm	7.8.4
37	calibrationFocalLength	Real	--	--	--	N/A	mm	7.8.5

7.8.1 Attribute 33 – scale

MISB ST 0801 section 6.4.7, titled Affine Correction Metadata, defines Differential Scale Affine Parameter (*scale*) and Skewness Affine Parameter (*skew*).

7.8.2 Attribute 34 – skew

Refer to the description of attribute 33, *scale*, for the details of this attribute.

7.8.3 Attribute 35 – principalPointOffsetX

MISB ST 0801 section 6.4.4, titled Focal Plane Metadata, defines the Focal Plane Principal Point Offset X (*principalPointOffsetX*), Focal Plane Principal Point Offset Y (*principalPointOffsetY*), and the Sensor Calibrated / Effective Focal Length (*calibrationFocalLength*). The calibrationFocalLength is a computed focal length from a calibration process and may be a different value than the optical focal length.

7.8.4 Attribute 36 – principalPointOffsetY

Refer to the description of attribute 35, *principalPointOffsetX*, for the details of this attribute.

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

7.8.5 Attribute 37 – calibrationFocalLength

Refer to the description of attribute 35, *principalPointOffsetX*, for the details of this attribute.

7.9 Imager Class

The Imager class specifies information about the sensor, its timing, pixel filters, and post processing. Figure 6 shows the Imager Class and its children.

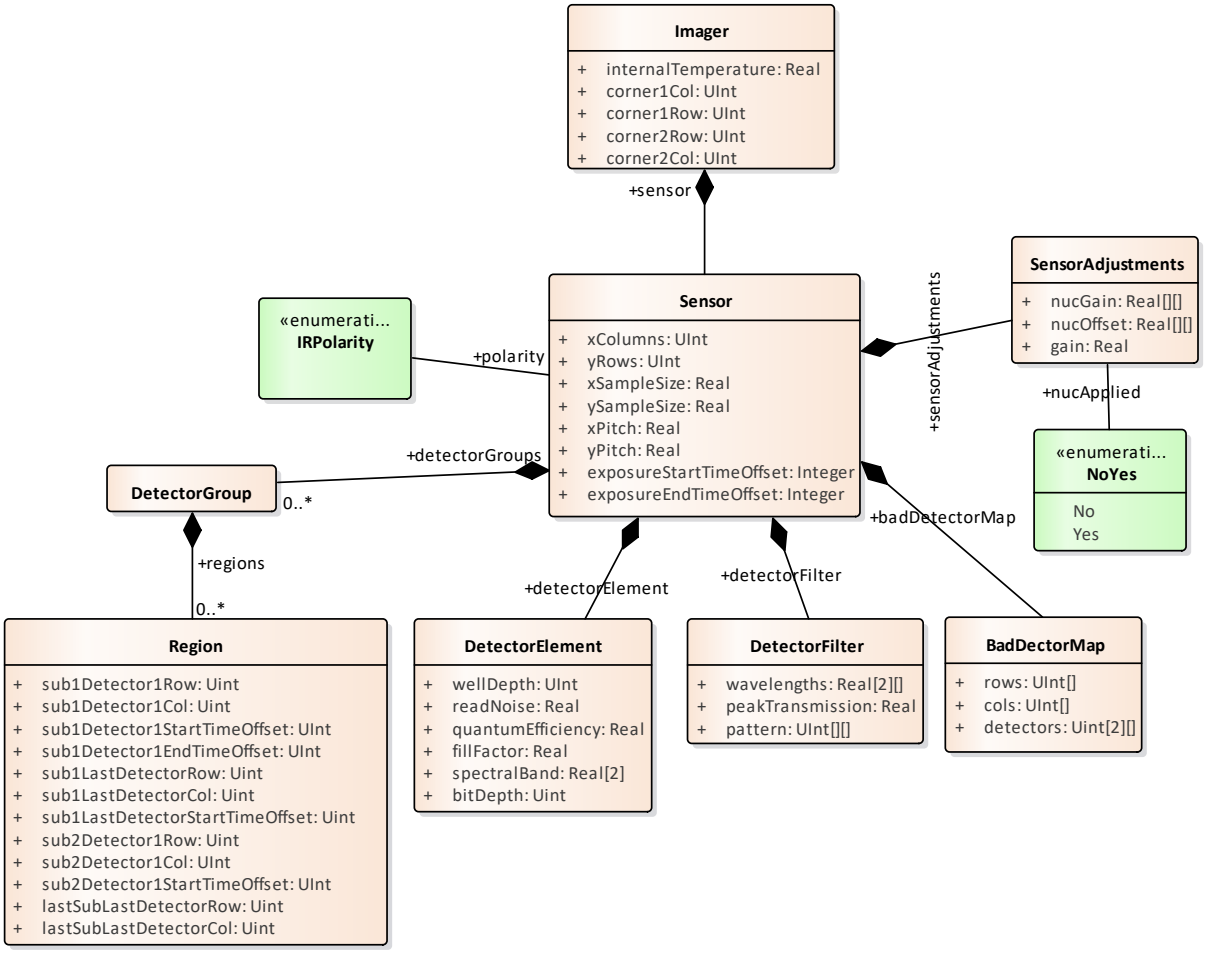

Figure 6: Imager Class

Table 11 lists the attributes for the Imager class.

Table 11: Imager Class Attributes[9]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	internalTemperature	Real	-274.0	127.0	1.0	N/A	°C	7.9.1
34	corner1Col	UInt	--	--	N/A	N/A	Pixels	7.9.2
35	corner1Row	UInt	--	--	N/A	N/A	Pixels	7.9.3
36	corner2Row	UInt	--	--	N/A	N/A	Pixels	7.9.4
37	corner2Col	UInt	--	--	N/A	N/A	Pixels	7.9.5
38	sensor	Sensor	N/A	N/A	N/A	N/A	None	7.9.6

7.9.1 Attribute 33 – internalTemperature

The *internalTemperature* attribute is the temperature of the Imager.

7.9.2 Attribute 34 – corner1Col

The corner 1 row and column (*corner1Row*, *corner1Col*) attributes along with the corner 2 row and column (*corner2Row*, *corner2Col*) attributes define a rectangular region in the post processed image which becomes the resulting image output from the Imager. The corner positions record the digital stabilization window the Imager electronics produce. The size of the window needs to match the size of the MISB ST 1907 [7] GeoIntelligence Class's nRows and nCols attributes.

Requirement	
ST 1908-02	Where the Imager class attributes corner1row, corner1col, corner2row, and corner2col are provided, the size of the window shall match the MISB ST 1907 GeoIntelligence class's nRows and nCols attributes when specified.

7.9.3 Attribute 35 – corner1Row

Refer to the description of attribute 34, *corner1Col*, for the details of this attribute.

7.9.4 Attribute 36 – corner2Row

Refer to the description of attribute 34, *corner1Col*, for the details of this attribute.

7.9.5 Attribute 37 – corner2Col

Refer to the description of attribute 34, *corner1Col*, for the details of this attribute.

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

7.9.6 Attribute 38 – sensor

This attribute is a composite relationship to the Class Sensor. Section 7.10 defines the Sensor class.

7.10 Sensor Class

Table 12 lists the attributes for the Sensor class. The Sensor class includes all information about the physical sensor and how it measures data.

Table 12: Sensor Class Attributes

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	polarity	ImagePolarity	N/A	N/A	N/A	N/A	None	7.10.1
34	xColumns	UInt	--	--	N/A	N/A	None	7.10.2
35	yRows	UInt	--	--	N/A	N/A	None	7.10.3
36	xSampleSize	Real	0.0	1 000.0	0.01	N/A	µm	7.10.4
37	ySampleSize	Real	0.0	1 000.0	0.01	N/A	µm	7.10.5
38	xPitch	Real	0.0	1 000.0	0.01	N/A	µm	7.10.6
39	yPitch	Real	0.0	1 000.0	0.01	N/A	µm	7.10.7
40	exposureStartTimeOffset	Integer	-1 000 000 000	1 000 000 000	N/A	N/A	ns	7.10.8
41	exposureEndTimeOffset	Integer	-1 000 000 000	1 000 000 000	N/A	N/A	ns	7.10.9
42	detectorGroups	LIST<DetectorGroup>	--	--	N/A	N/A	None	7.10.10
43	detectorElement	DetectorElement	N/A	N/A	N/A	N/A	None	7.10.11
44	detectorFilter	DetectorFilter	N/A	N/A	N/A	N/A	None	7.10.12
45	badDetectorMap	BadDetectorMap	N/A	N/A	N/A	N/A	None	7.10.13
46	sensorAdjustments	SensorAdjustments	N/A	N/A	N/A	N/A	None	7.10.14

7.10.1 Attribute 33 – polarity

This attribute is an enumeration. Section 8.4 defines the ImagePolarity enumeration.

The *polarity* attribute is an enumerated value depending on whether blacker (i.e., Black Hot) or whiter (i.e., White Hot) values indicate heat in an image.

7.10.2 Attribute 34 – xColumns

The *xColumns* and *yRows* attributes are the number of samples in the physical Sensor.

7.10.3 Attribute 35 – yRows

Refer to the description of attribute 34, *xColumns*, for the details of this attribute.

7.10.4 Attribute 36 – xSampleSize

The *xSampleSize* and *ySampleSize* attributes are the physical dimensions of a single sample in the sensor. The MIMD Model assumes the sample dimensions are homogeneous throughout the sensor.

7.10.5 Attribute 37 – ySampleSize

Refer to the description of attribute 36, *xSampleSize*, for the details of this attribute.

7.10.6 Attribute 38 – xPitch

The *xPitch* and *yPitch* are the distance in X and Y respectively between the center of the samples in the sensor.

7.10.7 Attribute 39 – yPitch

Refer to the description of attribute 38, *xPitch*, for the details of this attribute.

7.10.8 Attribute 40 – exposureStartTimeOffset

The *exposureStartTimeOffset* and *exposureEndTimeOffset* attributes are temporal offsets from the Sensor instance's Timer (plus Timer Offset) and indicates when the sensor starts and ends its exposure time. The vendor sets the exposureStartTimeOffset and exposureEndTimeOffset values only when the sensor uses global timing (a.k.a., global shutter). If using rolling shutter or some other sensor timing use the DetectorGroup to describe the timing. When the exposureStartTimeOffset and exposureEndTimeOffset values are set, the Detector Group classes are not used.

7.10.9 Attribute 41 – exposureEndTimeOffset

Refer to the description of attribute 40, *exposureStartTimeOffset*, for the details of this attribute.

7.10.10 Attribute 42 – detectorGroups

This attribute is a list of DetectorGroup classes. Section 7.11 defines the DetectorGroup class.

7.10.11 Attribute 43 – detectorElement

This attribute is a composite relationship to the Class DetectorElement. Section 7.13 defines the DetectorElement class.

7.10.12 Attribute 44 – detectorFilter

This attribute is a composite relationship to the Class DetectorFilter. Section 7.14 defines the DetectorFilter class.

7.10.13 Attribute 45 – badDetectorMap

This attribute is a composite relationship to the Class BadDetectorMap. Section 7.15 defines the BadDetectorMap class.

7.10.14 Attribute 46 – sensorAdjustments

This attribute is a composite relationship to the Class SensorAdjustments. Section 7.16 defines the SensorAdjustments class.

7.11 DetectorGroup Class

The DetectorGroup class specifies attributes for a non-global shutter Sensor, e.g., rolling shutter. Detector groups are sections of a Sensor using the same exposure configuration. See the Motion Imagery Handbook and MISB ST 1507 [8] for information on Detector Groups and Regions. The DetectorGroup class and Region class rely on the ST 1507 information and terminology. Table 13 lists the attributes for the DetectorGroup class.

Table 13: DetectorGroup Class Attributes[10]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	regions	LIST<Region>	--	--	N/A	N/A	None	7.11.1

7.11.1 Attribute 33 – regions

This attribute is a list of Region classes. Section 7.12 defines the Region class.

The *regions* list attribute is a list of all Regions in a Detector Group.

7.12 Region Class

The Region class has attributes to provide MISB ST 1507 Tuple information. ST 1507 defines four Tuples, Tuple 0 through Tuple 3. A Region uses two or more Tuples depending on the Region's exposure pattern. The Region class attributes contain all the information for the four Tuples, so for a specific Region style the appropriate Tuple information may be set. The Region instance's Timer Id and Timer Offset indicate the Reference Time as defined in Section 6.1.1 of ST 1507. Table 14 lists the attributes for the Region class.

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

Table 14: Region Class Attributes[11]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	sub1Detector1Row	UInt	--	--	N/A	N/A	Detectors	7.12.1
34	sub1Detector1Col	UInt	--	--	N/A	N/A	Detectors	7.12.2
35	sub1Detector1StartTimeOffset	UInt	--	--	N/A	N/A	ns	7.12.3
36	sub1Detector1EndTimeOffset	UInt	--	--	N/A	N/A	ns	7.12.4
37	sub1LastDetectorRow	UInt	--	--	N/A	N/A	Detectors	7.12.5
38	sub1LastDetectorCol	UInt	--	--	N/A	N/A	Detectors	7.12.6
39	sub1LastDetectorStartTimeOffset	UInt	--	--	N/A	N/A	ns	7.12.7
40	sub2Detector1Row	UInt	--	--	N/A	N/A	Detectors	7.12.8
41	sub2Detector1Col	UInt	--	--	N/A	N/A	Detectors	7.12.9
42	sub2Detector1StartTimeOffset	UInt	--	--	N/A	N/A	ns	7.12.10
43	lastSubLastDetectorRow	UInt	--	--	N/A	N/A	Detectors	7.12.11
44	lastSubLastDetectorCol	UInt	--	--	N/A	N/A	Detectors	7.12.12

7.12.1 Attribute 33 – sub1Detector1Row

The four attributes *sub1Detector1Row*, *sub1Detector1Col*, *sub1Detector1StartTimeOffset*, and *sub1Detector1EndTimeOffset* define Tuple 0, see MISB ST 1507.

7.12.2 Attribute 34 – sub1Detector1Col

Refer to the description of attribute 33, *sub1Detector1Row*, for the details of this attribute.

7.12.3 Attribute 35 – sub1Detector1StartTimeOffset

Refer to the description of attribute 33, *sub1Detector1Row*, for the details of this attribute.

7.12.4 Attribute 36 – sub1Detector1EndTimeOffset

Refer to the description of attribute 33, *sub1Detector1Row*, for the details of this attribute.

7.12.5 Attribute 37 – sub1LastDetectorRow

The three attributes *sub1LastDetectorRow*, *sub1LastDetectorCol*, and *sub1LastDetectorStartTimeOffset* define Tuple 1, see MISB ST 1507.

7.12.6 Attribute 38 – sub1LastDetectorCol

Refer to the description of attribute 37, *sub1LastDetectorRow*, for the details of this attribute.

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

7.12.7 Attribute 39 – sub1LastDetectorStartTimeOffset

Refer to the description of attribute 37, *sub1LastDetectorRow*, for the details of this attribute.

7.12.8 Attribute 40 – sub2Detector1Row

The three attributes *sub2Detector1Row*, *sub2Detector1Col*, and *sub2Detector1StartTimeOffset* define Tuple 2, see MISB ST 1507.

7.12.9 Attribute 41 – sub2Detector1Col

Refer to the description of attribute 40, *sub2Detector1Row*, for the details of this attribute.

7.12.10 Attribute 42 – sub2Detector1StartTimeOffset

Refer to the description of attribute 40, *sub2Detector1Row*, for the details of this attribute.

7.12.11 Attribute 43 – lastSubLastDetectorRow

The type attributes *lastSubLastDetectorRow* and *lastSubLastDetectorCol* define Tuple 3, see MISB ST 1507.

7.12.12 Attribute 44 – lastSubLastDetectorCol

Refer to the description of attribute 43, *lastSubLastDetectorRow*, for the details of this attribute.

7.13 DetectorElement Class

The DetectorElement class provides information about the individual energy measurement elements. This class states detector information expected to apply to all detectors throughout the array. Table 15 lists the attributes for the DetectorElement class.

Table 15: DetectorElement Class Attributes[12]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	wellDepth	UInt	--	--	N/A	N/A	Electrons	7.13.1
34	readNoise	Real	0.0	5 000.0	0.1	N/A	Electrons	7.13.2
35	quantumEfficiency	Real	0.0	100.0	0.1	N/A	%	7.13.3
36	fillFactor	Real	0.0	100.0	0.1	N/A	%	7.13.4
37	spectralBand	Real[2]	0.0	1 000.0	1.00E-06	N/A	µm	7.13.5
38	bitDepth	UInt	0	32	N/A	N/A	None	7.13.6

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

7.13.1 Attribute 33 – wellDepth

The *wellDepth* attribute is the maximum number of electrons the detector can measure before clearing the detector.

7.13.2 Attribute 34 – readNoise

The *readNoise* attribute is the average number of electrons spontaneously generated within the detector. For example, if the sensor system's lens cap is blocking light from the detector, there are electrons spontaneously measured in the detector.

7.13.3 Attribute 35 – quantumEfficiency

The *quantumEfficiency* attribute is the ratio of electrons measured by the detector to the number of photons hitting the detector.

7.13.4 Attribute 36 – fillFactor

The *fillFactor* attribute is the ratio of the photosensitive area of the detector surface to the full area of detector surface.

7.13.5 Attribute 37 – spectralBand

The *spectralBand* attribute is a range of wavelengths defining the responsivity region for the photodetector material. The first value is the minimum wavelength and the second value is the maximum wavelength.

7.13.6 Attribute 38 – bitDepth

The *bitDepth* attribute is the number of bits in the resulting detector measurement.

7.14 DetectorFilter Class

The DetectorFilter class defines the pattern of individual filters placed over each detector of the sensor (e.g., Bayer pattern). Each filter defines the minimum and maximum wavelengths of the end points of a band pass filter along with a transmission rate. For example, a pattern using three colors, red, green, and blue; each color has a starting and ending wavelength for the light passing through them, e.g., the red filter could range from 640nm to 750nm. Table 16 lists the attributes for the DetectorFilter class.

Table 16: DetectorFilter Class Attributes[12]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	wavelengths	Real[][2]	0.0	1 000.0	1.00E-06	N/A	µm	7.14.1
34	peakTransmission	Real[]	0.0	100.0	0.1	N/A	%	7.14.2
35	pattern	UInt[][]	--	--	N/A	N/A	None	7.14.3

7.14.1 Attribute 33 – wavelengths

The *wavelengths* attribute is a two-dimensional array with exactly two columns and a variable number of rows. The *peakTransmission* attribute is a one-dimensional array with the same number of rows as the wavelengths array.

The pattern array uses the row index to identify which filter is active for a given detector in the pattern. The columns of the wavelengths array are the starting wavelength and ending wavelengths for the band pass filter at Full Width Half Maximum (FWHM); the first column is the starting wavelength and the second column is the ending wavelength. The peakTransmission array defines a peak transmission rate at FWHM for each row in the wavelengths array. For example, if the detector pattern uses red, green, and blue filters, the wavelengths array defines three rows providing the starting and ending wavelength for each filter. Additionally, the peakTransmission array has three rows provides the peak transmission rate for each filter. Table 17 lists example red (row 0), green (row 1), and blue (row 2) filter wavelengths along with each filter's peak transmission.

Table 17: Wavelengths Array Example

Index	Wavelength Start	Wavelength End	Peak Transmission
0	0.600	0.750	80.0
1	0.495	0.600	90.0
2	.450	.495	70.0

The row indexes (0, 1, and 2) are values in the pattern table to identify which detector has which filter.

7.14.2 Attribute 34 – peakTransmission

Refer to the description of attribute 33, *wavelengths*, for the details of this attribute.

7.14.3 Attribute 35 – pattern

The *pattern* attribute is a two-dimensional array defining a pattern of detector filters. The filter pattern applies repeatedly across the whole sensor array. For example, Figure 7 illustrates a simple 2 x 2 Bayer pattern. This pattern repeats across the whole sensor array assigning these color filters to each detector. The numbers in the pattern are the rows indexes of the wavelengths and peakTransmission arrays.

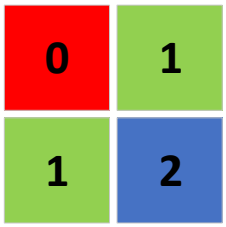

Figure 7: Example Bayer Pattern

7.15 BadDetectorMap Class

Sensor arrays may include non-functioning, or "bad" detectors. By identifying the "bad" rows and columns, individual detector adjustments are possible in post processing. Table 18 lists the attributes for the BadDetectorMap class.

Table 18: BadDetectorMap Class Attributes

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	rows	UInt[]	--	--	N/A	N/A	Detector	7.15.1
34	cols	UInt[]	--	--	N/A	N/A	Detector	7.15.2
35	detectors	UInt[2][]	--	--	N/A	N/A	Detector	7.15.3

7.15.1 Attribute 33 – rows

The *rows* attribute is an array of row numbers where the whole row in the sensor is "bad". For example, in a sensor array with rows 50, 610, and 913 producing no measurements because of a chip manufacturing defect, the rows array would consist of three elements: 50, 610, and 913.

7.15.2 Attribute 34 – cols

The *cols* attribute is an array of column numbers where the whole column in the sensor is "bad". See the rows attribute for similarity in the array construction. For example, in a sensor array with columns 13, 121, 470, and 851 producing no measurements because of a chip manufacturing defect, the cols array would consist of four elements: 13, 121, 470 and 851.

7.15.3 Attribute 35 – detectors

The *detectors* attribute is a two-dimensional array of row, column pairs that are the coordinates of "bad" detectors. The list represents a sparse matrix of "bad" detectors. The first row is the list of row coordinates; the second row is the list of column coordinates. For example, if the sensor has bad detectors at row/column pairs: (101, 13), (325, 27), (691, 231) the detectors array would contain three pairs of values as shown in Table 19.

Table 19: Bad Detector Sparse Array Example

Index	0	1	2
Row	101	325	691
Column	13	27	231

The detector array works in conjunction with the "bad" rows and "bad" cols attribute arrays. The detector array only contains elements not in "bad" rows or "bad" columns attribute arrays.

7.16 SensorAdjustments Class

Table 20 lists the attributes for the SensorAdjustments class.

Table 20: SensorAdjustments Class Attributes

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	nucGain	Real[][]	0.0	65 536.0	0.01	N/A	None	7.16.1
34	nucOffset	Integer[][]	-32 768	32 767	N/A	N/A	None	7.16.2
35	gain	Real	0.0	65 536.0	0.01	N/A	db	7.16.3
36	nucApplied	NoYes	N/A	N/A	N/A	N/A	None	7.16.4

7.16.1 Attribute 33 – nucGain

The Non-Uniform Correction (NUC) Gain (*nucGain*) and *nucOffset* attributes provide information for radiometric analysis. Both attributes are measures for each detector in the sensor, so there is one value per detector. The correction equation is linear: $y = mx + b$, where m is the nucGain, b is the nucOffset, and x is a sample value. The Max value enables the minimum sample value of one to have NUC correction to the above the maximum value of a 16-bit sample (i.e., 2^{16}).

7.16.2 Attribute 34 – nucOffset

Refer to the description of attribute 34, *nucGain*, for the details of this attribute.

7.16.3 Attribute 35 – gain

The *gain* attribute is the global gain for the whole sensor array.

7.16.4 Attribute 36 – nucApplied

This attribute is an enumeration. Section 8.5 defines the NoYes enumeration.

The *nucApplied* attribute states if the sensors measurements have NUC adjustments.

7.17 MIIS Class

The MIIS class and its children classes are the MIMD model version for the Motion Imagery Identification System (MIIS) (see MISB ST 1204 [9]). A MIIS identifier is either a Foundational Core Identifier or a Minor Core Identifier. Figure 8 shows the MIIS class and its children.

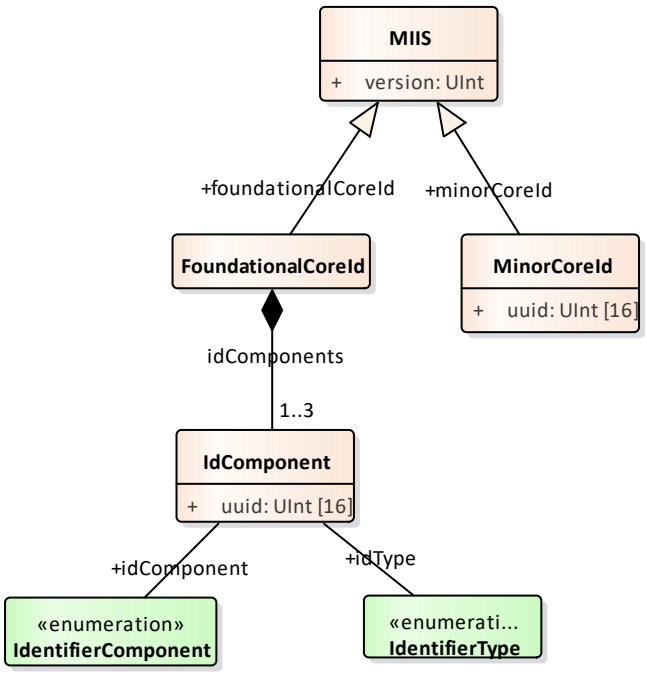

Figure 8: MIIS Class

Table 21 lists the attributes for the MIIS class.

Table 21: MIIS Class Attributes[8]

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	version	UInt	--	--	N/A	N/A	None	7.17.1
34	foundationalCoreId	FoundationalCoreId	N/A	N/A	N/A	N/A	None	7.17.2
35	minorCoreId	MinorCoreId	N/A	N/A	N/A	N/A	None	7.17.3

7.17.1 Attribute 33 – version

MISB ST 1204 section 7.2, titled "Version" defines the *version* attribute.

7.17.2 Attribute 34 – foundationalCoreId

This attribute is a specialization relationship to the MIIS class. Section 7.18 defines the FoundationalCoreId class.

7.17.3 Attribute 35 – minorCoreId

This attribute is a specialization relationship to the MIIS class. Section 7.20 defines the MinorCoreId class.

7.18 FoundationalCoreId Class

The FoundationalCoreId class is a list of up to three IdComponents: Platform Id, Sensor Id, and Window Id. See MISB ST 1204, section 6.1 for details. Table 22 lists the attributes for the FoundationalCoreId class.

Table 22: FoundationalCoreId Class Attributes (extends MIIS)

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	idComponents	LIST<IdComponent>	--	--	N/A	N/A	None	7.18.2

7.18.1 Attribute 33 – idComponent

This attribute is a composite relationship to the Class IdComponent. Section 7.19 defines the IdComponent Class.

7.18.2 Attribute 33 – idComponents

This attribute is a list of IdComponent classes. Section 7.19 defines the IdComponent class.

7.19 IdComponent Class

The IdComponent class is an identifier for a single device, i.e., Platform, Sensor, or Window. Table 23 lists the attributes for the IdComponent class.

Table 23: IdComponent Class Attributes

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	uuid	UInt[16]	0	255	N/A	N/A	None	7.19.1
34	idType	IdentifierType	N/A	N/A	N/A	N/A	None	7.19.2
35	idComponent	IdentifierComponent	N/A	N/A	N/A	N/A	None	7.19.3

7.19.1 Attribute 33 – uuid

The *uuid* attribute is a Universally Unique IDentifier, which is a 16-byte value generated using techniques described in MISB ST 1204.

7.19.2 Attribute 34 – idType

This attribute is an enumeration. Section 8.6 defines the IdentifierType enumeration.

The *idType* attribute defines the identifier "quality", physical, virtual, or managed. The IdentifierType Enumeration lists the valid values for the idType attribute, which match the bit values in MISB ST 1204.

7.19.3 Attribute 35 – idComponent

This attribute is an enumeration. Section 8.7 defines the IdentifierComponent enumeration.

The *idComponent* attribute defines the component the identifier represents, Platform, Sensor, or Window.

7.20 MinorCoreId Class

The MinorCoreId class is an identifier when Foundational Core Identifiers are not possible to generate, see MISB ST 1204. Table 24 lists the attributes for the MinorCoreId class.

Table 24: MinorCoreId Class Attributes (extends MIIS)

Id	Name	Type	Min	Max	Res	MLen	Units	Ref
33	uuid	UInt[16]	0	255	N/A	N/A	None	7.20.1

7.20.1 Attribute 33 – uuid

The *uuid* attribute is a Universally Unique IDentifier [10], which is a 16-byte value generated using techniques described in MISB ST 1204.

8 Model Enumerations

8.1 ControlMode Enumeration

With exception of the value 0 not included, the ControlMode enumeration matches the states in MISB ST 0601's UAS Datalink LS Item 126.

Table 25: Enumeration Values for ControlMode

Id	Name	Description
1	HomePosition	The sensor is in its 'home' or 'lock' position (e.g., locked for landing)
2	Uncontrolled	No person or system is controlling the sensor
3	ManualControl	A person is directing the sensor
4	Calibrating	The sensor is calibrating (e.g., pointing to NUC target)
5	Auto_Holding_Position	An autonomous system is controlling the sensor positioning which is in a holding mode pointing at a specific stationary ground position
6	Auto_Tracking	An autonomous system is controlling the sensor positioning which is tracking an object

8.2 FilterType Enumeration

Table 26: Enumeration Values for FilterType

Id	Name	Description
0	Low_Pass	Wavelengths below a value pass through the filter, the remaining wavelengths are blocked.
1	High_Pass	Wavelengths above a value pass through the filter, the remaining wavelengths are blocked.
2	Band_Pass	All wavelengths are blocked except a middle range of frequencies.
3	Notch	All wavelengths pass through the filter except a middle range which are blocked.
4	Polarization	The polarization of the light determines what light is passed/blocked.

8.3 FieldOfViewName Enumeration

Table 27: Enumeration Values for FieldOfViewName

Id	Name	Description
0	Narrowest	Narrowest view
1	Ultranarrow_x4	4x Ultranarrow view
2	Ultranarrow_x2	2x Ultranarrow view
3	Ultranarrow	Ultranarrow view
4	Narrow	Narrow view
5	Medium	Medium view
6	Wide	Wide view
7	Ultrawide	Ultrawide view
8	Ultrawide_x2	2x Ultrawide view
9	Ultrawide_x4	4x Ultrawide view
10	Widest	Widest View
11	Continuous_Zoom	Continuous Zoom (variable view)

8.4 ImagePolarity Enumeration

Table 28: Enumeration Values for ImagePolarity

Id	Name	Description
0	Black_Hot	Darker pixels indicate brighter object
1	White_Hot	Whiter pixels indicate brighter object

8.5 NoYes Enumeration

Table 29: Enumeration Values for NoYes

Id	Name	Description
0	No	Negative response
1	Yes	Positive response

8.6 IdentifierType Enumeration

Table 30: Enumeration Values for IdentifierType

Id	Name	Description
1	Managed	Device Identification inserted at control station
2	Virtual	Device Identification inserted by platform system
3	Physical	Device Identification inserted within the sensor

8.7 IdentifierComponent Enumeration

Table 31: Enumeration Values for IdentifierComponent

Id	Name	Description
0	Platform	Identifier is for a platform
1	Sensor	Identifier is for a sensor
2	Window	Identifier is for a sub-section of the motion imagery image